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LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT
(GASPARILLA AND ESTERO ISLANDS)

GENERAL REEVALUATION REPORT WITH ENVIRONMENTAL IMPACT STATEMENT

U. S. ARMY CORPS
OF ENGINEERS
Jacksonville District

LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT
WITH FINAL ENVIRONMENTAL IMPACT STATEMENT

SYLLABUS

1. The Lee County, Florida, Shore Protection Project was authorized by House Resolution dated December 15, 1970 and Senate Resolution dated December 17, 1970. As described in House Document 91-395, the authorized project provides for beach erosion control measures for the gulf shoreline of Gasparilla Island, Captiva Island and Estero Island in Lee County, Florida. The Captiva Island segment of the project has been constructed. The authorized project for the remaining two islands includes: beach restoration along 2.7-miles of shore, revetment along 2,400-feet of shore, and a 500-foot terminal groin on Gasparilla Island; and beach restoration along 4.6-miles of shore and a 600-foot terminal groin on Estero Island. The beaches are authorized for a 50-foot berm at elevation 4.0-feet MLW with a 1V:15H slope seaward of the crest to MLW and from there 1V:35H slope to intersection with the existing bottom. As authorized, the first cost for the two islands was $1,223,000 (1969 price level) for Gasparilla Island and $357,000 (1969 price level) for Estero Island. Of these, the Federal portion would be $418,300 and $44,800, respectively. Based on a 10-year life and 4 and 7/8% interest rate (1969), the average annual benefits were $154,700 for Gasparilla and $179,100 for Estero and the average costs were $122,700 and $130,400, respectively. Benefit to cost ratios were 1.3 to 1 for Gasparilla Island and 1.4 to 1 for Estero Island.

2. The recommended project for the two islands has been modified. For Gasparilla Island, initial restoration and periodic nourishment would be provided for 2.8-miles of shoreline. Renourishment would be accomplished at seven-year intervals. The recommended design template incorporates a 20-foot berm with an elevation of +5-feet MLW, a foreshore slope of 1V:15H transitioning to a nearshore slope of 1V:25H at MLW extending out to the intersection with the existing profile. The terminal groin and revetment were not justified. For Estero Island, initial restoration and periodic nourishment would be provided for 4.7-miles of shoreline. Renourishment would be accomplished at three-year intervals. The recommended design template incorporates a 40-foot berm with an elevation of +5-feet M.LW., a foreshore slope of 1V:25H transitioning to a nearshore slope of 1V:35H at M.L.W. extending out to the intersection with the existing profile. A 240-foot long rubblemound groin (with vinyl sheet pile core) would be placed at the northern end of the island. The borrow area for Gasparilla Island is located directly offshore of the southwestern portion of the island. For Estero Island, the borrow area is located approximately 16-miles northwest of the island. The non-Federal sponsor for the shore protection project will be the Lee County Board of County Commissioners, as is demonstrated by their letter of intent dated June 25, 1999.

3. The estimated combined cost of the recommended project would be $19,746,900 of which $5,069,500 would be for Gasparilla Island and $14,677,400 for Estero Island (these include Interest During Construction of $355,000 and $937,100 respectivley). Cost sharing would be 58.7 percent Federal and 41.3 percent non-Federal on Gasparilla Island and 63.5 percent Federal, 36.5 non-Federal on Estero Island. The average annual equivalent cost for each island (including renourishment and interest during construction) would be $711,400 for Gasparilla Island and $2,494,900 for Estero Island. Average annual storm damage benefits would be $2,005,800 for Gasparilla Island and $5,808,600 for Estero Island, resulting in benefit to cost ratios of 2.8 and 2.3, respectively without recreation. Including recreation provides average annual benefits of $2,260,000 for Gasparilla and $5,985,000 for Estero with respective BC ratios of 3.2 and 2.4. These numbers are based on FY 01's interest rate of 6.375%

4. In a letter dated May 10, 2000 the Lee County Board of Commissioners requested support from the Assistant Secretary of the Army, Civil Works, (ASA(CW)) to obtain approval in constructing these two segments of the project as reimbursable projects under Section 206 of the Water Resources Development Act (WRDA) of 1992. The ASA(CW) replied in a letter dated September 15, 2000 that the Corps of Engineers would not be able to transmit that support under current Administration policy; Congressional direction would be required. Section 309 of WRDA 2000 modifies the existing authorization of the Gasparilla and Estero Island segments of the Lee County, Florida Shore Protection Project to allow the Secretary to enter into an agreement with non-Federal interests in accordance with Section 206 of WRDA 1992. Provided that the Secretary determines that the project is technically sound, environementally acceptable, and economically justified. This allows the sponsor to construct the project and seek Federal reimbursement.

5. The selected project modifications presented in this report were demonstrated to be be economically feasible, environmentally acceptable, and soundly engineered. The selected project modifications are recommended for construction.

GENERAL REEVALUATION REPORT
SHORE PROTECTION PROJECT
GASPARILLA ISLAND AND ESTERO ISLAND PROJECT ELEMENTS
PERTINENT DATA

Physical Data:	Gasparilla Island	Estero Island
Length of Fill (mi.)	2.8	4.7
Volume of Nourishment (1,000 -cubic yards.)	786	791
Shoreline Extension (ft)	20	40
Berm Height (ft. above NGVD)	5	5
Renourishment Volume (1,000 – cubic yards)	542	244
Nourishment Interval (yrs.)	7	3
Terminal Groin, Length in Feet,	0	240
Height (ft. above MLW)	0	6
Borrow Area Location	Immediately Adjacent to Island	16 Mi Nrthwst of Island
Financial Data ($1,000 October 2000 Pricing Level):		
Periodic Renourishment Cost	3,175	4,836
Initial Construction Cost	4,714[2]	13,740[1]
Investment Cost (w/ IDC)	5,069[2]	14,677[1]
Annual Cost	711	2,495
Annual Benefits		
Damage Reduction	1,596	5,497
Loss of Land	410	312
Recreation	254	176
Total	2,260	5,985
Net Benefits ($1,000)	1,549	3,490
Benefit-to-Cost Ratio w/o recreation	2.8	2.3
Benefit-to-Cost Ratio w/ recreation	3.2	2.4
Interest Rate (%)	6.375	6.375
Cost Apportionment of 2001 Construction ($1,000)		
Federal	2,769 (58.7%)	8,721 (63.5%)
Non-Federal	1,945 (41.3%)	5,019 (36.5%)

(1) Includes Cost of Terminal Groin ($290,700)
(2) Includes Cost of Reef Mitigation ($305,500)

LEE COUNTY
GENERAL REEVALUATION REPORT
SHORE PROTECTION PROJECT
GASPARILLA ISLAND AND ESTERO ISLAND PROJECT ELEMENTS

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LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT
WITH FINAL ENVIRONMENTAL IMPACT STATEMENT

INTRODUCTION

1. This report summarizes the general reevaluation of the Federally authorized shore protection project for Lee 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 problems. Studies were conducted to see if modifications or enhancements to the existing Federal shore protection project are feasible. The project consists of three areas located on the Gasparilla, Captiva, and Estero Islands, respectively. This report focuses on the Gasparilla and Estero segments, as the Captiva Island sponsor (Captiva Island Erosion Prevention District) has already constructed the Captiva Island segment under the provisions of Section 215 of Public Law (PL) 90-483. A Project Cooperation Agreement was executed September 1, 1988.

2. Lee County is located on the lower Gulf Coast of Florida, about 90-miles south of the entrance to Tampa Bay and about 130-miles north of Key West. The 44-mile Gulf coastline consists of all or part of seven (7) coastal barrier islands and several smaller islands separated from the mainland by shallow tidal lagoons. Gasparilla Island is a narrow, low island about 6.7-miles long bounded on the north by Gasparilla Pass and on the south by Boca Grande Pass. The southerly 5-miles of the island lie in Lee County. The island varies in width from about 800-feet near the middle to about 2,900-feet near the south end. Natural ground elevations are generally under 10-feet MLW. Port Boca Grande, the deep-water port of Charlotte Harbor, is on the southeast shore of Gasparilla Island just inside the harbor entrance. The town of Boca Grande, well known for sport fishing, is on Gasparilla Island, 2-miles north of Port Boca Grande. Shore front development, including many expensive houses, is almost continuous along the town's one-mile gulf front. Access to Gasparilla Island is by toll causeway from the mainland across Gasparilla Sound.

3. The gulf shoreline of Estero Island is about 7.0-miles in length. The island varies in width from about 400-feet at the north end to about 3,800-feet near the south end. Natural ground elevations are between 5 and 10-feet MLW. The community of Ft. Myers Beach occupies the island. It, too, is a highly developed resort and residential community. Access to Estero Island is by a bridge over Matanzas Pass from the mainland and a causeway from the barrier islands to the south. The project area is shown on Figure 1.

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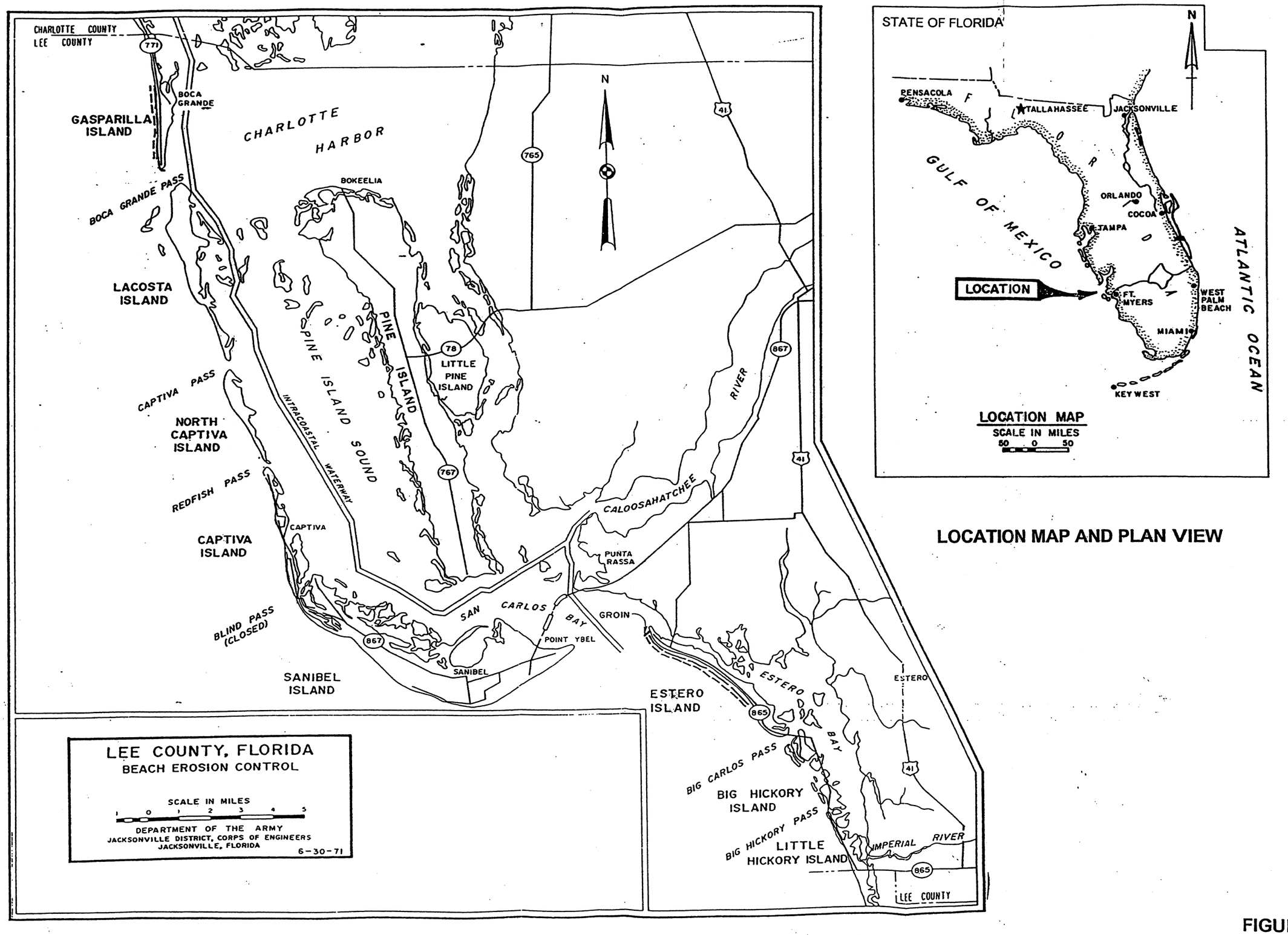


LOCATION MAP AND PLAN VIEW

FIGURE 1

STUDY AUTHORITY

4. The Lee County Shore Protection Project, as described in House Document 91-395, was authorized by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The authorized project includes shore protection features on Gasparilla, Captiva, and Estero Islands. The Captiva Island segment of the authorized project has been constructed, and this report only deals with the remaining two islands. The Energy and Water Appropriations Acts for Fiscal Years 1995 through 1999 provided Federal appropriations for preconstruction engineering and design studies to determine the need and Federal interest in modifications to the authorized shore protection project on Gasparilla and Estero Islands.

PURPOSE AND SCOPE

5. This report is of feasibility scope and contains an Engineering Appendix suitable for preparing plans and specifications for the project. Modifications to the authorized project which have the potential of reducing the average annual equivalent cost of project implementation were considered. Due to funding and scheduling, existing conditions within the study area changed enough to warrant a reevaluation of the Federal project before construction. The selected plan and proposed cost sharing apportionment presented in the report reflect current data pertinent to shoreline positions, shore ownership and use, real estate valuations, geotechnical investigations, environmental issues, and estimated project costs. Contingent upon approval of the reporting officer's recommendations, preparation of plans and specifications and subsequent construction of the project will be subject to availability of Federal and non-Federal sponsor funds and will be subject to Department of the Army policy, guidance, and regulations.

THE AUTHORIZED PROJECT

PROJECT AUTHORITY

6. The Lee County, Florida, Beach Erosion Control Project was authorized under the provisions of Section 201 of the 1965 Flood Control Act by Senate Resolution dated December 17, 1970, and House Resolution dated December 15, 1970. The authorized project provides for Federal participation in beach erosion control measures for the gulf shoreline of Gasparilla Island, Captiva Island, and Estero Island in Lee County, Florida. The Captiva Island segment of the authorized project has been constructed.

DESCRIPTION

GASPARILLA ISLAND

7. There are three features of the authorized project for Gasparilla Island: 1) beach restoration, 2) revetment and 3) terminal groin.

8. Beach Restoration. The beach restoration feature of the Gasparilla Island segment of the authorized shore protection project for Lee County, Florida provides for initial restoration and periodic nourishment of 2.7-miles (14,000-feet) of gulf shoreline extending south from 15th Street on Gasparilla Island. The berm width will be 50-feet at elevation 4-feet above MLW. The restored beach would have a slope of 1 on 15 from berm crest to MLW and then 1 on 35 from MLW to the intersection with the existing bottom. Periodic nourishment would be provided when needed to restore the beach to desired dimensions, with Federal participation limited to the first ten years of project life after completion of the initial fill replacement. The estimated volume of material required for initial restoration was 700,000-cubic yards.

9. Revetment. The revetment feature of the Gasparilla Island segment of the authorized shore protection project for Lee County, Florida provides for a 2,400-foot revetment, with a crest elevation of 5-feet above MLW. This structure would extend about 2,050-feet around the gulf shoreline and 350-feet around the bay side of the southerly tip of Gasparilla Island. The northwesterly end of the revetment will commence at the southern terminus of the beach fill. The estimated volume of materials were as follows: 12,700 tons capstone; 13,800 tons filter and bedding stone and 5,400-cubic yards excavation and fill.

10. Terminal Groin. The terminal groin feature of the Gasparilla Island segment of the authorized shore protection project for Lee County, Florida provides for a 600 foot rubble mound terminal groin with a sand tight core at the southerly end of Gasparilla Island. The crest elevation of the landward end of the groin will be at elevation 4-feet above MLW and extend to elevation 2.1-feet above MLW at the seaward end. The estimated volume of materials were as follows. 2,600 tons capstone and 2,700 tons core and bedding stone.

ESTERO ISLAND

11. There are two features of the authorized project for Estero Island: 1) beach restoration and 2) terminal groin.

12. Beach Restoration. The beach restoration feature of the Estero Island segment of the authorized shore protection project for Lee County, Florida provides for initial restoration and periodic nourishment of 4.6-miles (24,300-feet) of the northernmost gulf shoreline of Estero Island. The design dimensions of the restored beach will be the

same as described for Gasparilla Island. Also, as with the authorized Gasparilla Island beach restoration, periodic nourishment would be provided when needed to restore the beach to desired dimensions, with Federal participation limited to the first ten years of project life after completion of the initial fill placement. The estimated volume of material for initial restoration was 325,000-cubic yards.

13. Terminal Groin. The terminal groin feature of the Estero Island segment of the authorized shore protection project for Lee, County, Florida provides for a 600-foot rubble mound terminal groin with a sand tight core at the northerly end of Estero Island. The crest elevation of the landward end of the groin will be at elevation 4-feet above MLW and extend to elevation 3.0-feet above MLW at the seaward end. The estimated volumes of materials were as follows: 1,900 tons capstone and 1,200 tons core and bedding stone.

ITEMS OF LOCAL COOPERATION

The items of cooperation specified in the Chief of Engineers report of May 21, 1970 were as follows:

> "a. Contribute in cash the following percentages of the first costs (including contract price, engineering and design, and supervision and administration, and excluding the costs of lands, easements, rights-of-way, and relocations) all items of work to be provided by the Corps of Engineers, the amounts as presently estimated being listed below, to be paid in a lump sum prior to start of construction, or in installments prior to start of pertinent work items in accordance with construction schedules as required by the Chief of Engineers, the final apportionment of cost to be after the actual costs have been determined:
>
> (1) 65.8 percent, now estimated at $804,700, of the first cost at Gasparilla Island;
>
> (2) 91.3 percent, now estimated at $1,524,700, of the first cost at Captiva Island; and,
>
> (3) 87.5 percent, now estimated at $312,200, of the first cost at Estero Island;
>
> b. Contribute in cash toward beach nourishment for the first 10 years of project life the following amounts: 95.5 percent, now estimated at $53,100 annually, for Gasparilla Island; 91.3 percent, now estimated at $67,700 annually, for Captiva Island; and 96.9 percent, now estimated at $107,700 annually, for Estero Island; such nourishment costs for the first 5-year period of the project to be included for advance nourishment with the project first costs required in item a above, and following contributions to be made prior to each nourishment operation;

c. Contribute in cash 50.9 percent, now estimated at $500 annually, of the annual maintenance costs of the revetment on Gasparilla Island and 36.8 percent, now estimated at $40 annually, of the annual maintenance costs of the terminal groin on Estero Island, such contribution to be made prior to project construction in a lump sum equivalent to the present worth of the maintenance costs during the economic life, presently estimated at $9,300 for the revetment at Gasparilla Island and $700 for the groin at Estero Island;

d. Provide, after the first 10 years of project life, periodic nourishment of the restored beach at Gasparilla Island, Captiva Island, and Estero Island during the project life of the works, as may be required to serve the intended purpose;

e. Provide, at their own expense all necessary lands, easements, rights-of-way, and relocations required for construction and subsequent nourishment and maintenance of the project;

f. Assure continued public ownership for public use of the shore upon which the amount of Federal participation is based, and its administration for public use during the project life of the works;

g. Control water pollution that would endanger the health of bathers;

h. Hold and save the United States free from claims for damages that may result from construction, nourishment, or maintenance of the improvement; and

i. As a requirement for Federal participation in the costs of construction and nourishment of any additional beaches converted from private ownership to public ownership or use prior to construction, provide an adequate width of beach with acceptable access and other facilities necessary for public use."

PREVIOUS PROJECT MODIFICATIONS

CHANGES TO PROJECT FEATURES

14. With the exception of the Captiva Island segment, the authorized project has yet to be constructed. One aspect of this report is to evaluate the authorized project with respect to the design features. Certain aspects of the project such as berm height, berm width and length of fill are re-optimized due to changing existing conditions. The results of this process are presented in the "Proposed Modifications - NED Plan" section of this report.

CHANGES TO THE ITEMS OF LOCAL COOPERATION

15. Since original authorization in 1970 changes in law and budget priorities have occurred. This results in certain changes or additions/deletions to the items of local cooperation; the "Recommendations" section of this report contains the latest set of "Items of Local Cooperation".

PROJECT SPONSORSHIP

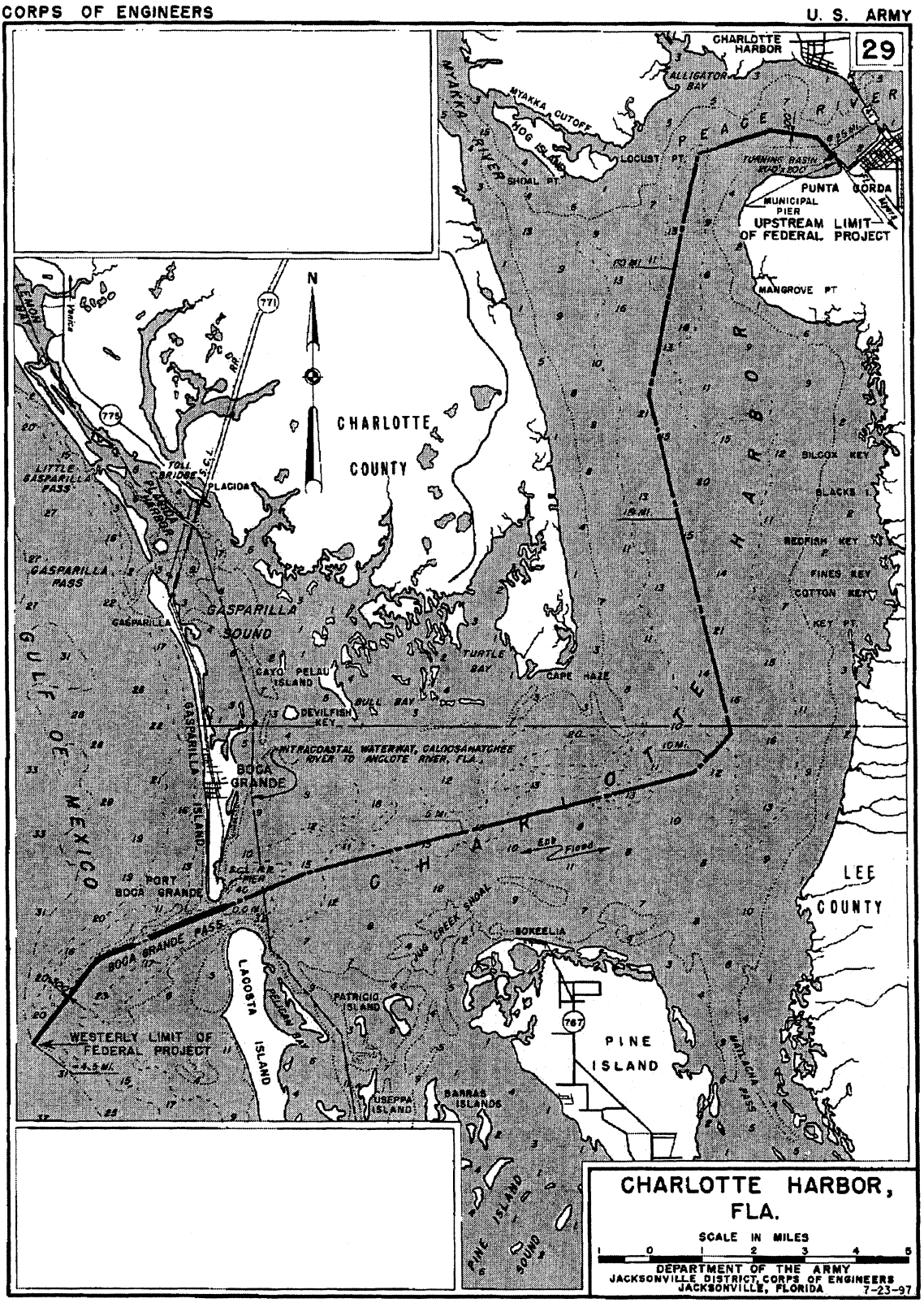
16. The local sponsor for this project is the Lee County Board of County Commissioners. A copy of their letter, dated June 25, 1999, can be found in the "Pertinent Correspondence" appendix of this report. Section 309 of the Water Resources Development Act of 1992 modifies the existing authorization of the Gasparilla and Estero Island segments of the Lee County, Florida Shore Protection Project to allow the Secretary to enter into an agreement with non-Federal interests in accordance with Section 206 of WRDA 1992. Provided that the Secretary determines that the project is technically sound, environementally acceptable, and economically justified. This allows the sponsor to construct the project and seek Federal reimbursement.

OTHER FEDERAL PROJECTS

17. Navigation Projects. Federal navigation works are defined as projects or features thereof that have been specifically authorized by the Congress in a River and Harbor Act or by the Chief of Engineers under the authority of Section 201 of the Flood Control Act of 1965, or Section 107 of the River and Harbor Act of 1960, as amended. These include projects or project features built by non-Federal entities that have been adopted as Federal navigation projects. A Federal navigation project for Charlotte Harbor was completed in 1959. The navigation project provides for an entrance channel 32-feet deep and 300-feet wide, increased to 700-feet wide at the bend, from the Gulf of Mexico to Port Boca Grande, thence 10-feet deep and 100-feet wide from deep water at Boca Grande to and including a turning basin 200-feet square at the municipal terminal at Punta Gorda about 25-miles northeast. A map of the Federal navigation project for Charlotte Harbor is shown in Figure 2.

18. The Charlotte Harbor navigation channel has been dredged a number of times since its completion in 1959. The maintenance dredging history for the channel is tabulated in Table 1. Information provided in Table 1 includes the date and location of the maintenance dredging operation, the quantity of dredged material removed, and the disposal site of the dredged material. Based on the dredging history provided in Table 1, an annual shoaling rate for the entrance channel is calculated to be approximately 155,500 cubic yards. Also, the channel is dredged, on the average, every two years.

Figure 2 – Map of Federal Navigation Project



19. Beach Erosion Control Projects. The Lee County project, as referenced in House Document No. 91-395, was authorized under the provisions of Section 201 of the 1965 Flood Control Act by Senate Resolution dated December 17, 1970, and House Resolution dated December 15, 1970. The authorized project provides for Federal participation in beach erosion control measures for the gulf shoreline of Gasparilla Island, Captiva Island, and Estero Island, in Lee County, Florida.

20. A limited reevaluation study of the Captiva segment of the Federal project was completed by the U.S. Army Corps of Engineers and summarized in a report dated October 1987. That report reaffirmed that a protective beach and periodic nourishment was the National Economic Development (NED) Plan. Preconstruction, planning engineering and design studies for the Captiva Island segment of the beach erosion control project were conducted and a preconstruction report was prepared by the local project sponsor, the Captiva Island Erosion Prevention District. Approval for the non-Federal sponsor to construct the project with subsequent Federal reimbursement, under the provisions of Section 215 of Public Law 90-403, was provided by the Assistant Secretary of the Army (Civil Works) on August 31, 1988.

21. Construction of the Captiva Island segment of the Federal shore protection project by the non-Federal project sponsor was completed in May 1989. Lee County passed a Board Resolution on May 23, 1990 expressing an interest in the construction of the Gasparilla and Estero Island segments of the Federal shore protection project. A copy of the Lee County Resolution is available upon request.

TABLE 1
MAINTENANCE DREDGING HISTORY FOR CHARLOTTE HARBOR

Date of Dredge	Shoaling Location	Quantity (yd^3)	Disposal Site
April 1971	-4.5mi to 0.0 mi	129,027	Offshore
July 1973	"	509,069	Offshore
January 1975	"	238,186	Offshore
April 1975	"	47,500	Offshore
August 1976	"	93,000	Offshore
April 1978	"	352,361	Offshore
February 1980	"	238,784	Offshore
September 1981	"	216,062	Beach (1)
November 1983	"	227,000	Offshore
August 1985	"	436,377	Offshore
February 1988	"	222,500	Offshore
May 1993	"	438,000	Beach (1)
April 1997	"	245,600	Beach (1)

(1) This material was disposed of on the gulf shoreline of Gasparilla Island.

PRIOR NON-FEDERAL CORRECTIVE ACTION

22. Prior corrective action to provide protection from erosion has been primarily limited to the construction of groins, seawalls, and the provision of beach fill by local interests. At Gasparilla Island, approximately 1.6-miles of shoreline have been armored to protect structures upland within the 3.6 mile problem area. Private property owners have constructed two sheetmetal groins, 5 timber groins, 13 permeable concrete groins, 22 stone groins, and about 8,200 linear feet of seawalls. Approximately 1,100 linear feet of the seawalls are of timber construction. The remaining 7,100-feet are made of concrete.

23. Near the southern end of Gasparilla Island, Lee County constructed nearly 700 linear feet of concrete seawall in efforts to prevent undermining of the county shoreline highway. Rock riprap has been dumped to protect a portion of the county highway which was damaged during the offshore passage of Hurricane Gladys in October 1968. A temporary timber bulkhead was also erected by the county and 500 cubic yards of backfill was reportedly provided until permanent repairs could be accomplished.

24. As mentioned previously, in 1981, 1993 and 1997 the Federal government, in cooperation with State and County officials, disposed of approximately 899,700 cubic yards of maintenance material on the gulf shoreline of Gasparilla Island near Boca Grande Park. The purpose of disposing of this material on the beach was to alleviate the erosion problems near the park and provide recreational enjoyment for the tourists and local citizens. This fill created a very substantial beach in front of Boca Grande Park. Over the course of time, however, the shoreline has receded back to its initial pre-disposal location.

25. Other corrective action included construction of a terminal groin at the southern tip of the island in 1982. This terminal groin was built to reduce the beach erosion in the area resulting from strong flood and ebb tides passing through Boca Grande Pass. The Florida Power and Light oil unloading and storage facility and the Boca Grande Lighthouse are located at the southern tip of the island.

PROJECT DESIGN AND ECONOMIC EFFICIENCY

INTRODUCTION

26. The process that has evolved on a Federal level to assist in the formulating and evaluating water resource projects, or modifications to authorized projects, is the National Economic Development objective, or NED. The underlying fundamental economic problem is that we cannot do everything. The NED principle is a policy developed to guide Federal water resource planners in their choice of problem

solutions. Choice is the fundamental business of economics. Because all resources are scarce, we are forced to make choices when they are used. Choose more of one thing and you are simultaneously choosing less of another. The process of developing a plan for the use of a water resource is an exercise in dealing with the fundamental problem of scarcity. The NED principle ensures that a project will be constructed only if the project outputs - the benefits to the Nation from the use of the resource - exceeds the cost of using it. Planning for Federal water resource projects, or modifications to existing projects, is an iterative process involving six major steps. The steps are as follows:

- SPECIFY PROBLEMS AND OPPORTUNITIES
- INVENTORY AND FORECAST CONDITIONS
- FORMULATE PROJECT MODIFICATIONS
- EVALUATE EFFECTS OF THE PROPOSED PROJECT MODIFICATIONS
- COMPARE PROPOSED PROJECT MODIFICATIONS
- SELECT A RECOMMENDED PROJECT MODIFICATION PLAN

PROBLEMS AND OPPORTUNITIES

27. The coastline of Lee County consists of coastal barrier islands separated from the mainland by shallow tidal lagoons. Problems in this area consist of beach erosion, shoreline receding and property damage from tidal flooding and wave action during seasonal storms and hurricanes. The focus of this study is confined to Gasparilla and Estero Islands in Lee County. Gasparilla Island lies partially in Charlotte County. Captiva Island, which is an element of the authorized Lee County Shore Protection Project, was constructed in 1989 and renourished in 1977.

28. Erosion of the shoreline has been a continuous problem in Lee County. Major damages are the result of severe storms which occasionally sweep across the Gulf of Mexico impacting the Lee county shoreline. These storms have caused severe erosion and damage by undermining and destroying structures. Sections of public roads have been either washed out, undermined or abandoned.

29. Local efforts at storm damage protection by various methods has been largely ineffectual. Construction of either shore or terminal groins have not provided the desired protective beach width. Construction of revetments, seawalls, and other types of coastal armor have had mixed results in terms of providing protection to upland development. The absence of sand in the nearshore littoral system has greatly reduced the effectiveness of the protective nature of a natural beach and dune system. In some areas of both islands the only protection afforded upland development is the

natural dune and vegetation. These natural dunes and vegetation are not effective in halting or reducing damages from even a 10-year storm event.

30. Another problem is that Gasparilla Island and Estero Island are separated by four islands and five inlets. The recession of the beaches vary with erosion rates differing for each island and different offshore characteristics. Because each island has its unique set of problems and needs, each will be evaluated as separate project elements in terms of engineering, economic and environmental justification.

HISTORIC, EXISTING AND FUTURE CONDITIONS

EXISTING ECONOMIC CONDITIONS

31. As stated earlier, the project area includes 2.8-miles of the southern portion of Gasparilla Island that is located in Lee County and 4.7-miles of Estero Island that is wholly located in Lee County. Erosion of the shoreline in the county has been a problem for a number of years. Storms threaten $31.7 and $66.6 million in front row structural improvements on Gasparilla and Estero Islands, respectively, not including infrastructure or land. Homes have been undermined and destroyed and sections of public roads have been washed out, undermined and abandoned. Major damages result from severe storms, which occasionally sweep across the Gulf and cause severe erosion and damage. The natural littoral process only partially restores the eroded beaches during favorable weather conditions. Local efforts at storm damage protection have been ineffectual. Construction of either short or long groins has not provided the desired protective beach width. Construction of revetments, seawalls and other such coastal armor has had mixed results in terms of providing protection to upland development. An absence of sand in the nearshore littoral system has greatly reduced the effectiveness of the protective nature of a natural beach and dune system.

32. **Gasparilla Island Volumetric Changes** Details of the historic volumetric changes for Gasparilla Island are presented in Appendix A and were prepared by Coastal Planning & Engineering, Inc. located in Boca Raton, Florida. Their report states "For the period from 1982 to 1989 the region showed a net loss of 138,000-cubic yards or an annual rate of 19,700-cubic yards, per year lost. This loss is most pronounced in the vicinity of R-15 and is most likely associated with the re-adjustment of 216,000 cubic yards of beach fill placed in this area in 1981 (Table A-8). A net volumetric gain of 260,000-cubic yards occurred for the period from 1989 to 1995. Most of this gain, however, can be attributed to the placement of over 400,000-cubic yards of fill in 1993. Considering fill placement, the region experienced a net loss of 178,000-cubic yards for an annual rate of 29,600-cubic yards, per year."

33. **Estero Island Volumetric Changes** Again, details of the historic volumetric changes for Estero Island are presented in Appendix A and were prepared by the firm cited above. Their report states that "Difficulties were encountered in the assessment of volumetric changes for Estero Island. The most recent USACE survey for Estero

provided profile data only to wading depth. Data from a LIDAR survey done concurrent with this survey proved to be unreliable and could not be used to provide offshore elevation to a depth of closure. Further comparisons of the 1982 and 1989 surveys for Estero indicate profile closure discrepancies most likely due to calibration errors in the fathometer surveys. The volumetric change is calculated by multiplying the shoreline change by the effective shoreline length and distance from the existing berm to the depth of closure. The effective shoreline length is assumed to extend from the monument location halfway to each adjacent monument. The effective shoreline length for each monument is in general near 1,000 feet. The resulting volumetric estimates are presented in Table A-9. For the period 1982 to 1989 the Estero shoreline gained 344,000 cubic yards. A portion of this gain is associated with 190,000 cubic yards of fill placed in 1986, indicating a net gain of 154,395 cubic yards. This relates to an annual accretion rate of 22,000 cubic yards per year. Overall, the area experienced a net loss of 324,000 cubic yards over the period 1982 to 1995 for an annual erosion rate of 25,000 cubic yards per year." (See Appendix A – Engineering Appendix)

34. **Inlet Effects** Data shown in Appendix A indicate that inlets in the project area have a significant impact on adjacent beach areas, particularly the southern tip of Gasparilla Island. Boca Grande Pass is a Federal project that is maintained to a minimum depth of 32-feet at a width of 1,000-feet. It is estimated that 160 million cubic yards of material is trapped in the ebb shoal as the result of the effect of tidal currents on littoral transport of material. Until 1981 the dredged material from the Pass has been deposited offshore. Since 1912, about 8.8 million cubic yards of material has been removed from the channel. Beach quality material has been deposited in the vicinity of monument R-17 and R-15 on Gasparilla Island. Estero Island is located between Matanzas Pass and Big Carlos Pass. Due to the shallow depths and 3-mile width of Matanzas Pass, tidal currents appear to have little effect on the littoral transport of material on Estero Island. However, significant tidal currents in the Big Carlos Pass affect littoral processes on the southern portion of the island. It appears that the pass intercepts and stores littoral material in its' ebb and flood shoals. It is estimated that the flood and ebb shoals contain about 4.2 and 8.0 million cubic yards of material, respectively. Material from the periodic dredging of these Passes has been placed on the adjacent beaches of Estero Island.

35. **Littoral and Cross-shore Sediment Transport** As shown in Appendix A, the net longshore transport rate for Gasparilla Island was estimated to be 124,000 cubic yards per year from north to south. This correlates well with the estimated 155,500 cubic yards per year of volumetric increase of the Boca Grande Pass ebb shoal. Studies used in the preparation of Appendix A, indicate that for a variety of reasons the longshore transport rate for Estero Island ranges from near zero to a maximum of 69,000 cubic years per year. Recent estimates, (Poff and Stephen, 1998) indicate a lower value of about 29,000 cubic yards per year.

36. Cross-shore sediment transport characteristics for the project area were estimated using the Storm Induced BEAch CHange model, SBEACH (Larson and

Kraus, 1989). SBEACH simulates beach profile changes, which result from varying storm waves and water levels. Details and the results of these simulations are presented in Appendix A. In addition, the Generalized Model for Simulating Shoreline Change (GENESIS) model (Hanson and Kraus, 1989) was used to model shoreline changes and sediment transport quantities for the with and without project conditions for both Gasparilla and Estero Islands. Again, details on these simulations are shown in Appendix A.

FUTURE WITHOUT – PROJECT MODIFICATIONS CONDITIONS

37. Future without project conditions have been predicted herein to enable a computation of without project damages. Basic assumptions of the storm damage analysis are that future long-term shoreline movement and beach profile volume changes can be characterized by survey data acquired from 1982 to 1995. A parcel-by-parcel storm damage analysis was conducted to determine future without project damages to upland development, loss of land, cost of backfill and cost of future coastal armoring. It was assumed that coastal armor will be damaged, replaced or constructed in response to long term shoreline erosion. The location of present or future armor lines has been established based upon the position of existing armor or, in its absence, a location immediately seaward of building foundations, pools, patios and other development worthy of protection. For this study, the shoreline was allowed to recede at a specific rate until the existing coastal armor was encountered. The rates varied according to each island. It was assumed that coastal armor constructed under the without project conditions would be sufficient to halt long term erosion, however, that armor would not halt recession associated with a storm greater than a 5-year frequency event.

38. Upland development predicted to be condemned prior to the base year of the project was omitted from the storm damage analysis. Condemnation of upland development is assumed for unprotected structures with full value distances located in reach of the impacts of a storm with a 5-year return period. Loss of land is to occur between the base year location of the reference shoreline and the location of coastal armor. Backfill costs are incurred landward of the coastal armor. Features of Federally authorized projects capable of impacting the future without project conditions were also modeled for optimization of project features. Additional background information and economic data can be found in Appendix A (Engineering) and Appendix E (Economics) of this report.

PLANNING OBJECTIVES AND CONSTRAINTS

39. **Principles and Guidelines** The guidance provided by the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (USWRC, 1983) (The Principles and Guidelines, or P&G) is used 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. There are three basic criteria:

- 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.

40. **The Federal Objective** 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, the 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:

- Provides for full consideration of measures to protect, enhance and restore ecological, aesthetic, historical and cultural resources.

- 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.

- 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

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

41. **Federal Environmental Objectives** The U.S. Army Corps of Engineers complies with all environmental laws and executive orders. The Corps considers carefully and seeks to balance the environmental and the developmental needs of the Nation in full compliance with the National Environmental Policy Act of 1969 (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.

42. 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 are provided with timely information before making recommendations. Significant environmental resources and values that would likely be impacted favorably as well as adversely, by alternatives being considered, are identified early in the planning process. All plans are formulated to avoid to the fullest extent practicable any adverse impact on significant resources.

43. Those significant adverse impacts that cannot be avoided are mitigated as required by Section 906(d) of the Water Resources Development Act of 1986 (WRDA 86). 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.

44. Participation in shore restoration 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 the protection of upland areas.

45. 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.

46. **Federal Project Purposes** Shore protection projects have been authorized for a variety of purposes including beach erosion control, shore/shoreline protection, hurricane/hurricane wave protection and storm protection. WRDA 86 now assigns costs of Federal projects to appropriate project purposes. The cost of constructing projects or features for shore protection are assigned to either storm damage reduction or recreation. Projects that provide hurricane and storm damage reduction are assigned a 65 percent Federal share. Non-separable project reaches that provide recreation output are assigned a 50 percent Federal share. Projects that provide for separable recreation are not Federally cost shared. The Federal Government does not cost share in the construction of recreation facilities at shore protection projects.

47. Recreation is not considered to be a high priority output or primary project output under current Department of the Army policy. The policy precludes use of Federal funds to support construction of hurricane or storm damage reduction projects that depend on separable recreation benefits for economic justification, or for which incidental recreation benefits are greater than 50 percent 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.

48. **Additional Federal Objectives** 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:

- Meet the specific needs and concerns of the general public within the project area.

- 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 geographic scale will be developed. The combined effectiveness and economic efficiency of shore protection, navigation maintenance and dredged material disposal programs can then be optimized.

- Respond to expressed public desires and preferences

- Be flexible to accommodate changing economic, social, and environmental patterns and changing technologies.

- Integrate with and be complementary to other related programs in the project area, and

- Be implementable with respect to financial and institutional capabilities and public consensus.

49. Four accounts are established to simplify the evaluation and display of effects of alternative plans. These four accounts encompass all significant effects of a plan on the human environment as required by NEPA. They also encompass social well being as required by Section 122 of the Flood Control Act of 1970. The national economic development account is included since 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:

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

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

- 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.

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

50. A plan that reasonably maximizes net NED benefits, consistent with the Federal objective, is the goal of the Federal optimization process. This plan will be identified as the NED plan. The NED plan must also meet the test of four additional criteria:

- 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.

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

- 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.

- 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, public policies.

51. **Mitigation of Shore Damage Due to Navigation Projects** Mitigation for the impacts of Federal navigation projects on adjacent shorelines is addressed by Section 101 (c) of WRDA 86 and Section 111 of the River and Harbor Act of 1968 as amended by Section 940 of WRDA 86. The U.S. Army Corps of Engineers can recommend the construction of measures for the prevention or mitigation of erosion or shoaling damages attributed to Federal navigation works. The cost for such measures are shared in the same proportion as the cost sharing provisions applicable to the project causing, or projected to cause, such erosion or shoaling. The U.S. Army Corps of Engineers can investigate and construct such projects under the Continuing Authorities Program. There are no program expenditure limits, but projects with Federal expenditures over $4,000,000 require Congressional authorization. The Federal navigation project at Boca Grande Pass does not appear to be impacting adjacent shores. Material dredged from this channel during maintenance operations is periodically placed on adjacent shorelines.

THE STATE OBJECTIVE

52. **CZM Consistency** Florida's Coastal Management Program was established under the Coastal Management Act of 1978 (Chapter 380.20, Florida Statutes (F.S.)) 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 implementation of the Federal Coastal Zone Management Act.

53. **Beach Management Plans** The Beach and Shore Preservation Act (Chapter 161, F.S.) is Florida's primary statute for developing and implementing the state's strategic beach management plan, regulating coastal construction seaward of mean high water and regulating activities seaward of the coastal construction control lines. The act, which is administered by the BB&CS, was first passed in 1965 and has since been significantly amended.

54. **Inlet Management Plans** In order to manage the erosion of adjacent beaches as a result of improved navigation inlets, the Florida Legislature passed the Declaration of Public Policy relating to improved navigation inlets (161.142, F.S.). In this statute the Legislature recognized the need for maintaining navigation inlets to promote commercial and recreational uses of the coastal waters and their resources. The Legislature further recognized that the inlets alter the natural drift of beach quality sand resources, that 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 seaward of the 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 s.403.021 (9) (b), 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 s.161.053, F.S. 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 hatchling 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 the ports listed in s.403.021 (9) (b).

55. 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 FDEP 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.

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

57. A comprehensive long-term management plan for the restoration of the state's critically eroding beaches shall be developed and maintained. The beach management plan shall:

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

b. 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:

(1) 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 renourishment; and

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

ENVIRONMENTAL CONSTRAINTS

58. Based on the evaluation of the nourishment activities the environmental impacts due to construction activities will be minimal. The very northern limits of the beach fill for Gasparilla will impact approximately 0.3 acres of low relief hardgrounds in the very near shore. These hardgrounds are located near DEP Monument 11. A site visit was conducted on 20 December 1999 at the suggestion of the USFWS's Coordination Act Report. Field measurements of the area located the 0.3 acres of hardgrounds; the revised plan for Gasparilla includes construction of 0.6 acres of similar habitat. Initial wave impact analysis precludes the use of Borrow Site 1 for Gasparilla, however, Borrow Site 2 contains approximately 7.8 million cubic yards of material. Three magnetometer hits in the upper northeast corner of Borrow Site 2 will have to be avoided, but this should not impact the volume of material to any degree of significance. Three different endangered species are located within the area; Loggerhead turtle nesting, American Crocodile nesting, and Bald Eagle nesting. These species should not be impacted, the EIS has been coordinated with Fish and Wild Life to verify this conclusion and to seek their recommendations.

FORMULATE PROJECT MODIFICATIONS

59. The authorized project features for the Lee County, Florida shore protection project include the following:

Berm Elevation

Beach Slopes

Shoreline Extension

Project Length

Volume Requirements and Renourishment Interval

Terminal Groin

Revetment (already in place)

Borrow Areas

60. Design criteria used for project feature optimization in this report are consistent with guidance provided by the SPM, engineer manuals, and technical notes. The most recent policy guidance is followed herein to determine the National Economic Development (NED) plan that results in the maximization of net primary project benefits. Army policy guidance used in this report for project feature optimization included but was not limited to ER 1165-2-130 (Federal Participation in Shore Protection), ER 1105-2-100 (Guidance for Conducting Civil Works Planning Studies), and EP1165-2-1 (Digest of Water Resources Policies and Authorities). Of significant impact to the process, WRDA '86 identified storm damage reduction as a primary project benefit and recreation as an incidental benefit. The following project features were considered in the present investigation.

BERM ELEVATION

61. **Gasparilla Island** Based on the existing natural berm elevation, a 5 foot above MLW design berm was selected. This elevation is a 1 foot increase over the authorized berm height of 4-feet above MLW. The increase approximates the naturally existing berm, where present, and was selected as a more appropriate elevation for design considerations.

62. **Estero Island** Based on the existing natural berm elevation, a 5 foot above MLW design berm was selected. This elevation is a 1 foot increase over the authorized berm height of 4-feet above MLW. The increase approximates the naturally existing berm, where present, and was selected as a more appropriate elevation for design considerations.

BEACH SLOPES

63. **Gasparilla Island** The existing beach slope is estimated as 1 vertical to 15 horizontal above MLW and 1 vertical to 25 horizontal below MLW. This estimate is based on the 1995 USACE survey. Profiles in the vicinity of shoreline protective structures were not considered in this estimate since the presence of these structures may produce artificially steep cross-shore slope estimate. A construction slope of 1 vertical to 10 horizontal was also adopted.

64. **Estero Island** The existing beach slope is estimated as 1 vertical to 25 horizontal above MLW and 1 vertical to 35 horizontal below MLW. This estimate is based on the average slope of the 1995 USACE survey. A construction slope of 1 vertical to 10 horizontal was also adopted.

SHORELINE EXTENSION

65. **Gasparilla Island** The project is defined in terms of shoreline extension. Over most of the project, the 1995 MHW shoreline position has been adopted as the project baseline. The benefits and cost associated with providing MHW shoreline extensions of 0 to 120-feet in 20-foot increments are shown in Table 2. This project is defined as a 20-foot extension of the baseline. As shown, the NED plan formulation and evaluation process produced a 20-foot berm extension with maximum net benefits of $1,273,726 annually. The design and cost for this alternative was then refined and is presented in the "Proposed Project Modifications – NED Plan" section of this report.

66. **Estero Island** The project is defined in terms of shoreline extension. The 1995 MHW shoreline position has been adopted as the project baseline. The Estero project is defined as a 40 foot extension of the baseline. The benefits and costs associated with providing MHW shoreline extensions of 0 to 120-feet in 20-foot increments are shown in Table 3. As shown, the NED plan formulation and evaluation process produced a 40-foot berm extension with maximum net benefits of $1,644,504 annually. The design and cost for this alternative was then refined and is presented in the "Proposed Project Modifications – NED Plan" section of this report.

TABLE 2
NED PLAN FORMULATION GASPARILLA ISLAND

EXTENSION [ft]	ANNUAL BENEFIT [$]	ANNUAL COST [$]	NET BENEFIT [$]	B/C RATIO
0	1,498,900	360,280	1,138,620	4.2
20	**2,005,800**	**745,076**	**1,260,724**	**2.7**
40	2,234,900	1,002,542	1,232,358	2.2
60	2,306,100	1,257,675	1,048,425	1.8
80	2,333,700	1,542,591	791,109	1.5
100	2,345,300	1,785,872	559,428	1.3
120	2,346,800	2,027,799	319,001	1.16

TABLE 3
NED PLAN FORMULATION ESTERO ISLAND

EXTENSION [ft]	ANNUAL BENEFIT [$]	ANNUAL COST [$]	NET BENEFIT [$]	B/C RATIO
0	2,827,000	1,279,544	1,547,456	2.2
20	4,415,900	2,590,333	1,825,567	1.7
40	**5,808,600**	**3,427,276**	**2,381,324**	**1.7**
60	6,509,500	4,222,571	2,286,929	1.5
80	7,199,600	5,013,055	2,186,545	1.4
100	7,513,700	5,808,028	1,705,672	1.3
120	7,652,500	6,641,805	1,010,695	1.15

(BENEFITS DO NOT INCLUDE RECREATION)

PROJECT LENGTH

67. **Gasparilla Island** About 2.8-miles of the shoreline are considered for nourishment, this is a 0.1 mile increase over the authorized project. This is based on existing recession rates and economic benefits. The south limit of the proposed beach fill is located at FDEP monument R-24. A 600-foot taper section connects the proposed beach fill with the existing southern shoreline. The northern limit of the nourishment area is defined as FDEP monument R-11. A 1,200-foot long taper section connects the proposed beach fill with the existing northern shoreline.

68. **Estero Island** About 4.7-miles of the shoreline are considered for nourishment, this is a 0.1 mile increase over the authorized project. This is based on existing recession rates and economic benefits. The north limit of the proposed beach fill is located at FDEP monument R-175. The southern limit of the nourishment area is defined as FDEP monument R-198. A 1,800-foot long taper section connects the proposed beach fill with the existing shoreline to the south.

VOLUME REQUIREMENTS AND RENOURISHMENT INTERVAL

69. **Gasparilla Island** The design template was determined based on a 20-foot MHW extension and a 1:15 and 1:25 slope above and below MLW, respectively. A total of 786,200-cubic yards of fill will be needed to construct this project. Of that amount, 244,400-cubic yards is the design volume, while 541,800-cubic yards is the advance fill volume. These volumes are necessary for the construction of the entire active profile. This was accomplished through a translation of the existing profile seaward to a distance such that the translated profile is entirely seaward of the design template. The volumes presented are necessary to maintain the design template. The optimum re-nourishment cycle was determined on an economic basis, which represents the lowest average annual equivalent cost of maintaining the project. As shown on Table 4, the optimum re-nourishment cycle was determined to be seven years. The numbers used in the optimization process differ compared to the finalized numbers since more time is spent refining these numbers once the alternatives have been optimized. Model studies determined that the 541,800-cubic yards shown above are necessary to maintain project dimensions over the initial seven-year period. (See Appendix A for additional details)

70. **Estero Island** The design template was determined based on a 40-foot MHW extension and a 1:25 and 1:35 slope above and below MLW, respectively. A total of 790,800-cubic yards of fill will be needed to construct this project. Of this amount, 546,400-cubic yards is the design volume and 244,400-cubic yards is the advance fill volume. These volumes are necessary for the construction of the entire active profile. The optimum re-nourishment cycle was determined on an economic basis, which represents the lowest average annual equivalent cost of maintaining the project. As shown on Table 5, the optimum renourishment cycle was determined to be three years. The numbers used in the optimization process differ compared to the finalized numbers since more time is spent refining these numbers once the alternatives have been optimized. Model studies determined that the 244,400-cubic yards shown above are necessary to maintain project dimensions over the initial three-year period. (See Appendix A for additional details). The sponsor for the project requested that the renourishment interval for the Estero Island project be reevaluated with respect to the renourishment event coinciding within the same time frame as the Gasparilla project. Initial reaction is that a cost savings would be realized due to reductions in mobilization/demobilization cost, plans and specifications costs, and award costs; however, due to the two different types of plant equipment that would be effective for the construction of the two projects, mobilization costs wouldn't be realized. The close proximity of the Gasparilla borrow site indicates that a hydraulic cutter/suction dredge would be the most effective means of construction, while Estero (borrow area is approximately 16 miles away) would be more suited to a hopper dredge. In addition, the distance between the two projects is over 30 miles and would in fact incur some additional mobilization costs to move the plant from one project site to the other. A second borrow area for Estero is currently under investigation, it would consist of the ebb shoal at San Carlos Bay.

TABLE 4 - Gasparilla Renourishment Interval

GASPARILLA ISLAND - 20FT BERM AT ELEVATION AT 5 FT MLW

LEE COUNTY SHORE PROTECTION PROJECT GRR: 20-FOOT BERM

30" CUTTER HEAD

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ECONOMIC ANALYSIS PERIOD	50 [yr]	MOB/DEMOB	$576,500.00	MONTHLY	LENGTH	2.65 [mi]
INTEREST RATE	6.375 [%]	UNIT PRICE $/CY	$3.09	PRODUCTION		14,000 [ft]
BACKGROUND EROSION RATE	32,200 [cy/yr]	MONITORING	$2,000 [/mo]	RATE [cy/mo]	DESIGN FILL	244,539 [cy]
PROJECT INDUCED EROSION RATE	63,768 [cy/yr]	MITIGATION	$0 [/mo]	325,000		
DESIGN FILL (1998)	244,539 [cy]	CONTINGENCY	20%			
OVERFILL FACTOR	0%	E&D, S&A	15%			

CAPITAL RECOVERY FACTOR 0.066789

AUGUST 1998 PRICE LEVELS

TOTAL DESIGN FILL+ECL (CU. YDs.)	NOUR. INT. (YEARS)	ADVANCE NOURISHMENT (CUBIC YARDS) (W/OVERFILL)	TOTAL INITIAL FILL (CUBIC YARDS) (W/OVERFILL)	EST. CONST. TIME (MONTHS) 1 DREDGE	COST OF INITIAL CONSTRUCTION (FIRST MOB.)	COST OF INITIAL CONSTRUCTION (SECOND MOB.)	ANNUAL COST OF INITIAL CONSTRUCTION	NOURISHMENT QUANTITY (CU. YRDS)	NOURISHMENT COST	ANNUAL COST OF NOURISHMENT	TOTAL AVERAGE ANNUAL EQUIVALENT COST
244,539	1	95,968	340,507	1.0	$2,250,452	$0	$150,305	95,968	$1,205,612	$1,205,612	$1,355,917
244,539	2	191,936	436,475	1.3	$2,660,493	$0	$177,692	191,936	$1,615,653	$782,873	$960,564
244,539	3	287,904	532,443	1.6	$3,070,535	$0	$205,078	287,904	$2,025,695	$640,589	$845,667
244,539	4	383,872	628,411	1.9	$3,480,577	$0	$232,464	383,872	$2,435,737	$566,563	$799,027
244,539	5	479,840	724,379	2.2	$3,890,619	$0	$259,850	479,840	$2,845,779	$501,066	$760,916
244,539	6	575,808	820,347	2.5	$4,300,660	$0	$287,237	575,808	$3,255,820	$459,475	$746,712
244,539	7	671,776	916,315	2.8	$4,710,702	$0	$314,623	671,776	$3,665,862	$430,453	$745,076
244,539	8	767,744	1,012,283	3.1	$5,120,744	$0	$342,009	767,744	$4,075,904	$403,755	$745,764
244,539	9	863,712	1,108,251	3.4	$5,530,786	$0	$369,395	863,712	$4,485,946	$377,726	$747,122
244,539	10	959,680	1,204,219	3.7	$5,940,827	$0	$396,782	959,680	$4,895,987	$364,957	$761,739
244,539	11	1,055,648	1,300,187	4.0	$6,350,869	$0	$424,168	1,055,648	$5,306,029	$340,035	$764,203
244,539	12	1,151,616	1,396,155	4.3	$6,760,911	$0	$451,554	1,151,616	$5,716,071	$329,404	$780,958

TABLE 5 - Estero Renourishment Interval

ESTERO ISLAND - 40 FT BERM AT ELEVATION AT 5 FT MLW

LEE COUNTY SHORE PROTECTION PROJECT GRR: 40-FOOT BERM

30" CUTTER HEAD

FILE: L:\GROUP\PDP\DAN\REGION2\LEE\GASPEST\EXCEL.WRK\OPTIREN.XL

ECONOMIC ANALYSIS PERIOD	50 [yr]	MOB/DEMOB	$846,600.00	MONTHLY	LENGTH	4.70 [mi]	
INTEREST RATE	6.375 [%]	UNIT PRICE $/CY	$10.76	PRODUCTION		24,300 [ft]	
BACKGROUND EROSION RATE	55,890 [cy/yr]	MONITORING	$2,000 [/mo]	RATE [cy/mo]	DESIGN FILL	655,580 [cy]	
PROJECT INDUCED EROSION RATE	78,734 [cy/yr]	MITIGATION	$0 [/mo]	142,000			
DESIGN FILL (1998)	655,580 [cy]	CONTINGENCY	20%				
OVERFILL FACTOR	0%	E&D, S&A	15%				
CAPITAL RECOVERY FACTOR	0.066789					AUGUST 1998 PRICE LEVELS	

TOTAL DESIGN FILL+ECL (CU. YDs.)	NOUR. INT. (YEARS)	ADVANCE NOURISHMENT (CUBIC YARDS) (W/OVERFILL)	TOTAL INITIAL FILL (CUBIC YARDS) (W/OVERFILL)	EST. CONST. TIME (MONTHS) 1 DREDGE	COST OF INITIAL CONSTRUCTION (FIRST MOB.)	COST OF INITIAL CONSTRUCTION (SECOND MOB.)	ANNUAL COST OF INITIAL CONSTRUCTION	NOURISHMENT QUANTITY (CU. YRDS)	NOURISHMENT COST	ANNUAL COST OF NOURISHMENT	TOTAL AVERAGE ANNUAL EQUIVALENT COST
655,580	1	134,624	790,204	5.6	$12,917,248	$0	$862,730	134,624	$3,169,929	$3,169,929	$4,032,659
655,580	2	269,248	924,828	6.5	$8,043,589	$8,043,589	$1,030,654	269,248	$5,171,551	$2,505,900	$3,536,554
655,580	3	403,872	1,059,452	7.5	$9,044,400	$9,044,400	$1,158,892	403,872	$7,173,172	$2,268,385	$3,420,015
655,580	4	538,496	1,194,076	8.4	$10,045,210	$10,045,210	$1,287,129	538,496	$9,174,794	$2,134,098	$3,421,228
655,580	5	673,120	1,328,700	9.4	$11,046,021	$11,046,021	$1,415,367	673,120	$11,176,415	$1,967,868	$3,383,235
655,580	6	807,744	1,463,324	10.3	$12,046,832	$12,046,832	$1,543,604	807,744	$13,178,037	$1,859,740	$3,403,344
655,580	7	942,368	1,597,948	11.3	$13,047,642	$13,047,642	$1,671,842	942,368	$15,179,658	$1,782,425	$3,454,267
655,580	8	1,076,992	1,732,572	12.2	$14,048,453	$14,048,453	$1,800,079	1,076,992	$17,181,280	$1,701,961	$3,502,040
655,580	9	1,211,616	1,867,196	13.1	$15,049,264	$15,049,264	$1,928,317	1,211,616	$19,182,901	$1,615,242	$3,543,559
655,580	10	1,346,240	2,001,820	14.1	$16,050,075	$16,050,075	$2,056,554	1,346,240	$21,184,523	$1,579,139	$3,635,693
655,580	11	1,480,864	2,136,444	15.0	$17,050,885	$17,050,885	$2,184,792	1,480,864	$23,186,144	$1,485,875	$3,670,666
655,580	12	1,615,488	2,271,068	16.0	$18,051,696	$18,051,696	$2,313,029	1,615,488	$25,187,766	$1,451,512	$3,764,541

TERMINAL GROIN

71. **Gasparilla Island** A terminal groin for the Gasparilla portion of the project was not economically justified based on lack of effect on the renourishment interval. An additional groin would lower maintenance volumes for the navigation project.

72. **Estero Island** Model studies indicated that a significant reduction in the amount of advanced fill could be achieved with the addition of a terminal groin at the north end of Estero Island in the vicinity of R-175. The effective length was optimized on an economic basis using the results of model studies. The optimum effective structural length was determined to be 150-feet. Table 6 presents the optimization analysis of the terminal groin. This is the distance from the existing MHW station seaward, but does not include the length of structure required landward of the MHW station. An additional 90-feet of structure is required to link the structure to the existing berm crest, resulting in a total structure length of 240-feet. A continuous structure height of 6-feet above MLW was selected. This height exceeds the natural berm height by about 1 foot and is capable of sustaining a wave of 4-feet with no overtopping, and a 6-foot wave with minimal overtopping. This structure requires 13,713 cubic feet of armor stone, 3,325 cubic feet of bedding stone, 7,968 cubic feet of foundation stone, 10,080 square feet of filter fabric, and 2,400 square feet of vinyl sheet pile. (See Appendix A for additional details). Justification for the groin was based on a reduction in required advance maintenance fill; this reduction in fill every three years over the life of the project results in a large annual savings in comparison to the annual cost of the groin, even after taking into account the maintenance and surveys for the groin. The annual cost of the groin includes replacing 10% of the armor stone every ten years, mobilization costs, P&E, S&A and a contingency. Costs for periodic inspection of the structure, along with surveys were also included in the average annual cost. All of the costs were refined after the groin length was optimized; those costs are presented in the MCACES. The final annualized cost is included in the Estero Island annualized costs; these costs include the initial fill construction, periodic renourishment, initial construction of the groin, periodic inspection and survey of the structure, and replacement of 10% of the armor stone every 10 years.

BORROW AREAS

73. **Gasparilla Island** For Gasparilla Island, the borrow area is directly offshore of the southwestern portion of the island and is designated as the Gasparilla Borrow Area - #2. The location of this borrow area is shown in Figure 3 and discussed in detail in the Geotechnical Appendix. Due to the anticipated wave regime's effect on the shoreline associated with Borrow Area 1, Borrow Area 2 will be used for construction and renourishment of Gasparilla Island. There are three potential Cultural resources located in the extreme north east corner of Borrow Area 2 that will need to be avoided. Because of the location of the borrow area a pipeline dredge will be used to collect material and place it for nourishment. A Consent of Use will be obtained from the State of Florida for this borrow area.

74. **Estero Island** The borrow for Estero Island is located approximately 16-miles northwest of the island and is designated as Estero Borrow Area B. Immediately adjacent to this location is a borrow area designated for future Estero Island nourishment. The location of this borrow area is shown in Figure 4 and is discussed in detail in the Geotechnical Appendix. Because of the location of the borrow material a hopper-dredge will be used to collect the material for nourishment. As with Gasparilla Island, a Consent of Use will be obtained from the State of Florida for this borrow area. Currently, the use of San Carlos Bay is also under investigation. Identified hardgrounds will require a 500 foot buffer zone to avoid impacts.

TABLE 6
Optimization of Terminal Groin for Estero Island

Length of Structure	Cost of Structure ($)	Reduction in Volume[1]	Reduction in Cost	Difference ($)	
50	137,800	9,289	128,653	(9,147)	
100	204,100	18,578	257,305	53,205	
150	**270,400**	**33,521**	**464,266**	**193,866**	**Optimun Savings**
200	336,700	33,521	464,266	127,566	

[1)] Reduction in volume based on GENISIS simulations

Annual Cost of Terminal Groin	Annual Savings in Fill Cost	Net Savings	BCR
$23,600	$176,200	$152,600	7.5 to 1.0

Figure 3 – Gasparilla Borrow Area

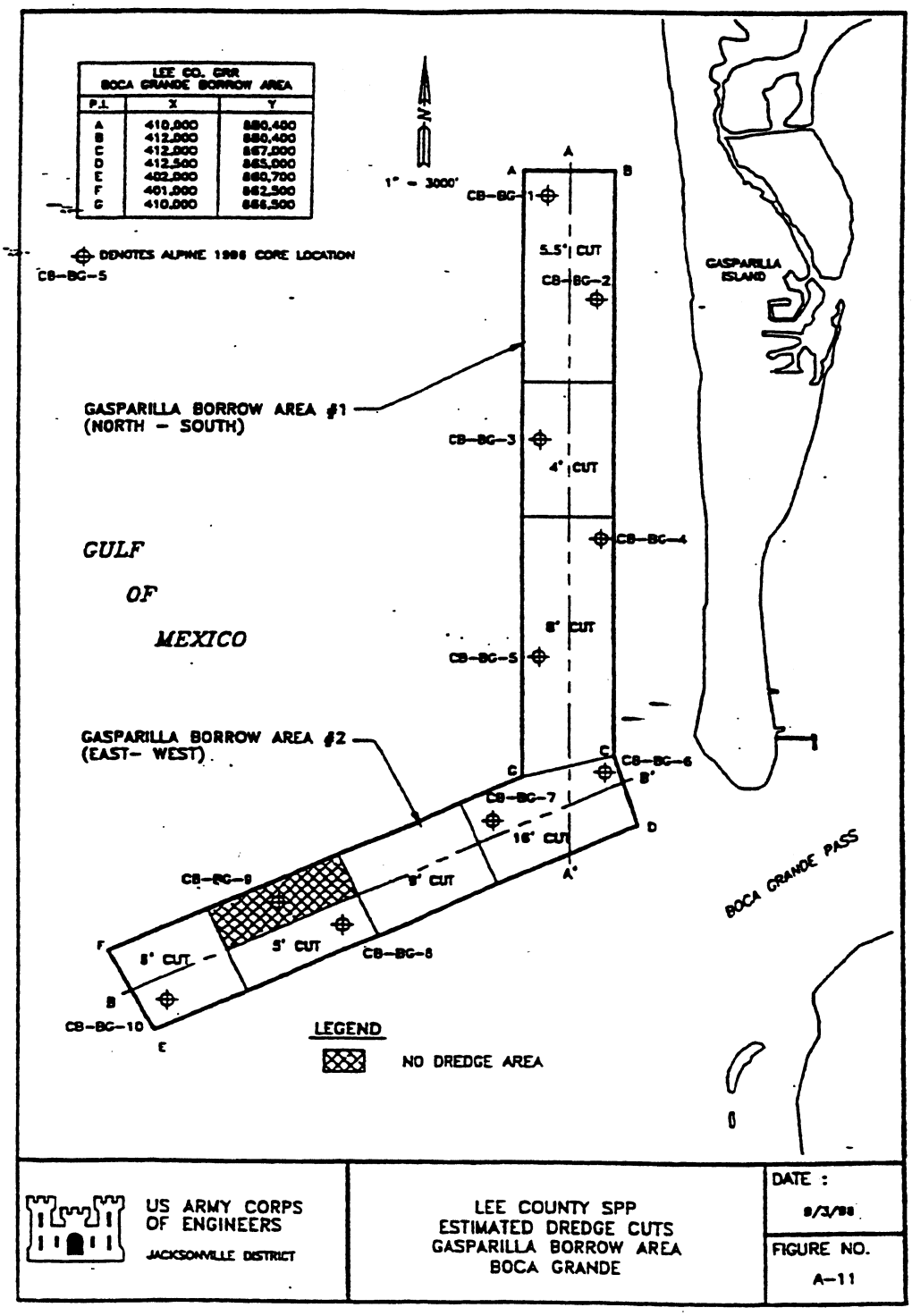
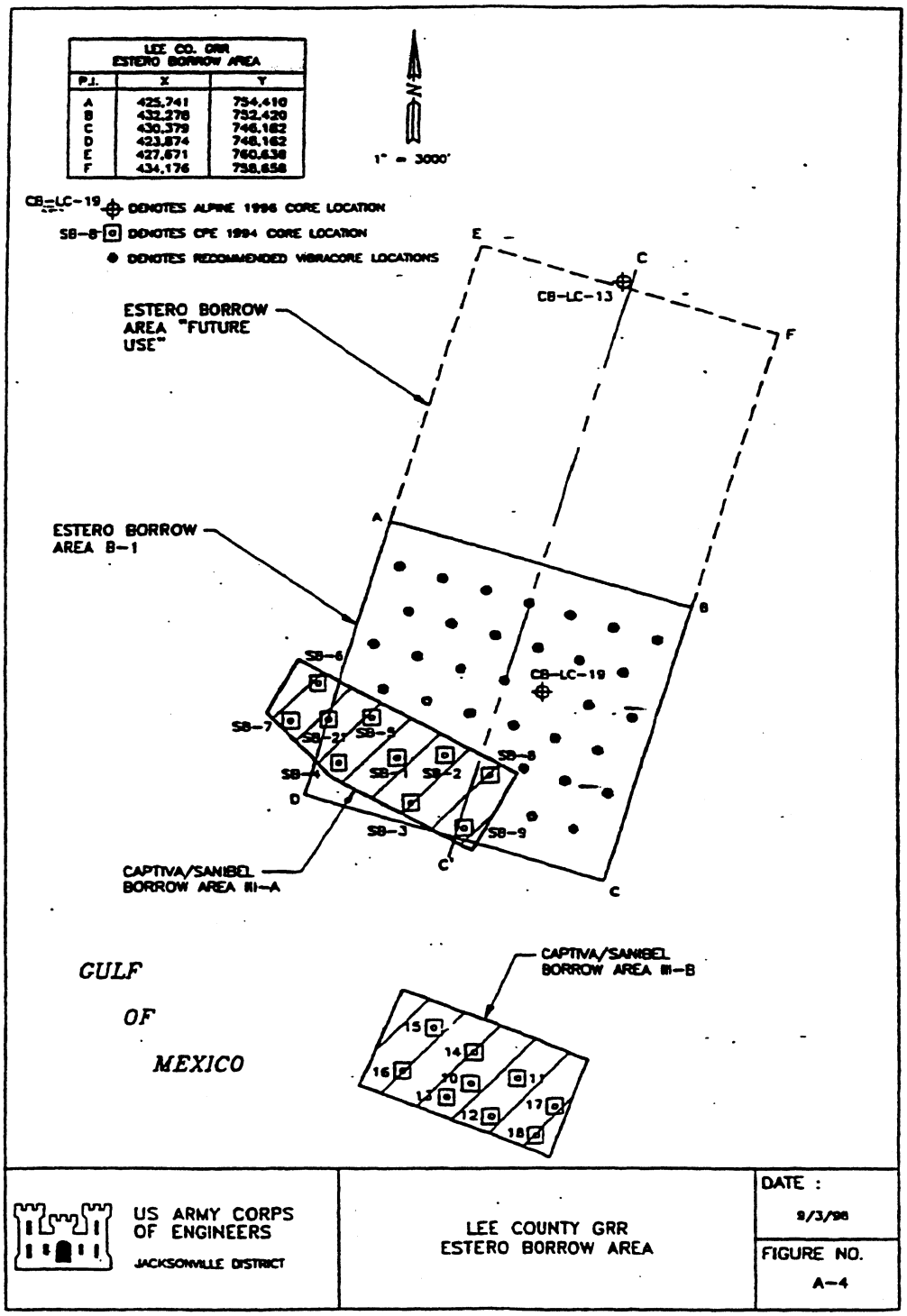


Figure 4 – Estero Borrow Area



GASPARILLA ISLAND

75. A variety of alternatives were investigated for the protection of development on Gasparilla Island. Within the 2.8-mile study area seven different shoreline extension alternatives were considered. Extensions of 0 (maintain existing shoreline), 20, 40, 60, 80, 100, and 120-feet were considered. As stated earlier a 20-foot extension was determined to be the NED plan. Also stated, was that the period of renourishment was optimized at seven years. Terminal groins were evaluated, but not justified. The NED plan will reduce damages to development and coastal armor by over 86 percent.

ESTERO ISLAND

76. A variety of alternatives were investigated for the protection of development on Estero Island. Within a 4.7-mile study area seven different shoreline extension alternatives were considered. Extensions of 0 (maintain existing shoreline), 20, 40, 60, 80, 100, and 120-feet were considered. As stated earlier a 40-foot extension was determined to be the NED plan. Also stated was that the period of renourishment was optimized at three years and that a 240-foot terminal groin (150 feet plus the 90 feet required on land) was economically justified. The NED plan will reduce damages to development and coastal armor by over 71 percent.

EVALUATE EFFECTS OF THE PROPOSED PROJECT MODIFICATIONS

NO ACTION PLAN

77. This alternative assumes that the erosion in each of the study areas will continue with no solutions or remedial measures being constructed, except for those in response to emergency situations. Within the study areas, front row structural improvements on Gasparilla and Estero Islands are estimated at $31.7 and $66.6 million, respectively, exclusive of infrastructure and land. Average annual damages on Gasparilla and Estero Islands are estimated at $2.3 million and $8.2 million, respectively and these annual damages will continue to occur if no action is taken. Local efforts to stop the storm and erosion damage have been limited to construction and repair of coastal armor.

78. This option avoids any undesirable effects that may be associated with construction of the authorized projects for both islands. However, if steps are not taken to counteract 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 damage to structural improvements along the respective shorelines. A

summary of the environmental impacts associated with the no action plan is presented in the Environemental Impact Statement that follows the main text of this report.

PROPOSED PROJECT MODIFICATIONS – NED PLAN

79. The design criteria used in the formulation of the authorized Gasparilla and Estero projects were in accordance with criteria and procedures presented in the U. S. Army Coastal Research Center's "Shore Protection Manual" (USACE 1984). The improvements selected for beach erosion control are to provide protection from gradual erosion during normal weather, and to a partial degree, provide protection against storms. Ample beach areas are to be provided for present and future recreational usage.

80. The NED plan is identified as the plan that results in the greatest excess of net primary benefits. Tables 2 and 3 display the benefits, costs, and net benefits for each shoreline extension considered in the intermediate optimization of project features for Gasparilla and Estero Islands, respectively. As shown in Table 2, the NED plan for the Gasparilla Island project is shown to be the 20 foot shoreline extension with excess net primary AAE benefits of $1,261,000. These are preliminary numbers used to determine the NED plan. As shown in Table 3, the NED plan for the Estero Island project is shown to be the 40-foot shoreline extension with excess primary AAE benefits of $2,381,000. Again, these are preliminary numbers used to determine the NED plan. The plans include a 50-year project life, starting from the completion of initial construction of each independent segment. The following section of the report ("Recommended Plan"), in conjunction with the Engineering Appendix, provides sufficient detail on the recommended plans required to proceed to the PED phase of project designs.

DESCRIPTION

81. The Lee County project consists of three separate elements. As stated previously the Captiva Island element of the project has been constructed. The remaining two elements are the Gasparilla and Estero Island elements. A description of each of these project elements follows:

GASPARILLA ISLAND

82. This segment of the project is comprised of 2.8-miles of shoreline located in Lee County between FDEP monuments R-11 and R-24. Boca Grande Pass, a Federal navigation project, is located off the southern tip of the island. Plan views and cross sections of the design template as well as the seaward limit of advance nourishment and the construction section of the recommended plan are shown in the Engineering Appendix.

83. The National Economic Development Plan consists of beach fill with a 1,200 foot tapered transition section at the northern limit and a 600 foot long tapered transition section to the south. The design template berm elevation is +5-feet above MLW and would result in the extension of the pre-project MHW shoreline by 20-feet. At the location of the seaward extent of the design berm, the design template slopes 1 vertical to 15 horizontal seaward to the location of MLW, thence 1 vertical to 25 horizontal out to the intersection with the existing profile. This project also involves construction of 0.6 acres of hardground mitigation.

84. Construction of the project would require the placement of about 244,400-cubic yards of design fill and 541,800-cubic yards of advance fill for a total of 786,200-cubic yards. For purposes of identifying the NED plan, it was assumed that construction would take place in the year 2001. The primary borrow source would be Borrow Area #2 for Gasparilla. Renourishment would be provided at 7-year intervals over the 50-year project life (starting upon completion of initial construction). Cost estimates developed for various alternatives indicate that a pipeline dredge would be the most cost effective plant for the construction of the project. A more detailed description can be found under the "Recommended Plan" section of this report.

85. **Construction** Construction of this 2.8 mile segment of the Lee County project is estimated to be accomplished over a 5 month period. A cutterhead dredge will be used to pump out material from the borrow area onto the beach. Booster pumps and barges may be required to cover the entire project reach. Bulldozers and graders will be used at the outfall to shape the material into the required construction template.

86. **Real Estate Requirements** Ownership of oceanfront property within the 2.8 project limit includes Federal, state, county, and private lands. An erosion control line (ECL) has not been designated for this segment of the project although one has been proposed. Easements on approximately 150 parcels of land will be required for the construction of this segment of the project.

87. **Costs** Preliminary cost estimates for providing beach nourishment were developed and compared to predicted benefits to determine the plan that would result in the maximization of net benefits (the NED plan). Dredge and fill operations would be conducted from the borrow area to the project area. Table 2 displays the benefits and costs for shoreline extension from 0 to 120-feet in 20-foot increments. Mobilization and demobilization costs are estimated at $663,000. Unit costs for pipeline dredging is $3.55 per cubic yard. A pipeline dredge is assumed of being capable of placing 325,000-cubic yards of material per month. The per cubic yard unit cost for dredging includes turtle and turbidity monitoring. A contingency factor of 20% is assessed on all dredging costs. Preconstruction engineering, design, supervision, and administration costs are estimated at 15% of the total construction cost. The Fiscal Year 2001 directed interest rate of 6 and 3/8ths percent is used in the analysis. Once the NED plan was selected the design and costs were refined and updated to October 2000 price levels in order to match the benefit price levels.

88. Table 7 (as described in Paragarah 141) displays the 20-foot shoreline extension cost estimate for project features. An approximate design volume of 244,400-cubic yards and an advance nourishment volume of 541,800-cubic yards (786,200-cubic yards total) of beach quality material would be required for initial construction. The use of a cutterhead dredge with pipeline pumpout capability to the beach would be the least cost alternative of the various plants considered. The table incorporates weighted averages of mobilization and unit costs based on cost estimates for placement of material along the 2.8-mile project area. Refined cost estimates for Preconstruction Engineering and Design (PED) and Supervision and Administration (S&A) are used in the detailed assessment of alternatives. The optimal nourishment interval for the 20 foot project is shown to be 7 years in Table 4.

89. The project provides for a 20 foot berm over 2.8-miles and periodic renourishment of 3.5-miles (including tapers). Initial construction is estimated at $5,069,500 (including required monitoring, mitigation and Interest During Construction and October 2000 pricing) with the Federal cost share being $2,769,000. These costs are based on updated unit prices and volumes. Periodic renourishment required every seven years is estimated to cost $3,175,000.

90. **Benefits** The primary purpose of the Gasparilla Island segment of the Lee County Shore Protection project would be the reduction of storm damage to upland development. The NED plan would provide protection in varying degrees to over $31.7 million in private, commercial, and public upland development, not including infrastructure such as roads and utilities. About $2.3 million of average annual damages are predicted to occur in the project area under future without project conditions. The 20 foot design template would result in an average annual equivalent benefit of $2,005,800. The benefit value includes the cost of damage to upland development, coastal armor, backfill, and the value of land lost. Incidental recreation benefits of $254,000 are also claimed for the selected plan. The average annual equivalent benefit of the selected plan would be $2,260,000. Detailed analyses of project benefits are presented in the Economics Appendix (Appendix E).

91. **Environmental Impacts** An Environmental Impact Statement (EIS) of project implementation has been compiled and follows the main text of this report. The EIS identifies environments to be affected by construction of this segment of the project. These environments include the borrow areas as well as the beach and the nearshore area along the project reaches. Consideration was given to the impacts of the project element on fish and wildlife resources, threatened or endangered species, cultural resources, water quality, hazardous and toxic wastes, aesthetic resources, coastal barrier resources, acoustic quality, air quality, and recreation. The EIS indicates that this segment of the project implementation would have minor negative impacts on the environment which can be alleviated through mitigation. A Record of Decision (ROD) will be provided by higher authority upon approval of the EIS and GRR.

92. **Cost Apportionment** Section 103(a) of WRDA 86 specifies that hurricane and storm damage reduction projects are to be cost shared at a 65 percent Federal and a 35 percent non-Federal basis. Section 103(c) (4) states that recreation projects are to be cost shared at 50 percent of separable costs. Section 103(d) states that the cost of constructing projects or measures for beach erosion control and water quality enhancement shall be assigned to the appropriate purposes listed above.

ESTERO ISLAND

93. This segment of the project is comprised of 4.7-miles of shoreline located in Lee County between FDEP monuments R-175 and R-198. Estero Island is located between San Carlos Bay, and Big Carlos Pass. Plan views and cross sections of the design template as well as the seaward limit of advance nourishment and the construction section of the recommended plan are shown in the Engineering Appendix.

94. The National Economic Development Plan consists of beach fill with a terminal groin constructed at the northern limit and a 1,800 foot long tapered transition section to the south. The design template berm elevation is +5-feet above MLW and would result in the extension of the pre-project MHW shoreline by 40-feet. At the location of the seaward extent of the design berm, the design template slopes 1 vertical to 25 horizontal seaward to the location of MLW, thence 1 vertical to 35 horizontal out to the intersection with the existing profile.

95. Construction of the project would require the placement of about 546,400-cubic yards of design fill and 244,400 cubic yards of advance fill for a total of 790,800-cubic yards. For purposes of identifying the NED plan, it was assumed that construction would take place in the year 2001. The primary borrow source would be located about 16-miles from the center of the project area. Renourishment would be provided at 3-year intervals over the 50-year project life (starting upon completion of initial construction). Cost estimates developed for various alternatives indicate that a hopper dredge would be the most cost effective plant for the construction of the project. A more detailed description can be found under the "Recommended Plan" section of this report.

96. A terminal groin is included in this plan at the northern terminus of the beach fill. The effective length of this groin was optimized on an economic basis using the results of model studies. This optimum effective length was determined to be 150-feet. Table 6 presents the optimization analysis. The 150-foot length is the distance from the existing MHW station seaward, but does not include the length of the structure landward of the MHW station. An additional 90-feet of structure is required to link the structure to the existing berm crest, resulting in a total length of 240-feet. A continuous structure height of 6-feet above MLW was selected. This height exceeds the natural berm by 1-foot and is capable of sustaining a 4-foot wave without overtopping, and a 6-foot wave with minimal overtopping. Quantities of materials required for the construction of the structure include 13,713-cubic feet of armor stone, 3,325-cubic feet

of bedding stone, 7,968-cubic feet of foundation stone, 10,080-square feet of filter fabric, and 2,400-square feet of vinyl sheet pile. A plan view and cross-section of the proposed structure are shown on Figures A-25 through A-27 in the Engineering Appendix.

97. **Construction** Construction of this 4.7-mile segment of the Lee County project is estimated to be accomplished over a 10 month period. A hopper dredge will be used with pump-out barges to pump material from the borrow area onto the beach. Booster pumps and barges may be required to cover the entire project reach. Bulldozers and graders will be used at the outfall to shape the material into the required construction template.

98. **Real Estate Requirements** Ownership of oceanfront property within the 4.7 project limit includes Federal, state, county, and private lands. An erosion control line (ECL) has not been designated for this segment of the project although one has been proposed. Easements on approximately 350 parcels of land will be required for the construction of this segment of the project.

99. **Costs** Preliminary cost estimates for providing beach nourishment were developed and compared to predicted benefits to determine the plan that would result in the maximization of net benefits (the NED plan). Dredge and fill operations would be conducted from the borrow area to the project area. Table 3 displays the benefits and costs for shoreline extension from 0 to120-feet in 20-foot increments. Mobilization and demobilization cost including the terminal groin are $974,000. Unit costs for a hopper dredge is $12.38 per cubic yard. The per cubic yard unit cost for dredging includes turtle and turbidity monitoring. A contingency factor of 20% is assessed on all dredging costs. Preconstruction engineering, design, supervision, and administration costs are estimated at 15% of the total construction cost, respectively. The Fiscal Year 2001 directed interest rate of 6 and 3/8ths percent is used in the analysis. Once the NED plan was selected the design and costs were refined and updated to October 2000 price levels to match the benefits' price level.

100. Table 8 (as described in Paragarah 144) displays the 40-foot shoreline extension cost estimate for project features. An approximate design volume of 546,400-cubic yards and an advance nourishment volume of 244,400-cubic yards (790,800-cubic yards total) of beach quality material would be required for initial construction. The use of a hopper dredge with pipeline pumpout capability to the beach would be the least cost alternative of the various plants considered. The table incorporates weighted averages of mobilization and unit costs based on cost estimates for placement of material along the 4.7-mile project area. Refined cost estimates for Preconstruction Engineering and Design (PED) and Supervision and Administration (S&A) are used in the detailed assessment of alternatives. The optimal nourishment interval for the 40 foot project is shown to be 3-years in Table 5.

101. The project provides for a 40 foot berm over 4.7-miles and periodic renourishment of 5.1-miles (including tapers). Initial construction is estimated at $14,677,400 (including terminal groin, required monitoring and Interest During Construction and October 2000 pricing) with Federal cost share being $8,721,000. Periodic renourishment required every three years is estimated to cost $4,836,000.

102. **Benefits** The primary purpose of the Estero Island segment of the Lee County Shore Protection project would be the reduction of storm damage to upland development. The NED plan would provide protection in, varying degrees, to over $66.6 million in private, commercial, and public upland development, not including infrastructure such as roads and utilities. About $8.2 million of average annual damages are predicted to occur in the project area under future without project conditions. The 40 foot design template would result in an average annual equivalent benefit of $5,808,600. The benefit value includes the cost of damage to upland development, coastal armor, backfill, and the value of land lost. Incidental recreation benefits of $176,000 are also claimed for the selected plan. The average annual equivalent benefit of the selected plan would be $5,985,000. Detailed analyses of project benefits are presented in the Economics Appendix (Appendix E).

103. **Environmental Impacts** An Environmental Impact Statement (EIS) of project implementation has been completed and follows the main text of this report. The EIS identifies environments to be affected by construction of this segment of the project. These environments include the borrow areas as well as the beach and the nearshore area along the project reaches. Consideration was given to the impacts of the project element on fish and wildlife resources, threatened or endangered species, cultural resources, water quality, hazardous and toxic wastes, aesthetic resources, coastal barrier resources, acoustic quality, air quality, and recreation. The EIS indicates that this segment of the project implementation would have no significant negative impacts on the environment, a Record of Decision (ROD) will be provided by higher authority upon approval of the EIS and GRR.

104. **Cost Apportionment** Section 103(a) of WRDA 86 specifies that hurricane and storm damage reduction projects are to be cost shared at a 65 percent Federal and a 35 percent non-Federal basis. Section 103(c) (4) states that recreation projects are to be cost shared at 50 percent of separable costs. Section 103(d) states that the cost of constructing projects or measures for beach erosion control and water quality enhancement shall be assigned to the appropriate purposes listed above.

THE RECOMMENDED PLAN

DESCRIPTION

105. The project features carried into detailed design constitute the National Economic Development plan for shore protection of Gasparilla Island and Estero Island, In Lee County Florida. The two projects are discussed below.

106. Gasparilla Island beach restoration provides for initial restoration and periodic nourishment of 2.8-miles of shoreline extending from FDEP monument R-11 south to FDEP monument R-24. A 600-ft taper section connects the proposed beachfill with the existing southern shoreline. On the northern end, a 1,200-foot taper section connects the proposed beach fill with the existing shoreline. Renourishment accomplished at seven-year intervals would optimize net primary benefits over the 50-year life of the project (starting upon completion of initial construction). The recommended design template incorporates a 20-foot berm with an elevation of +5-feet Mean Low Water (MLW), a foreshore slope of 1V:15H transitioning to a nearshore slope of 1V:25H at MLW extending out to the intersection with the existing profile.

107. Estero Island Beach Restoration provides for initial restoration and periodic nourishment of 4.7-miles of shoreline extending from FDEP monument R-175 south to FDEP monument R-198 on the southern end, an 1,800 foot taper section connects the proposed beach fill to the existing shoreline. Renourishment accomplished at three-year intervals would optimize net primary benefits over the 50-year life of the project (starting upon completion of initial construction). The recommended design template incorporates a 40-foot berm with an elevation of +5-feet Mean Low Water (MLW), a foreshore slope of 1V:25H transitioning to a nearshore slope of 1V:35H at MLW extending out to the intersection with the existing profile.

108. Estero Island Terminal Groin provides for the placement of a 240-foot rubble mound terminal groin at the northern end of Estero Island. The crest elevation of the groin is established at +6-feet MLW over the entire length of the structure. The structure will include armor stone, bedding stone and foundation stone along with filter fabric.

DESIGN AND CONSTRUCTION

BERM ELEVATION

109. Modification to the berm elevation of the Gasparilla and Estero Island shore protection project was considered through conventional beach nourishment design procedures and EM 1110-2-3301 (May 1995), Design of Beach Fills. The depth of closure for each portion of the project defines the depth limit of significant cross-shore sediment movement. The top of the natural berm crest defines the upper limit of

significant sediment movement. EM 1110-2-3301 stipulates that the construction berm elevation should be the same or slightly less than the natural berm crest elevation. It is understood that the construction berm will erode and the beach fill will be redistributed into a more naturally shape profile. Restricting the construction berm crest height to the natural berm crest height will minimize scarping problems as the beach fill undergoes readjustment. Scarps may hinder beach access by nesting sea turtles and they may pose safety problems for humans using the beach.

110. To determine the appropriate berm elevation along the project shoreline, foreshore features (as depicted in the cross section plots of the 1995 beach profile survey) were identified. Survey data collected at 1,000 ft spacing along the study area were utilized for the berm height analysis.

111. Based on the existing natural berm elevation, a + 5 foot (relative to MLW) design berm has been chosen for Gasparilla Island. This value represents an increase in the authorized project height of + 4-feet (relative to MLW). The increased berm elevation approximated the naturally existing berm in the area where it is present , and was selected as the appropriate elevation for design considerations. The design of the berm is based on the GENESIS model.

112. Based on the existing natural berm elevation, a + 5-foot (relative to MLW) design berm has been chosen for Estero Island. This value represents an increase in the authorized project height of + 5-feet (relative to MLW). The increased berm elevation approximate the naturally existing berm in the area where it is present , and was selected as the appropriate elevation for design considerations. The design of the berm is based on the GENESIS model.

BERM WIDTHS

113. An economic analysis was performed to optimize net benefits by comparing project costs and benefits for a number of alternatives. This analysis determined that for Gasparilla Island a MHW extension of 20-feet met this criterion. For Estero Island, the economic analysis determined that for a MHW extension of 40-feet met this criterion. Additional fill is required to maintain the berm widths at these two islands over the optimized renourishment interval.

BEACH SLOPES

114. An estimate of the existing slopes at both Gasparilla and Estero Islands was made using the 1995 U.S. Army Corps of Engineers survey. Based on the survey, the natural beach slope of Gasparilla Island was estimated as 1 (vertical) on 15 (horizontal) above MLW and 1 on 25 MLW. Utilizing the same 1995 USACOE survey, a natural beach slope on Estero Island was estimated as 1 (vertical) on 25 (horizontal) above MLW and 1 on 35 MLW.

115. Profiles taken in the areas adjacent to and affected by shoreline protective features were not considered in the estimate. It is believed that these structures generate conditions that may reflect an artificially steep cross-shore slope estimate, and thus, they are not considered representative of the natural slope. A construction slope of 1 vertical to 10 horizontial was also adopted for each project element. This construction slope will allow renourishment without adverse impact to the adjacent waters.

PROJECT VOLUME REQUIREMENTS AND RENOURISHMENT INTERVAL

116. A design template was developed for both Gasparilla and Estero Islands. The design template for both islands was based on guidance provided by the National Research Council's report on beach renourishment (National Research Council, 1995). This template for Gasparilla Island was based on a 20-foot MHW extension and a 1:15 and 1:25 slope above and below MLW, respectively. A similar template for Estero Island yielded a 40-foot MHW extension and a 1:25 and 1:35 slope above and below MLW, respectively.

117. The design volumes that are presented here are based on nourishment of the entire active profile on each island. This projected nourishment was accomplished through a translation of the existing profile seaward. This translation resulted in the profile being moved seaward a distance such that it is entirely seaward of the design template. The design template can be considered the threshold dimensions for the project. That is, the volume estimates based solely on the design template can be considered to generally under predict the renourishment volume necessary to maintain the design template.

118. Volumes for both the design template and the additional translated volumes are presented in Tables A-17 and A-19 of the Engineering Appendix for Gasparilla and Estero Islands, respectively. These volumes were generated based on design requirements at approximately 1,000-foot intervals. Volumes are the average end approximations based upon interpolation of cross section cut and fill areas. The area between the survey and the design template cross-section is determined. This volume is then multiplied by the distance between the cross-sections to determine the average renourishment volume.

119. Typical cross-sections based on the design template for the with-project conditions on Gasparilla Island are provided in the Engineering Appendix. In a similar fashion cross-sections with the baseline design template for the with project conditions on Estero Island are also in the Engineering Apprendix. The volume requirements for each project incorporate the material needed to establish various MHW extensions, advance maintenance extensions, overfill, and tapers for transition to the natural shoreline. The minimum project (0-foot MHW extension) provides for maintaining the shoreline in existing conditions.

120. The Gaspirilla Island design template is projected to extend from FDEP monument R-11 on the north to FDEP monument R-24 on the south. The reach for the project is approximately 2.8-miles in length. Based on the profile surveys obtained in 1995, approximately 244,400-cubic yards of beach quality sand would be required to establish a 20-foot MHW extension.

121. The Estero Island design template is projected to extend from FDEP monument R-175 on the north to FDEP monument R-198 on the south. The reach for the project is approximately 4.7-miles in length. Based on the profile surveys obtained in 1995, approximately 546,400-cubic yards of beach quality sand would be required to establish a 40-foot MHW extension.

122. As with most renourishment efforts, it can be expected that a long-term volumetric loss will occur over the renourishment cycle. Therefore, advanced nourishment is required. The optimum renourishment cycle was determined based on economic considerations to reflect the lowest annual average cost of maintaining the project.

123. The advance nourishment volume reflects the projected erosion rates and the optimization of the nourishment interval. Volume requirements were determined by the average end method described previously. The volume requirements also consider the transition sections at each end of the project. The transition section at the northern end of the Gasparilla Island project consists of 1,200-feet of taper section. On the southern end of the Gasparilla Island project, the taper section is approximately 600-feet in length. In both cases, these taper sections are designed to form a transition area from the design template to the natural shoreline. For the Gasparilla Island, the optimum renourishment interval was determined to be 7 years. The volume of this advanced and return interval nourishment was calculated to be 541,800-cubic yards. A uniform placement of the fill material was adopted based on findings of the GENESIS model.

124. The geotechnical investigation of the proposed borrow areas for Gasparilla Island which are described in the Geotechnical Appendix indicate a grain size of the borrow area that is greater than the observed native beach conditions. Thus, there is no additional fill volume required for nourishment resulting in an overfill ratio of 1.0.

125. For Estero Island, the advance nourishment volume was calculated to be 244,400-cubic yards. This volume calculation also considers the volume necessary to taper the fill back to natural conditions. Because of the location of the fill, and the anticipated placement of a terminal groin at the northern end of Estero Island, only the southern end of the Estero Island required a taper. Based on the analysis, a 1,800-foot taper section at the southern end of the project is required to connect the renourishment area with the natural shoreline. The optimum renourishment interval was determined to be 3 years. Thus, 244,400-cubic yards will be required for the periodic renourishment that equates to 81,500-cubic yards on a yearly basis.

Modifications of the level of periodic renourishment may be undertaken based on future monitoring of project performance.

126. A geotechnical investigation of the borrow areas for Estero Island indicates that the borrow area grain size is greater than that observed on the native beach. This size differential is a benefit to the project in that the overfill ratio is determined to be 1.0.

TERMINAL GROIN

127. The Estero Island analysis using the GENESIS model found that a significant improvement in the ability of the shoreline to retain the renourishment was obtained through the placement of a terminal structure at the north end of the project. The placement of this terminal structure will be in the vicinity of FDEP Monument R-175. The effective length of the structure was optimized economically based on the results of the GENESIS model with structures of varying length.

128. The GENESIS simulations determined the optimal length of the terminal groin structure to be 150-feet. This distance represents the distance from the existing MHW station seaward. However, this distance does not include the length of structure required landward of the MHW station. An analysis of the distance between the existing berm crest and the MHW station adds an additional 90-feet to the structure length. Thus, the total length of the terminal structure is 240-feet. The seaward end of the structure extends to the crest of the bar at a water depth of approximately –2.5-feet (relative MHW). The GENESIS model results indicate that a positive region of influence stretching approximately 2,000-feet south of the structure will occur. Further, these simulation results indicate a maximum fill volume of 72,200-cubic yards.

129. The NED evaluation calls for the placement of a terminal structure with a continuous structure height of 6-feet (relative to MLW). This elevation exceeds the natural berm height in the area of FDEP Monument R-175. This elevation is capable of sustaining a wave of 4-feet with no overtopping. Further, the analysis of the wave action shows that a 6-foot wave only results in minimal overtopping. Depth induced wave breaking should serve to limit the size of waves which are incident on the structure in all but the most severe conditions.

130. Estero Island terminal groin provides for the placement of 240-feet rubble mound groin at the northern end of Estero Island. The crest elevation of the groin is established at +6-feet MLW over the entire length of the structure. The structure will include armor stone, bedding stone and foundation stone along with filter fabric.

BORROW AREA

131. The borrow area for Estero Island is located approximately 16-miles west of the island and is designated as Estero Borrow Area B. Identified hardgrounds will require a 500 foot buffer zone. For Gasparilla Island, the borrow area is directly offshore of the

southwestern portion of the island and is designated as the Gasparilla Borrow Area - #2. A Consent of Use will be obtained from the State of Florida for each of these borrow areas.

REAL ESTATE REQUIREMENTS

132. Material placed upon public lands seaward of the proposed ECL will require a Consent of Use from the State of Florida. The Consent of Use issued by the State grants the right to place material on state-owned submerged lands in accordance with the beach nourishment plans submitted with the application of an erosion control line. Also included in this document is the approval to use any submerged borrow areas and/or pipeline corridors. This document must be renewed with each renourishment contract.

133. Easements are required from approximately 150 parcels on Gasparilla Island and 350 parcels on Estero Island located landward of the ECL. It is recommended that the local sponsors acquire the standard perpetual beach storm reduction easement estate. In the event the local sponsor encounters difficulties in acquiring this perpetual estate and so notifies the Corps of Engineers, it is recommended that approval be granted for the local sponsors to acquire a temporary beach storm reduction easement for a fifty-year term concurrent with the duration of the project.

134. The appraiser has determined that the value of the lands needed for easement purposes are assessed at zero. Erodable land that is to be protected by the Federal project is valued at zero as it will be enhanced post-project. Federal regulations state that "shore protection projects will generally be treated in a manner as to not allow credit for lands when the project provides direct benefits such as the prevention of erosion or re-establishment of beaches."

OPERATION AND MAINTENANCE

135. The non-federal sponsors will operate and maintain the project for the project life. The currently authorized project life is 10 years from the end of initial construction; this document is seeking a re-authorization for a 50 year project life (starting upon completion of initial construction). Future periodic nourishment is considered construction and will be performed as part of the Federal project.

136. It is estimated that the current operation and maintenance procedures as conducted by the sponsor will continue to be sufficient. Trash and scarp removal will continue after the implementation of the Federal project.

ECONOMICS OF THE PROJECT

137. All NED project costs and benefits are calculated in terms of equivalent annual dollars. Engineer Regulation (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 for other induced benefits and costs. For without and with-project conditions, estimate the cost of maintaining shore protection and navigation projects. At the project site and other impacted sites, assess the extent of damages to property through the analysis of storm surge and wave damage; assess changes in recreation (if any); and evaluate project impacts to jetties, channels and other navigation features."

138. 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). NED costs are defined as "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.)

139. NED benefits result in an increase to the net value of the national output of goods and services as a direct outcome of project implementation. The key point to understand 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. The NED plan for both the Gasparilla and Estero Islands elements of the Lee County Shore Protection Project consists of beach fill with periodic renourishment for the purpose of reducing storm damages along portions of the shorelines on these islands in Lee County. The optimum renourishment interval for the Gasparilla Island element of the project is 7 years, while the optimum renourishment interval for the Estero Island element is 3 years. The Estero Island plan also includes as a project feature a 240 foot terminal groin that has an optimum effective length of 150-feet.

COSTS

140. Engineering Circular (EC) 1110-2-538, dated 28 February 1989 requires the establishment and consistent use of standard code of accounts when estimating costs for civil works projects. The cost estimates for the selected plans for each element of the project are presented using the standard code of accounts. Cost estimates for engineering and design were prepared by Engineering Division, USACE, Jacksonville. The estimates of real estate and related costs were prepared by Real Estate Division, USACE, Jacksonville. A direct interest rate of 6 and 3/8ths percent was used to determine average annual equivalent cost. Project cost estimates are based on October 2000 price levels. The Geotechnical Appendix details the location and composition of material contained in the borrow areas. An overfill factor of

approximately 1.0 was found for various portions of the study area indicating compatibility of this fill material to the native sands. A list of overfill factors for various borrow areas is presented in the Geotechnical Appendix. A breakdown of the costs is provided in Tables 7 and 8.

141. Cost estimating information used for project feature optimization incorporated unit prices for placed material, mobilization, and environmental monitoring costs. Estimates of preconstruction engineering and design as well as supervision and administration costs are used to develop final project costs. Project quantities were based on conditions of the shoreline as determined by beach profile surveys conducted in each project element area in 1995. The renourishment interval, as stated previously, was optimized at 7-years for Gasparilla Island when considering an annual loss of 96,000-cubic yards over the entire 2.8-mile length of shoreline and 3-years for Estero Island when considering an annual loss of 135,000-cubic yards over the entire 4.7-mile length of shoreline. The optimized berm widths and renourishment intervals were then modeled and the annual loss rates for Gasparilla and Estero were modified to 77,500 cubic yards and 81,500 cubic yards, respectively.

ANNUAL COST OF INITIAL CONSTRUCTION

142. **Gasparilla Island** The 20-foot design template would require the placement of approximately 244,400-cubic yards of beach quality material. Analysis of the 20-foot design template resulted in identification of an initial construction volume of approximately 786,200 cubic yards (244,400 cubic yards design and 541,800-cubic yards advance fill) placed during one dredging season and a 7-year renourishment interval for the 50-year life of the project (starting upon completion of initial construction). The initial construction cost of this element of the project would be approximately $4,714,000, as shown in Table 7. The average annual equivalent cost for initial construction was determined to be $338,600 by multiplying the capital recovery factor for the Fiscal Year 2001 (FY01) directed interest rate (0.066789 for a 6 and 3/8ths percent interest rate) times the cost of initial construction plus the calculated Interest During Construction.

143. **Estero Island** The 40- foot design template would require the placement of approximately 546,400-cubic yards of beach quality material. Analysis of the 40-foot design template resulted in identification of an initial construction volume of approximately 790,800-cubic yards (546,400-cubic yards design and 244,400-cubic yards advance fill) placed during one dredging season and a 3-year renourishment interval for the 50-year life of the project (starting upon completion of initial construction). The project plan for this element also includes the construction of a 240-foot terminal groin. The initial construction cost of this element of the project, including the terminal groin would be approximately $13,740,000, as shown in Table 8. The average annual equivalent cost for initial construction was determined to be $980,300 by multiplying the capital recovery factor for the Fiscal Year 2001 (FY01) directed

interest rate (0. 066789 for a 6 and 3/8th percent interest rate) times the cost of initial construction plus the calculated Interest During Construction.

TABLE 7
GASPARILLA ISLAND
SHORE PROTECTION COSTS

ITEM		COST
Construction Cost		
Mobilization, Demobilization, and Prep. Work		$ 663,027
Pipeline Dredging -- 786,200-cubic yards		2,794,304
General Items		
Turbidity Monitoring	$ 20,069	
Manatee Observer	43,006	
Sea Turtle Observer and Relocation	71,676	
Beach Tilling	8,886	
	$143,637	143,637
Total Construction Cost		**$3,600,968**
Non-construction Cost		
Lands and Damages		$ 159,939
Planning, Engineering and Design		287,889
Construction Management		360,158
Total Non-construction Cost		**$ 807,986**
Mitigation Costs (Nearshore reef impacts)		**$ 305,536**
Total Cost of Initial Fill		**$4,714,490**
Periodic Renourishment		
Construction Cost		
Mobilization, Demobilization, and Prep. Work		$ 663,027
Pipeline Dredging – 541,800-cubic yards		1,925,660
General Items		
Turbidity Monitoring	$ 13,767	
Manatee Observer	29,500	
Sea Turtle Observer and Relocation	49,166	
Beach Tilling	8,885	
	$101,318	101,138
Total Construction Cost		$2,690,005
Non- construction Cost		
Lands and Damages		$ 0
Planning, Engineering and Design		215,621
Construction Management		268,934
Total Non-construction Cost		**$ 484,555**
Total Periodic Renourishment Cost		**$3,174,560**

TABLE 8
ESTERO ISLAND
SHORE PROTECTION COSTS

ITEM		COST
Construction Cost		
Mobilization, Demobilization, and Prep. Work		$ 973,616
Hopper Dredging -- 790,800-cubic yards		9,790,443
General Items		
Turbidity Monitoring	$ 46,110	
Manatee Observer	98,806	
Sea Turtle Observer and Relocation	164,677	
Beach Tilling	8,886	
	$318,479	318,479
Total Construction Cost		**$11,082,538**
Non-construction Cost		
Lands and Damages		$ 373,190
Planning, Engineering and Design		886,178
Construction Management		1,107,723
Total Non-construction Cost		**$ 2,367,091**
Total Cost of Initial Fill		**$13,449,629**
Terminal Groin		
Construction Cost		
Mobilization, Demobilization, and Prep. Work		$ 54,369
Breakwaters		191,521
Total Construction Cost		$ 245,890
Non-construction Cost		
Planning, Engineering and Design		$ 19,903
Construction Management		24,879
Total Non-construction Cost		$ 44,782
Total Cost Terminal Groin		**$ 290,672**
Total Initial Cost		**$13,740,301**

TABLE 8 cont.
ESTERO ISLAND

PERODIC RENOURISHMENT

Construction Cost		
Mobilization, Demobilization, and Prep. Work		$ 973,616
Hopper Dredging – 244,400-cubic yards		3,025,777
General Items		
Turbidity Monitoring	$ 14,264	
Manatee Observer	30,566	
Sea Turtle Observer and Relocation	50,943	
Beach Tilling	8,886	
	$104,659	104,659
Total Construction Cost		$4,104,052
Non- construction Cost		
Lands and Damages		$ 0
Planning, Engineering and Design		322,247
Construction Management		409,916
Total Non-construction Cost		**$ 732,163**
Total Periodic Renourishment Cost		**$4,836,215**

ANNUAL COST OF INTEREST DURING CONSTRUCTION, MONITORING AND MAINTENANCE

144. The convention, used to calculate the IDC, involves payment at the beginning of every month with the interest (6.375 percent annually) applied at the middle of the month. Construction of the considered shore protection plan is to be in two separate contracts for the two islands. Interest starts to accrue during Preconstruction Engineering and Design (PED) and stops at the beginning of the base period for project life, i.e., year 2001 for the two projects. IDC amounts to $355,000 for the Gasparilla project and $937,100 for the Estero project with an AAEQ of $23,700 and $62,600 respectively. Maintenance of the projects, including scarp removal, trash pick up, and turtle nest relocation is assumed to take the same effort as presently expended by the non-Federal sponsor under exiting conditions. No additional associated cost have been identified for beach maintenance under the "with projects" conditions. These tables can be found after the main text.

145. Interest during construction for the terminal groin is included in the values shown above for Estero Island. For the terminal groin, it was estimated that 10 percent of the

cover layer would need replacing every 10 years. In each case, the cost of the rock structure maintenance is computed as 10 percent of the cost of the armor layer plus mobilization and demobilization, and adding the appropriate contingencies, PED and construction management costs. Costs were also estimated for inspection of the groin to assure that it is functioning as designed and that all of the benefits claimed are produced. The Corps will inspect the structure annually and have a survey of the structure every two years. The non-Federal sponsor will be required to inspect the structure on a semi-annual basis. When all these costs are annualized over the 50 year life of the project, the annual cost is $10,100 for maintenance of the terminal groin.

ANNUAL COST OF FUTURE BEACH NOURISHMENT

146. **Gasparilla Island** The cost of each future renourishment would be approximately $3,175,000. The annual cost of future beach renourishment at 6 and 3/8ths percent is equal to the sum of the present worth for each future renourishment at years 2008, 2015, 2022, 2029, 2036, 2043, and 2050 times the capital recovery factor. Interest and amortization of future renourishment for the NED plan would be $372,800.

147. **Estero Island** The cost of each future renourishment would be approximately $4,836,200. The annual cost of future beach renourishment at 6 and 3/8ths percent is equal to the sum of the present worth for each future renourishment at years 2004, 2007, 2010, 2013, 2016, 2019, 2022, 2025, 2028, 2031, 2034, 2037, 2040, 2043, 2046, and 2049 times the capital recovery factor. Interest and amortization of future renourishment for the NED plan would be $1,514,600.

TOTAL ANNUAL PROJECT COST

148. The total average annual equivalent cost for the Gasparilla Island NED plan is estimated at $711,400. The total average annual cost for the Estero Island NED plan is estimated at $2,494,900. Tables 9 and 10 show the relevant financial data for the two project elements.

BENEFITS

149. Federal storm damage reduction benefits accrued by shore protection projects 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 MHW shoreline and the coastal armor line along the project shoreline. The Economic Appendix (Appendix E) provides a full account of the Jacksonville District's Storm Damage Model (SDM) used to predict damages under with and without project conditions.

150. To estimate structural improvement values, the Jacksonville District Staff Appraiser relied upon the Lee County Property Appraiser's assessments (for ad valorem taxation) which included separate values for both land and improvements. The

improvement values are developed by estimating the new replacement cost less depreciation of the improvements. Replacement cost is defined in the 10th Edition, The Appraisal of Real Estate, American Institute of Real Estate Appraisers, as "the estimated cost to construct, at current prices, a building with utility equivalent to the building being appraised, using modern material and current standards, design and layout". Accrued depreciation is the difference between the replacement cost on the effective date of the appraisal and the market value of the improvements on the same date. Accrued depreciation is the cumulative reduction in value caused by physical deterioration, functional obsolescence due to inadequacy or super-adequacy, and external obsolescence. In appraisal theory, replacement cost new less depreciation is equal to the market value of an improvement. Estimates of replacement cost and accrued depreciation are made by observing construction quality, condition and effective age, analysis of floor plans, measurement of improvements, and analysis of permits issued for additions/renovations, plumbing, electrical, etc.

151. The assessed value normally represents the market value less the typical administrative costs of deed transfer (or sale) including points, commissions, document stamps, recording fees, etc. Typical assessed values in Florida are 85%+/- of market value. To provide a check for this, the appraiser has made a comparison of the assessed value to market value (sales price) of several recent improved and vacant sales (oceanfront and near shore) within the project limits of Lee County. Generally, the ratios were between 70% and 80%. To bring the assessed value of the oceanfront structures up to market value, structural assessments were factored upward based on a 75% assessed value to market value ratio for Lee County. For the purpose of providing a mass appraisal for planning purposes only, we can assume that the factored structural assessments are equivalent to the market value of the structure.

TABLE 9
GASPARILLA ISLAND
AVERAGE ANNUAL COSTS

Total Cost of Initial Fill	$4,714,000
Interest During Construction	355,000
Total Financial Cost	**$5,069,000**
ANNUAL COST	
Interest On Investment @ 6 and 3/8^{ths} percent	**$ 338,600**
Periodic Beach Renourishment	372,800
Total Annual Cost	**$ 711,400**

TABLE 10
ESTERO ISLAND
AVERAGE ANNUAL COSTS

Total Cost of Initial Fill and Terminal Groin	$13,740,000
Interest During Construction	937,100
Total Financial Cost	**$14,677,100**
ANNUAL COST	
Interest On Investment @ 6 and 3/8^{ths} percent	$ 970,200
Periodic Beach Renourishment	1,514,600
Terminal Groin Maintenance	10,100
Total Annual Cost	**$ 2,494,900**

152. Shoreline change values have been assumed for short and long term trends. Short-term shoreline change is associated with the recession distances expected for storms of various frequencies of occurrence. The computer model SBEACH was used to determine recession values for representative beach profiles. A frequency versus recession distance curve was developed for the project areas using joint probability analysis methods. Long-term shoreline changes anticipated over the life of the project are required by the SDM. The Engineering Appendix contains a discussion of the development of the frequency versus recession distance curve and the long-term shoreline change rates.

153. Other assumptions made in determining the benefits of the authorized project elements include the return period of a storm which would signal condemnation of a structure, protective value of existing and future coastal armor, and the base year of the project elements. 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 condemned prior to the base year of the two project elements are removed from the SDM inventory entirely. Additional assumptions are presented in the Economic Analysis Appendix (Appendix E).

154. After a series of investigative SDM simulations, it was determined that condemnation would be implemented if a structures full value would be realized, in a given year, by a 5-year return period storm unless that structure was protected by adequate coastal armoring. Thus if the structure was within the distance of the 5 year event as measured from the current shoreline position, it was removed from the structure inventory so it would not contribute to future damages. The protective level of existing coastal armor was assessed through a series of site inspections. The SDM explicitly accounts for the protective level of coastal armor on a parcel-by-parcel basis. It accomplishes this through consideration of the protection, from storm induced damages and long-term recession, that is favored to upland development leeward of the armor. The base year of each of the project elements was assumed to be 2001, contingent upon construction authorization and allocation of Federal, non-Federal and state funding.

155. Benefits of beach nourishment were determined for MHW extensions of 0 to 120-feet in 20-foot increments. Primary benefits for storm damage reduction were used to determine the NED Plan. Incidental recreation benefits are claimed only for the plan that maximizes NED benefits based solely on storm damage prevention (See Appendix E for additional details). Storm damage benefits result from project implementation through reductions in damages to upland development, loss of land, backfill requirements, coastal armor construction and maintenance. The FY01 directed interest rate of 6 and 3/8 percent was used in the intermediate assessment of alternative plans.

156. The computer model SBEACH was utilized to characterize the frequency versus recession curve for each of the project element areas. The Engineering Appendix contains detailed descriptions of the methods used to develop the frequency versus recession distance curves used in the storm damage analysis.

157. Average annual equivalent storm damages for the without project condition in the Lee County project area are estimated at about $10.5 million. Of this amount $2.3 million are associated with the Gasparilla Island element of the project and $8.2 million associated with the Estero Island element. Additional characteristics of the no action plan for the study areas are described in the section of this report entitled "Future Without Project Conditions". A breakdown of average annual damages in each of the study areas is shown in Appendix E.

STORM DAMAGE BENEFITS

158. Economic justification of beach nourishment on Gasparilla and Estero Islands is based on the protection of structural improvements located along the front row of development along the respective project element shoreline. Shoreline developments on each of these islands is a mix of single family, multi-family, commercial, and park improvements. The economic evaluation determines the justification of Federal participation based on benefits generated versus the cost of providing the authorized level of protection along the respective project element shorefront.

159. Benefits resulting from the beach fill 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 Engineer Regulation (ER) 1105-2-100 which states " recreation benefits produced 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".

160. Average annual storm damage benefits for the 50 years of economic life of each project element were determined by comparing the respective with and without project conditions. Damages were simulated from changes due to shoreline movements and erosion events associated with storms. The probabilistic frequency versus storm recession distance curves for both Gasparilla and Estero Islands were developed and are discussed in greater detail in the Engineering Appendix. Annual shoreline position changes were estimated based on historic shoreline change rates in each of project element areas.

161. The extent of damages is a result of annual shoreline position changes and the damage probabilities from the frequency versus recession distance curves. Damages are claimed as a result of these two mechanisms in the SDM. Basic assumptions of the computer model are that a structure experiences damage when the landward extent of storm recession impacts the seaward edge of the structure. Full value of the bottom two floors of structures on slab and grade foundations is realized when erosion reaches the middle of the structure. Structures are condemned and taken from the inventory if their full value (including armor protection level) is located within the recession envelope of the 5-year return period storm during the first year of damage simulation. Inherent in the routine is the capacity of coastal structures to halt erosion, and the ability to construct new coastal structures upon failure of the existing structures. A more detailed discussion of the SDM and the required input data is provided in the Economic Appendix.

162. The proposed shoreline extensions are simulated by the 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 and the expected annual damages under the with-project conditions. In the analysis of the annual storm related benefits which each of the project elements will provide, the damages projected for the 50-year economic life of the two project elements are determined assuming with and without project conditions. The NED shoreline for the Gasparilla Island and Estero Island project elements, as identified by the maximization of primary net benefits, provided the basis for development of the project design cross section configuration.

LOSS OF LAND

163. Loss of land benefits are claimed at privately owned shorefront parcels in the region bounded by the pre-project MHW shoreline and the location of the coastal armor. Beach nourishment results in a design shoreline which is at or seaward of the pre-project MHW 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 nearshore land. The value of nearshore land is not influenced by its proximity to the shore. Real Estate Division, Jacksonville District, investigated recent vacant nearshore land sales on both Gasparilla and Estero Islands for both residential and commercial properties. Upland sales data indicated an average value for nearshore residential as well as nearshore commercial property on Gasparilla Island and Estero Island of $15.00 and $9.75 per square foot, respectively.

RECREATION

164. Recreation benefits are incidental to the project's primary purpose of storm damage reduction. Benefits associated with the increase in recreational opportunities on both Gasparilla and Estero Islands as the result of project implementation are

presented in the Economics Appendix. Recreation benefits were calculated by analyzing recreational demand under with and without project conditions for each island and using the Travel Cost Method to determine beach users "willingness to pay". Average annual equivalent benefits for the Gasparilla Island and the Estero Island elements of the Lee County Shore Protection Project are $254,000 and $176,000, respectively. Total project recreation benefits are estimated at $430,000.

ECONOMIC JUSTIFICATION

165. Table 11 summarized the economic justification for the Gasparilla Island and Estero Island project elements. The BCR's for the Gasparilla Island element and the Estero Island element are 2.8 and 2.3, respectively, including recreation, for the directed interest rate of 6 and 3/8 percent. Without recreation benefits the BCR's for Gasparilla and Estero Islands are 3.2 and 2.4 respectively.

TABLE 11
ECONOMIC JUSTIFICATION
LEE COUNTY SHORE PROTECTION PROJECT

ITEM	GASPARILLA ISLAND	ESTERO ISLAND
ANNUAL BENEFITS		
Storm Damage Reduction	$2,005,800	$5,808,600
Recreation	254,000	176,000
Total Benefits	**$2,259,800**	**$5,984,600**
ANNUAL COSTS		
Total Average Annual Costs	**$ 711,400**	**$2,494,900**
BENEFIT/COST RATIO		
BCR	**2.8**	**2.3**

SUMMARY OF ENVIRONMENTAL EFFECTS

166. The main text includes an Environmental Impact Statement (EIS) which has been circulated under the policies and procedures established for coordinating civil works activities in accordance with the requirements of the Office of Management and Budget's Circular A-95 and the Fish and Wildlife Coordination Act. As the result of this

coordination a Record of Decision will be prepared. No significant environmental impacts are foreseen, hardgrounds off of Gasparilla Island are offshore of the project and to the north of the project. 0.3 acres of low relief hardgrounds were located in 2 to 3 feet of water near DEP Monument 11; these are being mitigated for under the Gasparilla project. The borrow area for Gasparilla contains three magnetometer readings that will be avoided. The borrow are for Estero Island contains some hardgrounds, these have been identified and will have a 500 foot buffer zone.

PLAN IMPLEMENTATION

COST ALLOCATION

167. Section 103(a) of WRDA 86 specifies that hurricane and storm damage reduction projects are to be cost shared at a 65 percent Federal and a 35 percent non-Federal basis. Section 103(c)(4) states that recreation projects are to be cost shared at 50 percent of separable costs. Section 103(d) states that the cost of constructing projects or measures for beach erosion control and water quality enhancement shall be assigned to the appropriate purposes listed above.

168. Before WRDA 86, Federal projects to protect against hurricanes and abnormal tidal flooding were established on a case-by-case basis, based on specific Congressional authorizations. Hurricane protection projects were viewed as being more like flood control projects from an authorization perspective prior to 1986. With the passage of WRDA 86, there are now no Federal distinctions between shore protection measures for hurricanes, storms or tidal induced flooding and beach erosion.

169. Shoreline erosion must be caused by wind and tidal generated waves. Therefore, the shore protection program does not cover erosion at upstream locations caused by stream flows except for those actions defined as emergency measures to protect highways, public works, and non-profit facilities. Department of Army Engineering Regulation 1105-2-100 contains general program guidance for the U.S. Army Corps of Engineers' Civil Works programs. Current shore protection law provides for Federal participation in shore protection projects, provided that the restored beaches are open and available for public use. Federal cost sharing is based on law, policy, and conditions of shore ownership and use at the time of construction or subsequent periodic renourishment.

170. Section 103(d) of WRDA 86 (Public Law 99-662) 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 the purposes to which the costs are assigned, except that no costs are assigned for incidental recreation. Hurricane and storm damage reduction projects are

cost shared at 65 percent Federal and 35 percent non-Federal, and separable recreation features are cost shared at 50 percent Federal and 50 percent 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, and Headquarters, U.S. Army Corps of Engineers (HQUSACE) memorandum dated September 23,1994.

171. Federal and non-Federal cost sharing percentages are categorized by shoreline ownership and use. The following is a breakdown of cost sharing percentages. 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 percent Federal and 50 percent non-Federal. The cost sharing would be 65 percent Federal and 35 percent non-Federal for protection of privately owned lands accessible to the public (assuming that the standard estate is acquired). Protection of undeveloped private lands would be 100 percent local responsibility. Street ends would be cost shared 65 percent Federal and 35 percent non-Federal since their protection results in storm damage reduction. Table 12 presents these percentages in tabular format. The following Table 13 summarizes the applicable cost sharing percentages for the Gasparilla Island project element. Table 14 summarizes the applicable cost sharing percentages for the Estero Island project element.

TABLE 12
COST SHARING PERCENTAGES

Land Ownership/Use	Federal (%)	non-Federal (%)
Private		
Developed		
Accessible	65	35
Inaccessible	0	100
Undeveloped	0	100
Public	50	50
Street Ends	65	35

COST APPORTIONMENT

SHORELINE OWNERSHIP AND USE

172. **Gasparilla Island** The 2.8-mile shoreline in this project element is comprised of 0.4-miles of parks and recreation areas, 0.6-miles of undeveloped parcels, and 1.8-miles of developed parcels. Based on the analysis presented in Table 13, the cost allocation for shore protection on Gasparilla Island is 58.7 percent Federal and 41.3 percent non-Federal. Table 15 outlines the break down of costs between the Federal and non-Federal responsibilities.

TABLE 13 - Gasparilla Cost Allocation

GASPARILLA ISLAND			
STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
'HOUSE R-11 '	180	0.65	117.0000
'HOUSE '	100	0.65	65.0000
'Vacant Lot '	100	0	0.0000
'HOUSE '	120	0.65	78.0000
'Street End '	50	0.65	32.5000
'HOUSE '	110	0.65	71.5000
'HOUSE '	110	0.65	71.5000
'HOUSE '	110	0.65	71.5000
'Street End '	50	0.65	32.5000
'HOUSE '	110	0.65	71.5000
'HOUSE '	110	0.65	71.5000
'Street End '	50	0.65	32.5000
'HOUSE '	200	0.65	130.0000
'HOUSE '	250	0.65	162.5000
'10th Street '	50	0.65	32.5000
'CONDO R-12 '	170	0.65	110.5000
'HOUSE '	130	0.65	84.5000
'Apt. Complex '	560	0.65	364.0000
'HOUSE '	80	0.65	52.0000
'7th Street '	50	0.65	32.5000
VACANT R-13 '	400	0.65	260.0000
USFWS	700	1	700.0000
4th Street R-14 '	50	0.65	32.5000
'HOUSE '	100	0.65	65.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	100	0.65	65.0000
'HOUSE '	80	0.65	52.0000
'HOUSE '	150	0.65	97.5000
'HOUSE '	100	0.65	65.0000
'Vacant Lot '	90	0	0.0000
'HOUSE R-15 '	200	0.65	130.0000
'VACANT '	100	0	0.0000
'HOUSE '	250	0.65	162.5000
'STREET END '	50	0.65	32.5000
'HOUSE '	140	0.65	91.0000
REC AREA '	400	0.5	200.0000
APARTMENT R-16'	200	0.65	130.0000
'HOUSE '	110	0.65	71.5000
'HOUSE '	110	0.65	71.5000
'HOUSE '	120	0.65	78.0000
'REC '	600	0.5	300.0000
'VACANT R-17 '	700	0	0.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000

TABLE 13 - Gasparilla Cost Allocation

GASPARILLA ISLAND			
STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'APT. R-18 '	360	0.65	234.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'VACANT LOT '	60	0	0.0000
'TWNHOUSE '	60	0.65	39.0000
'TWNHOUSE R-19 '	60	0.65	39.0000
'TWNHOUSE '	60	0.65	39.0000
'TWNHOUSE '	60	0.65	39.0000
'TWNHOUSE '	60	0.65	39.0000
'TWNHOUSE '	60	0.65	39.0000
HOUSE '	80	0.65	52.0000
HOUSE '	80	0.65	52.0000
'STREET END '	50	0.65	32.5000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. R-20 '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'APT. '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE R-21 '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000
'HOUSE '	60	0.65	39.0000

TABLE 13 - Gasparilla Cost Allocation

GASPARILLA ISLAND			
STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
'HOUSE '	60	0.65	39.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
'APT. '	40	0.65	26.0000
CONDO	200	0.65	130.0000
Barrier Island Geopark	2200	0.5	1100.0000
'RESTAURANT '	180	0.65	117.0000
CONDO R-25 '	460	0.65	299.0000
'CONDO '	110	0.65	71.5000
TOTAL	14,660		8,612
MILES	2.8	FEDERALPERCENTAGE	58.74%

TABLE 14 - Estero Cost Allocation

		ESTERO ISLAND		
DEP MON	STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
	'Bowditch Pt Park'	700	0.5	350
	Conodminium	460	0.65	299
-1 R176	'Estero Blvd Condo'	200	0.65	130
	Condo '	390	0.65	253.5
	'Condo '	50	0.65	32.5
	'Condo '	50	0.65	32.5
	'Condo '	50	0.65	32.5
	'Condo '	110	0.65	71.5
	'Coconut Beach '	230	0.65	149.5
-1 R177	'Apts '	60	0.65	39
	'Beach Club I '	100	0.65	65
	'Island Shores '	110	0.65	71.5
	'Island Shores '	80	0.65	52
	'Windward Condo '	240	0.65	156
	'Walkway/Access '	10	0.5	5
	'Condo '	50	0.65	32.5
	'Condo '	50	0.65	32.5
	'Condo '	50	0.65	32.5
	'Condo '	50	0.65	32.5
	'Gateway Condo '	100	0.65	65
	'Condo '	190	0.65	123.5
-1 R178	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Cane Condo '	190	0.65	123.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Accessway '	30	0.5	15
-1 R179	'Best Western '	360	0.65	234
	'Accessway '	30	0.5	15
	'House '	50	0.65	32.5
	'Street End '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Accessway '	30	0.5	15
	'Condo '	80	0.65	52
	'Condo '	65	0.65	42.25
	'Condo '	65	0.65	42.25
	'Bellaire Condo '	100	0.65	65
	'Beach Club Condo '	100	0.65	65
	'Condo '	100	0.65	65
-1 R180	'Condo '	100	0.65	65
	'Condo '	100	0.65	65
	'Lynn Hall Park '	500	0.5	250
	'Pier '	65	0.65	42.25
	'Shops '	90	0.65	58.5
	'Shops '	60	0.65	39
	'Shops '	100	0.65	65

TABLE 14 - Estero Cost Allocation

ESTERO ISLAND				
DEP MON	STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
	'Parking Lot '	100	0.65	65
-1 R181	'Sandman Rest. '	70	0.65	45.5
	'Motel '	100	0.65	65
	'Days Inn '	200	0.65	130
	'House '	40	0.65	26
	'Motel '	90	0.65	58.5
	'Condo '	125	0.65	81.25
	'Street End '	30	0.65	19.5
	'Small Bldg. '	115	0.65	74.75
	'Restaurant '	140	0.65	91
	'Street End '	35	0.65	22.75
-1 R182	'Condo '	310	0.65	201.5
	'Access/Walkway '	10	0.5	5
	'Condo '	280	0.65	182
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
"-1 R183	'Street End '	20	0.65	13
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Access/Walkway '	10	0.5	5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	60	0.65	39
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Access/Walkway '	10	0.5	5
	'House '	100	0.65	65
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'El Bch Club Condo'	330	0.65	214.5
	'Palm Drive End '	50	0.65	32.5
	'House '	50	0.65	32.5
-1 R184	'Vacant lot '	180	0	0
	'Under Constructio'	80	0.65	52
	'Condo '	110	0.65	71.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Surf Song Condo '	75	0.65	48.75
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Street End '	40	0.65	26
	'Neptune Inn '	320	0.65	208
	'House '	60	0.65	39
-1 R185	'Mango Street End '	30	0.65	19.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5

TABLE 14 - Estero Cost Allocation

ESTERO ISLAND				
DEP MON	STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
	'Street End '	30	0.65	19.5
	'House '	60	0.65	39
	'House '	50	0.65	32.5
	'House '	40	0.65	26
	'House '	70	0.65	45.5
	'Pelican Condo '	200	0.65	130
	'Islnd House Condo'	110	0.65	71.5
-1 R186	'Estero Bch Club '	180	0.65	117
	'Gulf Bch Rd End '	40	0.65	26
	'Estero Bch Club E'	150	0.65	97.5
	'Small bldg. '	75	0.65	48.75
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'Condominium '	160	0.65	104
	'Condominium '	250	0.65	162.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
-1 R187	'Condominium '	65	0.65	42.25
	'Street End '	30	0.65	19.5
	'Sandy Beach Cott '	50	0.65	32.5
	'Sandy Beach Cott '	50	0.65	32.5
	'Sandy Beach Cott '	10	0.65	6.5
	'Sandy Beach Cott '	55	0.65	35.75
	'Sandy Beach Cott '	50	0.65	32.5
	'Sandy Beach Cott '	50	0.65	32.5
	'Caper Bch Club '	440	0.65	286
	'Street End '	30	0.65	19.5
	'Condominium '	175	0.65	113.75
	'House '	75	0.65	48.75
	'Estero Sands '	200	0.65	130
-1 R187	'House '	75	0.65	48.75
	'Trailer Park '	450	0.65	292.5
	'Restaurant '	120	0.65	78
	'Restaurant '	'225	0.65	146.25
	'Access/Walkway '	10	0.5	5
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'Access/Walkway '	10	0.65	6.5
	'House '	65	0.65	42.25
-1 R188	'House '	80	0.65	52
	'House '	70	0.65	45.5

TABLE 14 - Estero Cost Allocation

ESTERO ISLAND				
DEP MON	STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
	'House '	70	0.65	45.5
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	70	0.65	45.5
	'Connecticut St En'	45	0.65	29.25
	'House '	45	0.65	29.25
	'House '	45	0.65	29.25
-1 R189	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	50	0.65	32.5
	'House '	100	0.65	65
	'House '	80	0.65	52
	'House '	70	0.65	45.5
	'House '	70	0.65	45.5
	'Access/Walkway '	10	0.5	5
	'House '	95	0.65	61.75
	'House '	85	0.65	55.25
	'House '	160	0.65	104
	'Vacant Lot '	90	0	0
	'House '	75	0.65	48.75
	'House '	70	0.65	45.5
	'House '	100	0.65	65
-1 R190	'House '	100	0.65	65
	'House '	60	0.65	39
	'House '	125	0.65	81.25
	'House '	120	0.65	78
	'House '	150	0.65	97.5
	'Cabana St End '	20	0.65	13
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	100	0.65	65
	'Hercules Dr End '	50	0.65	32.5
-1 R191	'House '	100	0.65	65
	'House '	50	0.65	32.5
	'House '	65	0.65	42.25
	'Coconut Rd End '	45	0.65	29.25
	'House '	100	0.65	65
	'House '	75	0.65	48.75
	'House '	65	0.65	42.25
	'House '	95	0.65	61.75
	'House '	70	0.65	45.5
	'House '	75	0.65	48.75
	'Bayview Ave End '	50	0.65	32.5
	'Condominium '	120	0.65	78

TABLE 14 - Estero Cost Allocation

ESTERO ISLAND				
DEP MON	STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
	'Condominium '	120	0.65	78
	'Gulf View Ave End'	50	0.65	32.5
-1 R192	'Apartment '	75	0.65	48.75
	'Condominium '	170	0.65	110.5
	'Strandview Ave '	50	0.65	32.5
	'House '	100	0.65	65
	'House '	100	0.65	65
	'Access/Walkway '	10	0.5	5
	'Condominium '	150	0.65	97.5
	'House '	100	0.65	65
-1 R193	'House '	55	0.65	35.75
	'House '	60	0.65	39
	'Seaside Condo '	325	0.65	211.25
	'Buccaneer Condo '	150	0.65	97.5
	'Island Tower ' '	140	0.65	91
	'Kahla Condo ' '	130	0.65	84.5
	'Beach House ' '	90	0.65	58.5
	'Access/Walkway' '	10	0.5	5
	'Point South ' '	225	0.65	146.25
-1 R194	'Smuggler's Cove '	340	0.65	221
	'Smuggler's Cove '	280	0.65	182
	'Tropical Inn ' '	140	0.65	91
-1 R195	'House '	90	0.65	58.5
	'House '	60	0.65	39
	'House '	60	0.65	39
	'House '	60	0.65	39
	'House '	60	0.65	39
	'House '	60	0.65	39
	'House '	60	0.65	39
	'House '	60	0.65	39
	'House '	70	0.65	45.5
	'House '	55	0.65	35.75
	'House '	55	0.65	35.75
	'House '	90	0.65	58.5
	'House '	90	0.65	58.5
	'Dakota Ave End '	50	0.65	32.5
	'Apartment '	50	0.65	32.5
	'Apartment '	40	0.65	26
	'Apartment '	40	0.65	26
	'Condominium '	225	0.65	146.25
-1 R196	'Lahaina '	185	0.65	120.25
	'House '	60	0.65	39
	'House '	20	0.65	13
	'House '	50	0.65	32.5
	'House '	45	0.65	29.25
	'House '	45	0.65	29.25
	'House '	60	0.65	39
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5
	'House '	50	0.65	32.5

TABLE 14 - Estero Cost Allocation

ESTERO ISLAND				
DEP MON	STRUCTURE DESCRIPTION	LOT WIDTH (FT)	COST SHARING (%)	FEDERAL SHARE
	'Stirling Ave End '	70	0.65	45.5
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
-1 R197	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'Aberdeen Ter End '	40	0.65	26
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'House '	75	0.65	48.75
	'Lanark Ter End '	40	0.65	26
	'House '	75	0.65	48.75
	TOTAL	24,965		15,846
	MILES	4.73	**FEDERAL PERCENTAGE**	63.47%

173. Estero Island The 4.7-mile shoreline in this project element is comprised of 0.3-miles of parks and walkway/access areas, 0.1-miles of undeveloped parcels, and 4.4-miles of developed parcels. Based on the analysis presented in Table 14, The cost allocation for shore protection on Estero Island is 63.5 percent Federal and 36.5 percent non-Federal. Table 16 outlines the break down of costs between the Federal and non-Federal responsibilities.

TABLE 15 – GASPARILLA COST APPORTIONMENT

COST SHARING FOR GASPARILLA ISLAND

OCTOBER 2000 PRICE LEVELS

Project Feature	Project Cost	Federal Share	Federal Cost	Non-Federal Share	Non-Federal Cost
Mobilization	$663,027	58.7%	$ 389,472	41.3%	$ 273,555
Beach Replenishment	$2,794,304	58.7%	$ 1,641,415	41.3%	$ 1,152,889
Engineering & Design	$287,889	58.7%	$ 169,110	41.3%	$ 118,779
Construction Management	$360,158	58.7%	$ 211,562	41.3%	$ 148,596
Mitigation	$305,536	58.7%	$ 179,476	41.3%	$ 126,060
Monitoring	$143,637	58.7%	$ 84,374	41.3%	$ 59,263
Real Estate	$159,939	58.7%	$ 93,951	41.3%	$ 65,988
Total Cost	**$4,714,490**		**$ 2,769,361**		**$ 1,945,129**

TABLE 16 – ESTERO COST APPORTIONMENT

COST SHARING FOR ESTERO ISLAND

OCTOBER 2000 PRICE LEVELS

Project Feature	Project Cost	Federal Share	Federal Cost	Non-Federal Share	Non-Federal Cost
Mobilization	$973,616	63.5%	$ 617,992	36.5%	$ 355,624
Beach Replenishment	$9,790,443	63.5%	$ 6,214,372	36.5%	$ 3,576,071
Engineering & Design	$886,178	63.5%	$ 562,491	36.5%	$ 323,687
Construction Management	$1,107,723	63.5%	$ 703,115	36.5%	$ 404,608
Terminal Groin	$290,672	63.5%	$ 184,501	36.5%	$ 106,171
Monitoring	$318,479	63.5%	$ 202,151	36.5%	$ 116,328
Real Estate	$373,190	63.5%	$ 236,878	36.5%	$ 136,312
Total Cost	**$13,740,301**		**$ 8,721,500**		**$ 5,018,801**

IMPLEMENTATION SCHEDULE

174. Pending approval of this document by higher headquarters, the next phase would be the drafting and review of a Project Cooperation Agreement (PCA), in this case a Section 206 reimbursable agreement. The review and submittal of the final PCA to the Assistant Secretary of the Army (CW) for approval could be accomplished by December of 2001. During this process, Plans and Specifications would be finished by the sponsor and reviewed by the District, this would allow for a construction start in March 2002. Real Estate instruments have already been executed with some remaining actions still outstanding. Since the sponsor is seeking reimbursement, and has been granted authorization in Section 309 of WRDA 2000, draft Section 102 Congressional notification letters would also need to be initiated upon approval of this report.

FEDERAL RESPONSIBILITIES

175. 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 of Engineers would review the necessary preconstruction engineering and design needed prior to construction. The sponsor will obtain State water quality certification and will be to the maximum extent practicable consistent with the State's Coastal Zone Management Plan, and would advertise, award, and manage the execution of the construction contract for the project. It is envisioned that separate construction contracts would be awarded for the Gasparilla island element and the Estero Island element of the Lee County Shore Protection Project.

NON-FEDERAL RESPONSIBILITIES

176. The non-Federal sponsor, Lee County, would provide up-front cash contribution for initial construction costs for each element of the proposed project. The amount of the non-Federal up-front cash contribution would be based on total implementation costs with reimbursement being provided by the Federal government at a later date based on cost sharing principles reflecting shoreline use, ownership and public access in existence at the time of construction; these items would be coordinated in the Section 206 Agreement. The non-Federal sponsor would also provide the entire cost of all material placed on undeveloped lands and developed private lands, which are inaccessible to the public, landward of the Erosion Control Line (ECL). The Non-Federal Sponsor will perform all relocations necessary for the project. The costs for lands, easements, and rights-of-way and a portion of the administrative costs associated with land requirements would also be a non-Federal responsibility. The non-Federal sponsor for the shore protection project elements on Gasparilla and Estero

Islands will be the Lee County Board of County Commissioners, as demonstrated by their letter of intent dated June 25, 1999.

ITEMS OF LOCAL COOPERATION

177. The original items of local cooperation included in the authorizing document, House Document No. 91-395, 91st Congress, 2nd Session, dated October 6th, 1970, have been modified to reflect current laws and requirements. These updated items can be found in the "Recommendations" section of this report.

FINANCIAL ANALYSIS

178. A 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 the non-Federal sponsor understands the financial commitment involved and has reasonable plans for meeting that commitment. The sponsor's preliminary assessment has been added to the report in a letter dated 28 March 2001 under the pertinent correspondence appendix. The letter states that Lee County has applied for funding from the States Department of Environmental Protection agency, which agreed to pay 44.8% and 45.7% of the non-Federal costs associated with Gasparilla and Estero Islands. It goes on to state that one third of the county's tourist development tax is dedicated by ordinance for beach and shoreline improvements.

OTHER NON-FEDERAL RESPONSIBILITIES

179. 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.

180. The non-Federal 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.

181. Section 402 of the WRDA 86 (33 USC 701b-12) as amended by Section 14 of the Water Resource Development Act of 1988 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 (FIP) to receive Federal funding for a recommended storm damage reduction project. Compliance with Section 402 has been added as an item of local cooperation.

PROJECT COOPERATION AGREEMENT

182. The model Project Cooperation Agreement (PCA) (or Section 206 Agreement) and possible deviations based on the recommended plan have been fully discussed with the non-Federal sponsor. 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.

183. The terms of local cooperation to be required in the PCA are described in the "Recommendations " of this report. The non-Federal sponsor's (Lee County) letter of intent dated June 25, 1999 is contained in the Pertinent Correspondence Appendix.

184. Federal commitments relating to a construction schedule or specific provisions of the PCA can not be made to the non-Federal sponsor on any aspect of this project or separable element until:

- The selected project modifications are approved by the Assistant Secretary of the Army (CW);
- Section 102 Congressional notification letters have been generated;
- The draft PCA has been reviewed and approved by the office of the Assistant Secretary of the Army (CW).

185. The PCA will not be executed nor will construction be initiated on this project or any separable element 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 Lee County Shore Protection Project, these requirements are met once the Environmental Impact Statement has been coordinated, comments prepared, and finalized.

186. Final PCA negotiations with the non-Federal sponsor may be conducted, and a draft PCA package submitted through the USACE higher authorities for review and approval by the Assistant Secretary of the Army (CW) ASA(CW), once this GRR is approved and the project is budgeted for construction. The PCA for this project will be executed only after the GRR 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 ASA(CW) approves the non-Federal sponsor's

financing plan and executes the PCA. Since the Authorization in Section 309 or WRDA 2000, for use of Section 206 authority, is after enactment of Public Law 106-60 on September 1999, the cost sharing agreement will be subject to the provisions of Section 102 of the FY00 Energy and Water Development Appropriations Act. As part of the Project Cooperation Agreement package, Congressional notification letters are drafted by the District in the event that the project funding could be included in the President's Budget. The PCA package and notification letters would be prepared following approval of the GRR and coordination with higher authority.

SUMMARY OF COORDINATION AND COMMENTS

187. The Lee County, Florida Shore Protection Project has been coordinated with the following Federal and State agencies:

- U.S. Fish and Wildlife Service
- National Marine Fisheries Service
- U.S. Environmental Protection Agency
- Florida State Historic Preservation Officer (SHPO) and the
- Florida Department of Environmental Protection.

In addition, the proposed project has been coordinated with several local and regional planning agencies. A mailing list of these groups and individuals is included in the EIS. An updated mailing list is maintained at the District Office and may be consulted upon request.

DEPARTURES FROM THE PROJECT DOCUMENT

188. This section of the report provides information concerning changes to the unconstructed elements of the authorized project. An authorized project is a project specifically authorized by Congress. In this case, the project was authorized in accordance with the recommendations of the Chief of Engineers in House Document No.91-395, under provisions of Section 201 of the Flood Control Act of 1965. The original cost of the project, as defined in the 1970 Chief of Engineers Report, was based on 1969 price level and all annualized costs and benefits were computed based on an interest rate of 4 and 7/8th percent.

DESCRIPTION OF AUTHORIZED PROJECT

189. The shore protection project for Lee County is authorized in accordance with Section 201 of the Flood Control Act of 1965 and by House and Senate Resolutions enacted December 15th, 1970 and December 17th, 1970, respectively,and is described within the May 1970 Chief of Engineers Report. "The Authorized Project " section of this report contains a description of the authorized project. The items of local cooperation specificed at that time can also be found in the same section.

AUTHORIZATION

190. The Lee County Shore Protection project was authorized as stated above in 1970. The Chief of Engineers recommended the project that contained three separable elements; namely Gasparilla, Captiva, and Estero Islands. The Chief of Engineers recommended improvements for beach erosion control by beach restoration, periodic nourishment, revetment, and groins. It should be noted that the Captiva Island element has already been constructed.

CHANGES IN SCOPE OF AUTHORIZED PROJECT

191. **Gasparilla Island** The overall physical changes to this element of the project are listed in this paragraph. The overall length of the improvement has increased from 2.7-miles, as authorized, to 2.8-miles recommended herein. The authorized berm width of 50-feet has been reduced to 20-feet based on economic optimization studies. The design berm elevation has been increased from 4-feet above MLW to 5-feet above MLW. The authorized 2,400-foot revetment and 500-foot terminal groin have been deleted from the recommendations contained herein. Tapered transition sections will be constructed at both the northern and southern terminuses of the beach fill. The authorized plan envisaged a 5-year renourishment cycle. The recommendations contained herein reflect an economically optimum renourishment cycle of 7-years. The recommended plan extends the project life from 10 years to 50 years.

192. **Estero Island** The overall physical changes to this element of the project are listed in this paragraph. The overall length of the improvement has increased from 4.6-miles, as authorized, to 4.7-miles recommended herein. The authorized berm width of 50-feet has been reduced to 40-feet based on economic optimization studies. The design berm elevation has been increased from 4-feet above MLW to 5-feet above MLW. The authorized 500-foot terminal groin has been economically optimized at 240-feet and is included in the recommendations contained herein. A tapered transition sections will be constructed at the southern terminus of the beach fill. The authorized plan envisaged a 5-year renourishment cycle. The recommendations contained herein reflect an economically optimum renourishment cycle of 3-years. The recommended plan extends the project life from 10 years to 50 years (starting upon completion of initial construction).

CHANGES IN PROJECT PURPOSE

193. Both the Gasparilla and Estero Island elements of the authorized project provide storm damage reduction benefits, reductions in maintenance of existing coastal armor and reductions in land loss. The elements also provide recreation benefits. Recreation benefits comprise about 12 percent and 3 percent of total project benefits for the Gasparilla and Estero Island elements, respectively. There are not any changes in project purposes.

CHANGES IN ITEMS OF LOCAL COOPERATION

194. The general intent of the items of local cooperation have remained the same, outlining the fact that the non-federal sponsor will have to provide lands, easements, and rights-of-way, provide cash contributions for initial construction and periodic renourishment, hold and save the United States free from claims, and continue to provide public access. Some of the changes that will need to be implemented include; a better definition of required cost sharing, CERCLA investigations, compliance with P.L. 88-352 for nondiscrimination on the basis of handicap, compliance with flood plain management programs, completion and implementation of a flood plain management plan, and other items that are listed in the "Recommendations" section of this report.

CHANGES IN LOCATION OF PROJECT

195. There is no change in location of the project elements.

DESIGN CHANGES

196. The design berms for Gasparilla and Estero optimized at 20 ft and 40 ft respectively, as opposed to the authorized 50 ft berm. The berm elevation also changed from +4 ft MLW to +5ft MLW, and there were some minor changes to the slopes of the berm.

CHANGES IN BENEFITS

197. **Gasparilla Island** The average annual equivalent benefits have increased from $154,700 as presented in the Chief's Report to $2,005,800 as presented herein. Increases in predicted storm damage reduction outputs for shore protection projects are associated with documentation and simulation of storm impacts on upland development. Increases in structural density and replacement of smaller older homes with newer larger homes account for a large portion of this increase as well as a significant increase in the recreational use of the beach. Advances in data analysis and numerical modeling capabilities have resulted in enhanced predictive tools for assessing with and without project conditions. Interest rates used in the economic analyses for the authorized and recommended projects were 4 and 7/8th percent and 6 and 3/8 percent, respectively. Similarly, price levels were 1969 and February 1999,

respectively.

198. **Estero Island** The average annual equivalent benefits have increased from $179,100 as presented in the Chief's Report to $5,808,600 as presented herein. Increases in predicted storm damage reduction outputs for shore protection projects are associated with documentation and simulation of storm impacts on upland development. Increases in structural density and replacement of smaller older homes with newer larger homes account for a large portion of this increase as well as a significant increase in the recreational use of the beach. Advances in data analysis and numerical modeling capabilities have resulted in enhanced predictive tools for assessing with and without project conditions. Interest rates used in the economic anaylsis for the authorized and recommended projects were 4 and 7/8th percent and 6 and 3/8 percent, respectively. Similarly, price levels were 1969 and February 1999, respectively.

BENEFIT-TO-COST RATIO (BCR)

199. The BCR for the Gasparilla Island and the Estero Island project elements are 2.8 and 2.3, respectively. The respective BCR's in the Chief's report were 1.3 and 1.4. Without recreation benefits, the respective BCR's as presented herein are 3.2 and 2.4.

CHANGES IN COST ALLOCATION

200. No change. Project purposes for both the authorized and recommended plans for each project element include shore protection and recreation. Prior to WRDA 86, shore protection projects were formulated based upon beach erosion control, hurricane damage reduction, property value enhancement, and recreation benefits. Subsequent to WRDA 86, project purposes were defined as storm damage reduction and recreation.

CHANGES IN COST APPORTIONMENT

201. Cost apportionment in this report is different than that in the authorizing document. This is due primarily to the provisions contained in WRDA 86 and changes in shoreline ownership and usage as well as changes in existing regulations and policies. For the Gasparilla Island element of the project, the apportionment of first cost has changed from 34.20 percent Federal / 65.80 percent non-Federal to 58.7 percent Federal / 41.3 percent non-Federal. For the Estero Island element of the project, the apportionment of first cost has changed from 12.50 percent Federal / 87.5 percent non-Federal to 63.5 Federal / 36.5 percent non-Federal.

ENVIRONMENTAL CONSIDERATIONS IN RECOMMENDED CHANGES.

202. NEPA coordination for the authorized and recommended projects has been documented by an Environmental Impact Statement (EIS), the latest EIS is incorporated into this document. Environmental and cultural resource issues

associated with the use of the various borrow areas have been coordinated with the local, state, and Federal agencies.

PUBLIC INVOLVEMENT

203. Public involvement in the formulation of the recommended project consisted of meetings held in Lee County and coordination of the draft report and environmental document with municipal, county, state, and Federal interests.

HISTORY OF PROJECT

204. The Lee County Shore Protection Project was authorized in accordance with Section 201 of the Flood Control Act of 1965 with House and Senate Resolutions in December 1970. The Captiva Island element of the project was constructed in 1989 and renourished in 1997. The remaining two elements, Gasparilla Island and Estero Island were never constructed. Upon entering the Design Memorandum phase for these two elements, it was decided that existing conditions had changed to such a degree that a general reevaluation needed to be completed.

SECTION 902 LIMITS

205. The Lee County Shore Protection Project was authorized prior to WRDA 86 and is therefore not subject to the provisions of Section 902. Section 902 of WRDA 86 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 project cost overruns. The cost of the project could be increased for price level changes, but the scope of the project could not be changed if it increased project costs by more than 20 percent.

STUDY SUMMARY

206. This report summarizes the feasibility scope studies conducted for the general reevaluation of the Lee County Shore Protection Project, specifically, Gasparilla Island and Estero Island, in the interest of shore protection and storm damage prevention. Based on these studies the following conclusions were reached:

- Storm damage threatens properties on both Gasparilla and Estero Island in Lee County. The amount of shorefront development on these two islands is estimated at $98.3 million.

- The most practical and economical means to prevent or reduce structural damages is to construct the remaining two elements of the authorized shore

protection project as modified herein. The non-Federal sponsor supports the construction of the project.

- The Gasparilla Island element provides for a 20 foot berm over 2.8-miles. Initial construction cost is estimated at $5,069,500 (including IDC of $355,000) with the Federal share being $2,769,000. Periodic renourishment is required every 7-years and is estimated to cost $3,175,000.

- The Estero Island element provides for a 40-foot berm over 4,7-miles. Initial construction cost is estimated at $14,677,400 (Including IDC of $937,100), including a terminal groin, with the Federal share being $8,721,000. Periodic renourishment is required every 3-years and is estimated to cost $4,836,000.

FLOOD PLAIN DEVELOPMENT

207. 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 elevate structures above the flood plain. Potential flood plain development as a result of constructing the two elements of the project would be minimal. The continued renourishment in the project areas would have minimum impact on the natural and beneficial values of the flood plain. In the without project flood plain, there will be minimal loss of natural resources due to potential development. Implementation of any non-structural 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

208. Section 403 of WRDA 86 as amended by Section14 of WRDA 88 states "Before construction of any project for 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". Lee County is enrolled in and is in compliance with the national Flood Insurance Program.

COASTAL ZONE MANAGEMENT ACT

209. The Coastal Zone Management (CZM) Act of 1972, as amended (P.L. 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 CMZ 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 renourishment of previously constructed project features.

CONCLUSIONS

210. This General Reevaluation Report (GRR) provided the opportunity to review and reevaluate the coastal problems and alternatives on a systematic basis for the authorized Lee County Shore Protection Project. As a result, the modification of existing authority and the advisability of providing various project features were considered. Consideration has been given to all significant aspects of the authorized project in overall public interest, including engineering feasibility, economic feasibility, and social and environmental effects. Modifications to the authorized project provide the optimum solution to shore protection for upland development on Gasparilla Island and Estero Island in Lee County, Florida.

211. Gasparilla Island beach restoration provides for initial restoration and periodic nourishment of 2.8-miles of shoreline. The recommended design template incorporates a 20-foot berm with an elevation of +5-feet Mean Low Water (MLW), a foreshore slope of 1V:15H transitioning to a nearshore slope of 1V:25H at MLW extending out to the intersection with the existing profile. Initial construction cost is estimated at $5,069,500 (including IDC of $355,000) with the Federal share being $2,769,000. Periodic renourishment is required every 7-years and is estimated to cost $3,175,000.

212. Estero Island Beach Restoration provides for initial restoration and periodic nourishment of 4.7-miles of shoreline and includes a terminal groin on the north end of the island. The recommended design template incorporates a 40-foot berm with an elevation of +5-feet Mean Low Water (MLW), a foreshore slope of 1V:25H transitioning to a nearshore slope of 1V:35H at MLW extending out to the intersection with the existing profile. Initial construction cost is estimated at $14,677,400 (Including IDC of $937,100), including a terminal groin, with the Federal share being $8,721,000. Periodic renourishment is required every 3-years and is estimated to cost $4,836,000.

213. Section 309 of the Water Resources Development Act of 1992 modifies the existing authorization of the Gasparilla and Estero Island segments of the Lee County, Florida Shore Protection Project to allow the Secretary to enter into an agreement with non-Federal interests in accordance with Section 206 of WRDA 1992. Provided that the Secretary determines that the project is technically sound, environementally acceptable, and economically justified. This allows the sponsor to construct the project and seek Federal reimbursement.

RECOMMENDATIONS

214. 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 changes to the authorized project as described herein. The recommended project modifications described in this report provide the optimum solution for shore protection benefits within the study area that can be developed within the framework of the formulation concepts. The Gasparilla Island segment of the Lee County shore protection project would be modified to provide for initial restoration and periodic nourishment of a 20 foot berm over 2.8-miles of shoreline. Periodic nourishment accomplished at seven-year intervals would optimize net primary benefits over the 50-year life of the project.

215. The Estero Island segment of the Lee County shore protection project would be modified to provide for initial restoration and periodic nourishment of a 40 foot berm over 4.7-miles of shoreline and includes a terminal groin on the north end of the island. Periodic nourishment accomplished at three-year intervals would optimize net primary benefits over the 50-year life of the project.

216. I recommend modification of the Gasparilla and Estero Island segment of the Lee County, Florida shore protection project be modified as described herein. The project would be implemented subject to the cost sharing, financing, and other applicable requirements for navigation projects established by WRDA 1986, as amended, and would be implemented with such modifications as the Chief of Engineers deems advisable within his discretionary authority. Federal implementation would also be subject to the non-Federal sponsor agreeing to comply with applicable Federal laws and policies.

217. Prior to implementation, the non-Federal sponsor would be required to enter into a written Project Cooperation Agreement (Section 206 Agreement), as required by Section 221 (PL 91-611), as amended, to provide local cooperation satisfactory to the Secretary of the Army. Such local cooperation shall provide the following non-Federal responsibilities:

a. Provide 35 percent of initial and periodic nourishment project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial and periodic nourishment project costs assigned to recreation, plus 100 percent of initial and periodic nourishment projects 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 construction, 25 percent 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, 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 50 percent of initial and periodic nourishment project costs assigned to recreation, plus 100 percent of initial project costs assigned to protection 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. 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 inspection, 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, document, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the stands 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 the 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), 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 Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), requiring non-Federal preparation and implementation of flood plain management plans;

k. Provide 35 percent of initial and periodic nourishment project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial and periodic nourishment project costs assigned to recreation, plus 100 percent of initial and periodic nourishment project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits of that portion of total historic preservation mitigation and data recovery costs attributable to hurricane and storm damage reduction that are in excess of 1 percent of the total amount authorized to be appropriated for hurricane and storm damage reduction;

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.

DISCLAIMER

218. The recommendations contained 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 program 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 modification and/or implementation funding.

219. The recommendations herein for the provision of shore protection for Gasparilla Island and Estero Island in Lee County, Florida, do not include any provisions for work that 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 these proposed project elements were prohibited by this Act.

CERTIFICATION OF PUBLIC ACCESSIBILITY – LEE COUNTY, FLORIDA, SHORE PROTECTION PROJECT

220. As part of the obligations established in the PCA for the Lee County, Florida, Shore Protection 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 elements. The non-Federal sponsor shall also provide and maintain necessary access roads, parking areas and other public use facilities, open and available to all on equal terms.

221. 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 further 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.

222. A recreation benefit analysis is presented in the Economics Appendix. Recreation benefits are claimed in the economic justification of the selected plan. It

was determined that there is ample parking available to all on an equal basis in each element of the project to meet use demand.

223. I therefore conclude that there is reasonable public availability in the project beaches in all areas on Gasparilla and Estero Islands where Federal participation is provided.

James G. May
Colonel, Corps of Engineers
Jacksonville District

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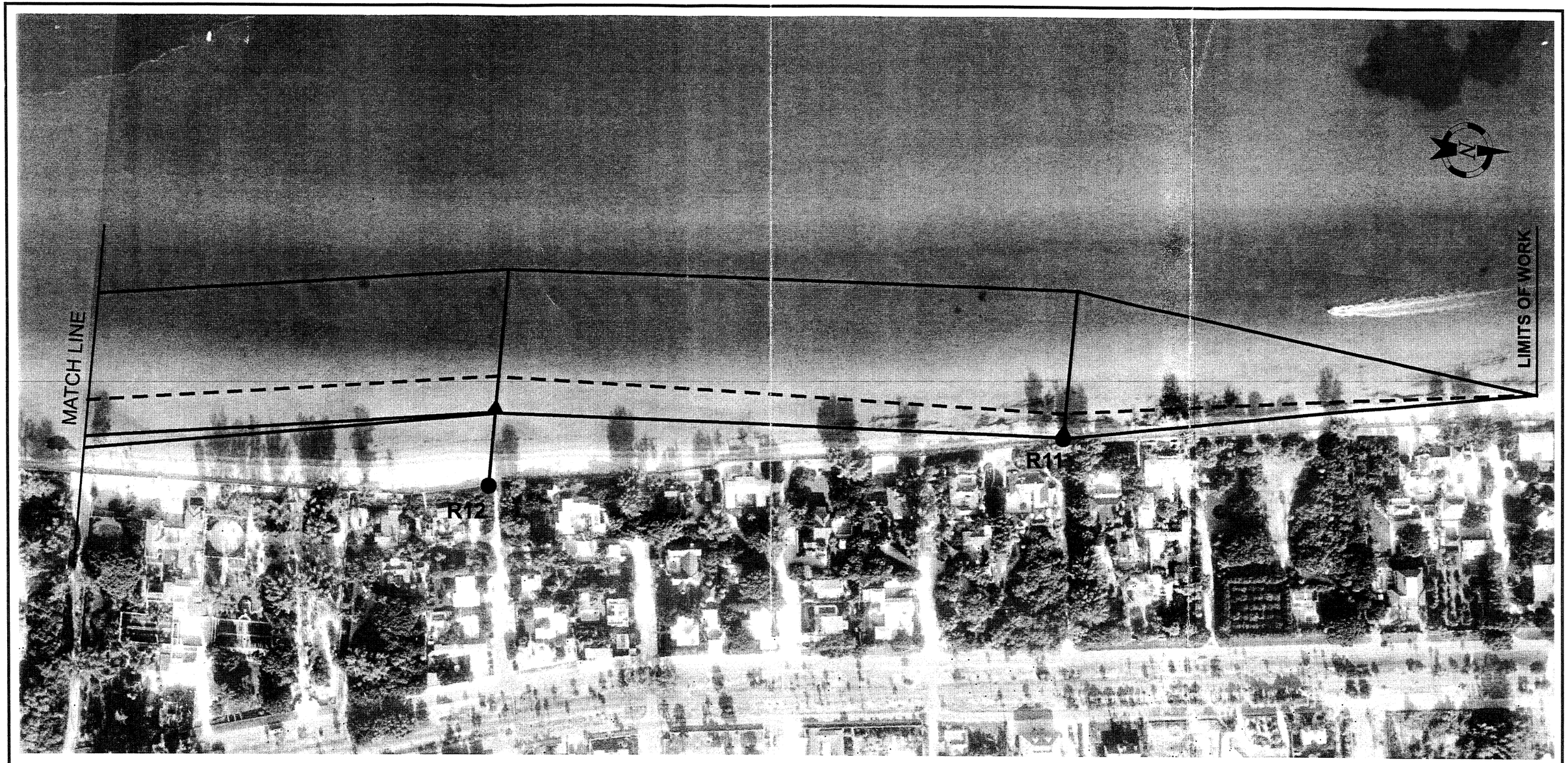
Gasparilla Island - Interest During Construction (IDC)												
Activity	Date	Month	E&D	Real Estate	Mob/Demob	Mitigation	Beach Renourish plus monitor	S&A	Totals	FWF	Future Worth	IDC
	Jun-01	1							0	1.108846	$0	$0
Start PED	Jul-01	2	**95,963**						95,963	1.102986	$105,846	$9,883
	Aug-01	3	**95,963**						95,963	1.097157	$105,287	$9,324
Complete PED	Sep-01	4	**95,963**						95,963	1.091360	$104,730	$8,767
	Oct-01	5		**79,970**					79,970	1.085592	$86,814	$6,845
Start Construction	Nov-01	6		**79,970**	**397,816**		**979,314**	**90,040**	1,547,139	1.079856	$1,670,687	$123,548
	Dec-01	7				152,768	**979,314**	**90,040**	1,222,121	1.074149	$1,312,740	$90,619
	Jan-02	8				152,768	**979,314**	**90,040**	1,222,121	1.068473	$1,305,803	$83,682
	Feb-02	9			**265,211**			**90,040**	355,250	1.062827	$377,569	$22,319
	Mar-02	10							0	1.057210	$0	$0
	Apr-02	11							0	1.051624	$0	$0
	May-02	12							0	1.046066	$0	$0
	Jun-02	13							0	1.040538	$0	$0
	Jul-02	14							0	1.035040	$0	$0
	Aug-02	15							0	1.029570	$0	$0
	Sep-02	16							0	1.024129	$0	$0
	Oct-02	17							0	1.018718	$0	$0
	Nov-02	18							0	1.013334	$0	$0
	Dec-02	19							0	1.007979	$0	$0
Complete Construction	Jan-03	20							0	1.002653	$0	$0
Total Cost			$287,889	$159,939	$663,027	$305,536	$2,937,941	$360,158	$4,714,490			$354,987
											Rounded	**$355,000**
							Total First	Cost	**$4,714,490**			
							AAEQ's	Const,ED,SA	**$314,900**			
							IDC		**$355,000**			
							AAEQ's	IDC	**$23,700**			

Table

Estero Island - Interest During Construction (IDC)

Activity	Date	Month	E&D	Real Estate	Mob/Demob	Groin	Beach Renourish plus monitor	S&A	Totals	FWF	Future Worth	IDC
	Jun-01	1							0	1.108846	$0	$0
Start PED	Jul-01	2	**295,393**						295,393	1.102986	$325,814	$30,421
	Aug-01	3	**295,393**						295,393	1.097157	$324,092	$28,700
Complete PED	Sep-01	4	**295,393**	**124,397**					419,789	1.091360	$458,141	$38,352
	Oct-01	5		**124,397**					124,397	1.085592	$135,044	$10,647
Start Construction	Nov-01	6		**124,397**	**584,170**		**1,684,820**	**158,246**	2,551,633	1.079856	$2,755,395	$203,762
	Dec-01	7				145,336	**1,684,820**	**158,246**	1,988,402	1.074149	$2,135,841	$147,438
	Jan-02	8				145,336	**1,684,820**	**158,246**	1,988,402	1.068473	$2,124,554	$136,152
	Feb-02	9					**1,684,820**	**158,246**	1,843,066	1.062827	$1,958,860	$115,794
	Mar-02	10					**1,684,820**	**158,246**	1,843,066	1.057210	$1,948,509	$105,442
	Apr-02	11					**1,684,820**	**158,246**	1,843,066	1.051624	$1,938,212	$95,146
	May-02	12			**389,446**			**158,246**	547,693	1.046066	$572,923	$25,230
	Jun-02	13							0	1.040538	$0	$0
	Jul-02	14							0	1.035040	$0	$0
	Aug-02	15							0	1.029570	$0	$0
	Sep-02	16							0	1.024129	$0	$0
	Oct-02	17							0	1.018718	$0	$0
	Nov-02	18							0	1.013334	$0	$0
	Dec-02	19							0	1.007979	$0	$0
Complete Construction	Jan-03	20							0	1.002653	$0	$0
Total Cost			$886,178	$373,190	$973,616	$290,672	$10,108,922	$1,107,723	$13,740,301			$937,084
											Rounded	**$937,100**
							Total First	Cost	**$13,740,301**			
							AAEQ's	Const,ED,SA	**$917,700**			
							IDC		**$937,100**			



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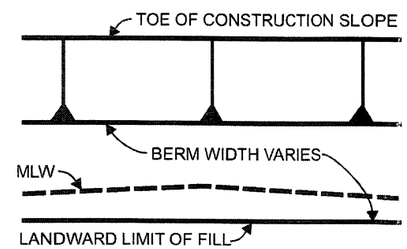


LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT

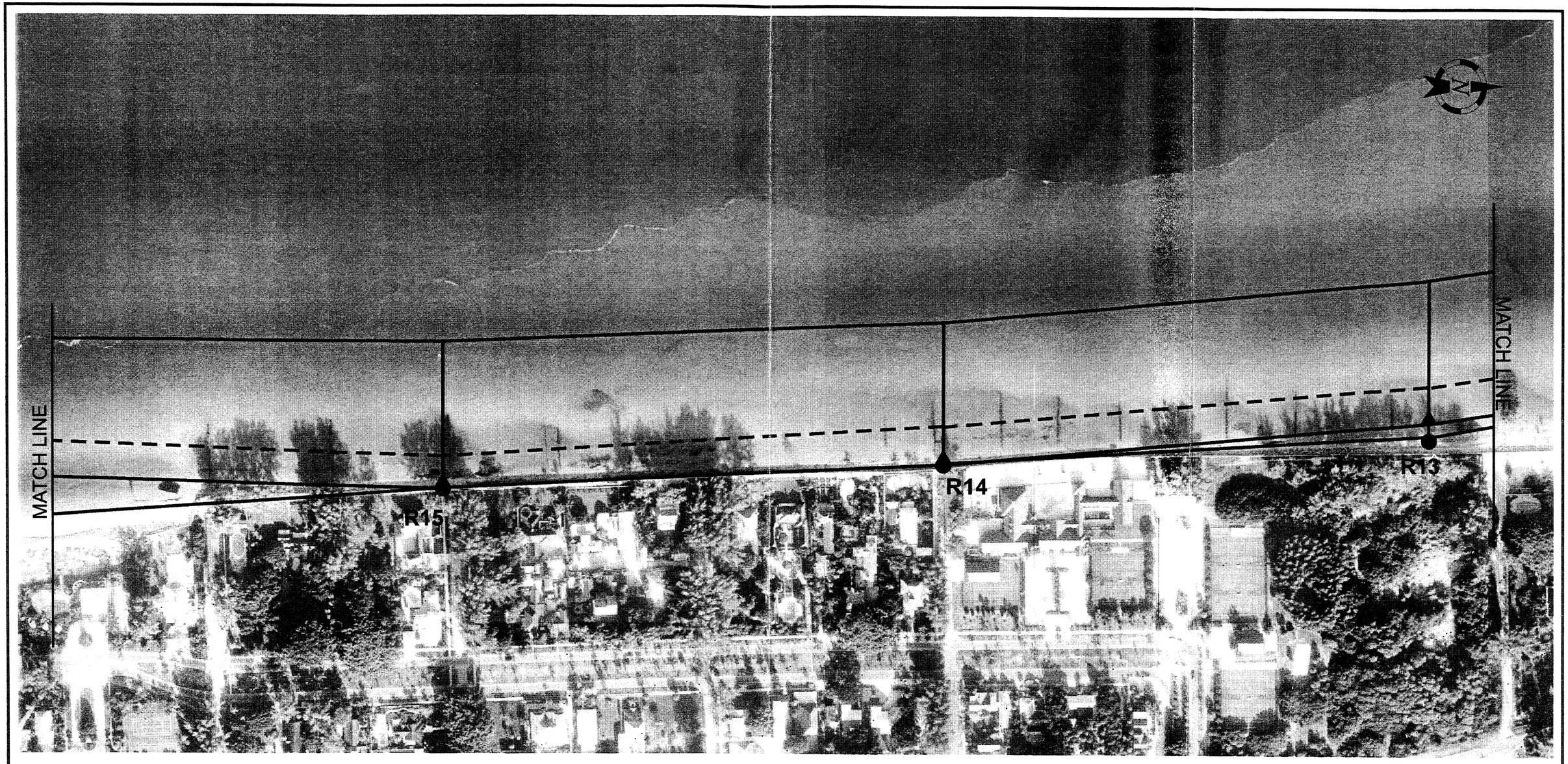
SELECTED PLAN

GASPARILLA ISLAND

SCALES AS SHOWN

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

TO ACCOMPANY GENERAL REEVALUATION REPORT,
, DATED:
FILE NO.



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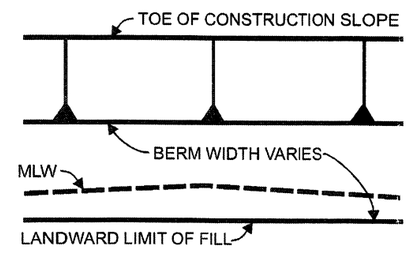

LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT

SELECTED PLAN

GASPARILLA ISLAND

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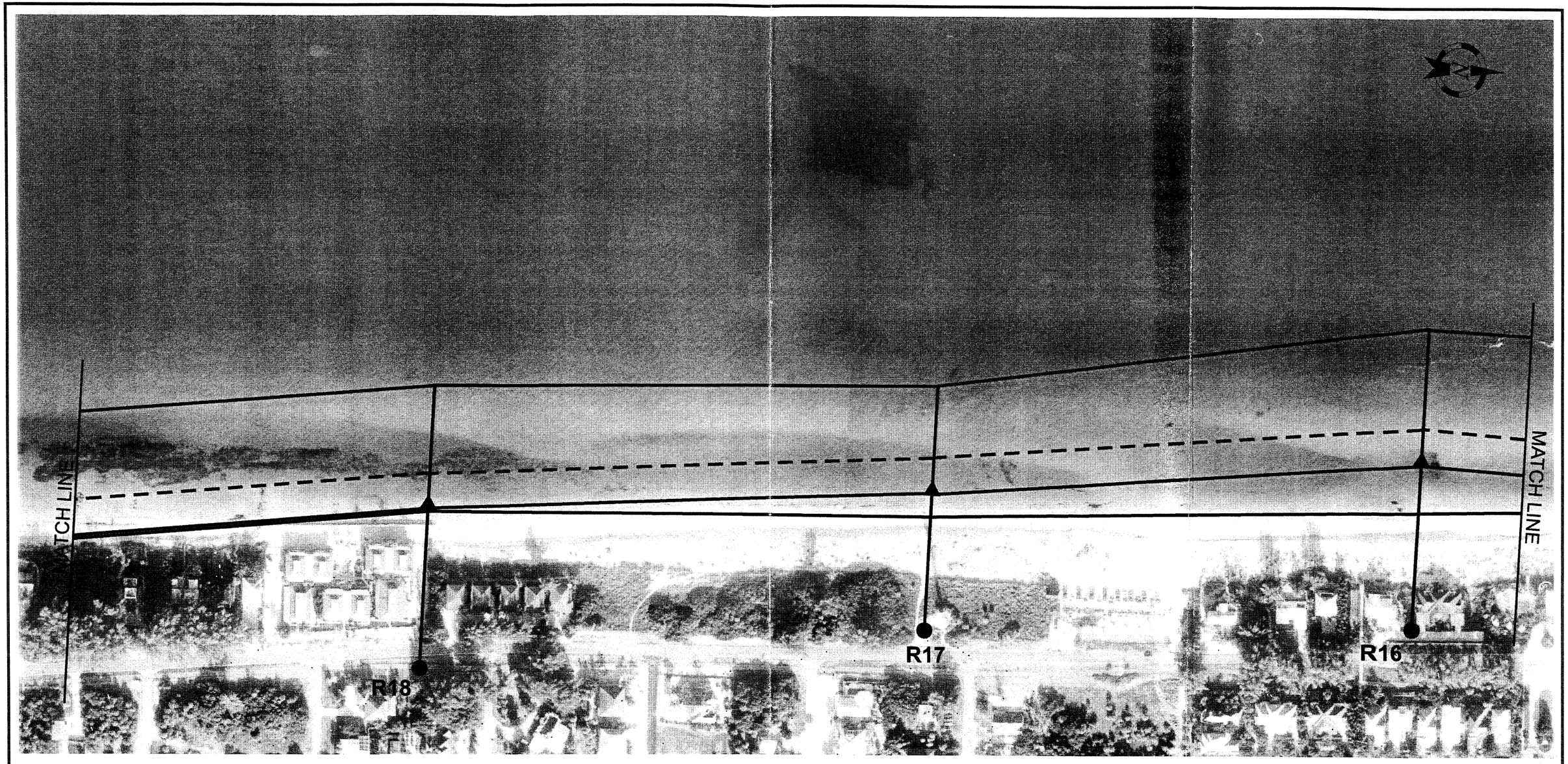

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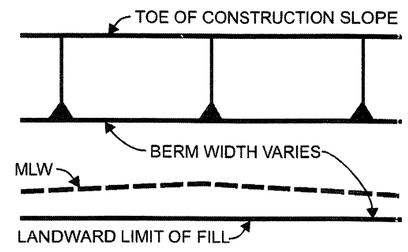

LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT

SELECTED PLAN

GASPARILLA ISLAND

SCALES AS SHOWN

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
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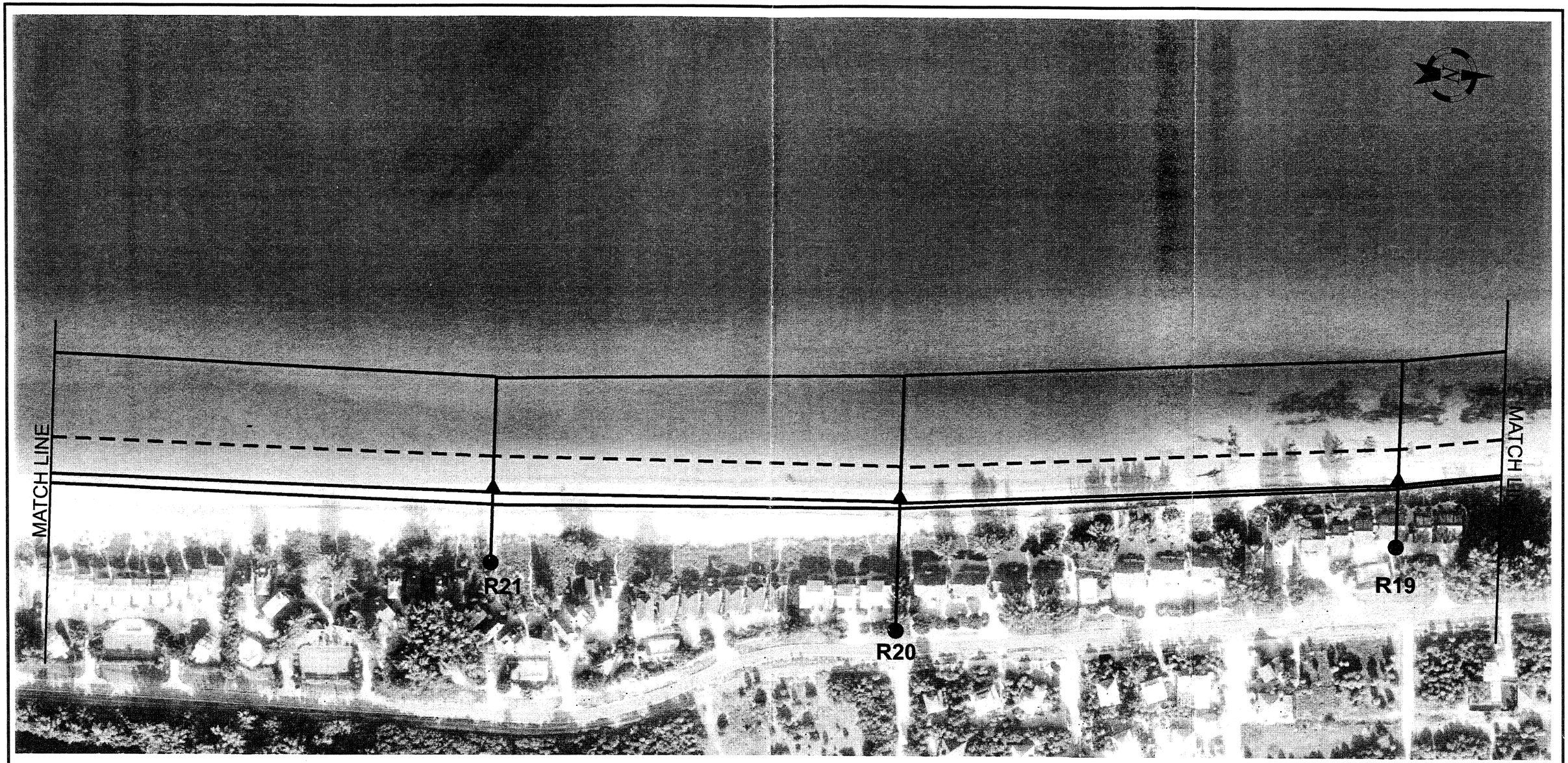

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R001 Monument Number

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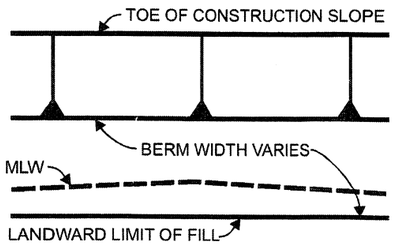


LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT

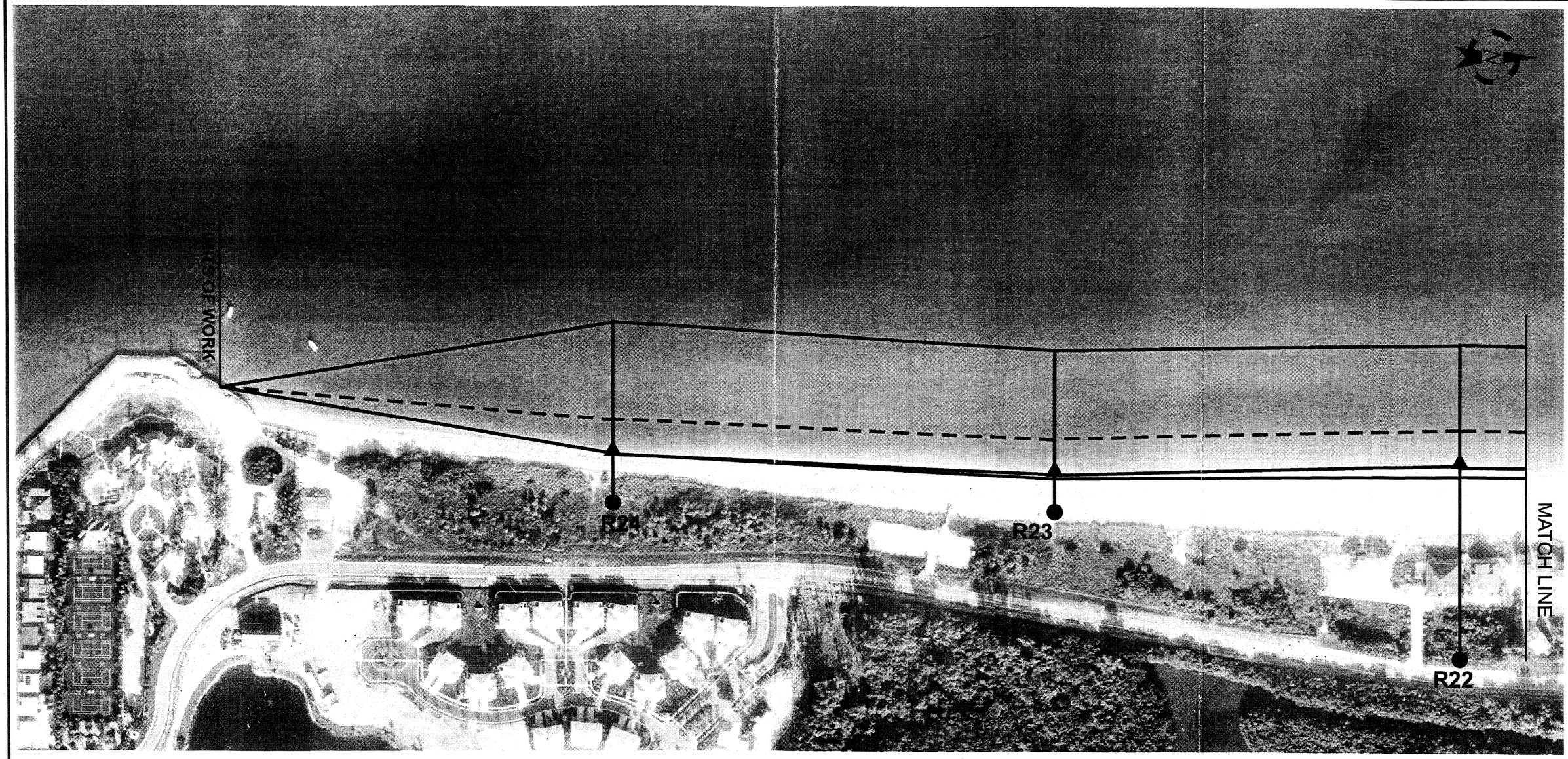
SELECTED PLAN

GASPARILLA ISLAND

SCALES AS SHOWN

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

TO ACCOMPANY GENERAL REEVALUATION REPORT,
, DATED:
FILE NO.



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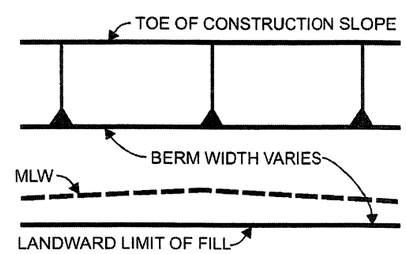

LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT

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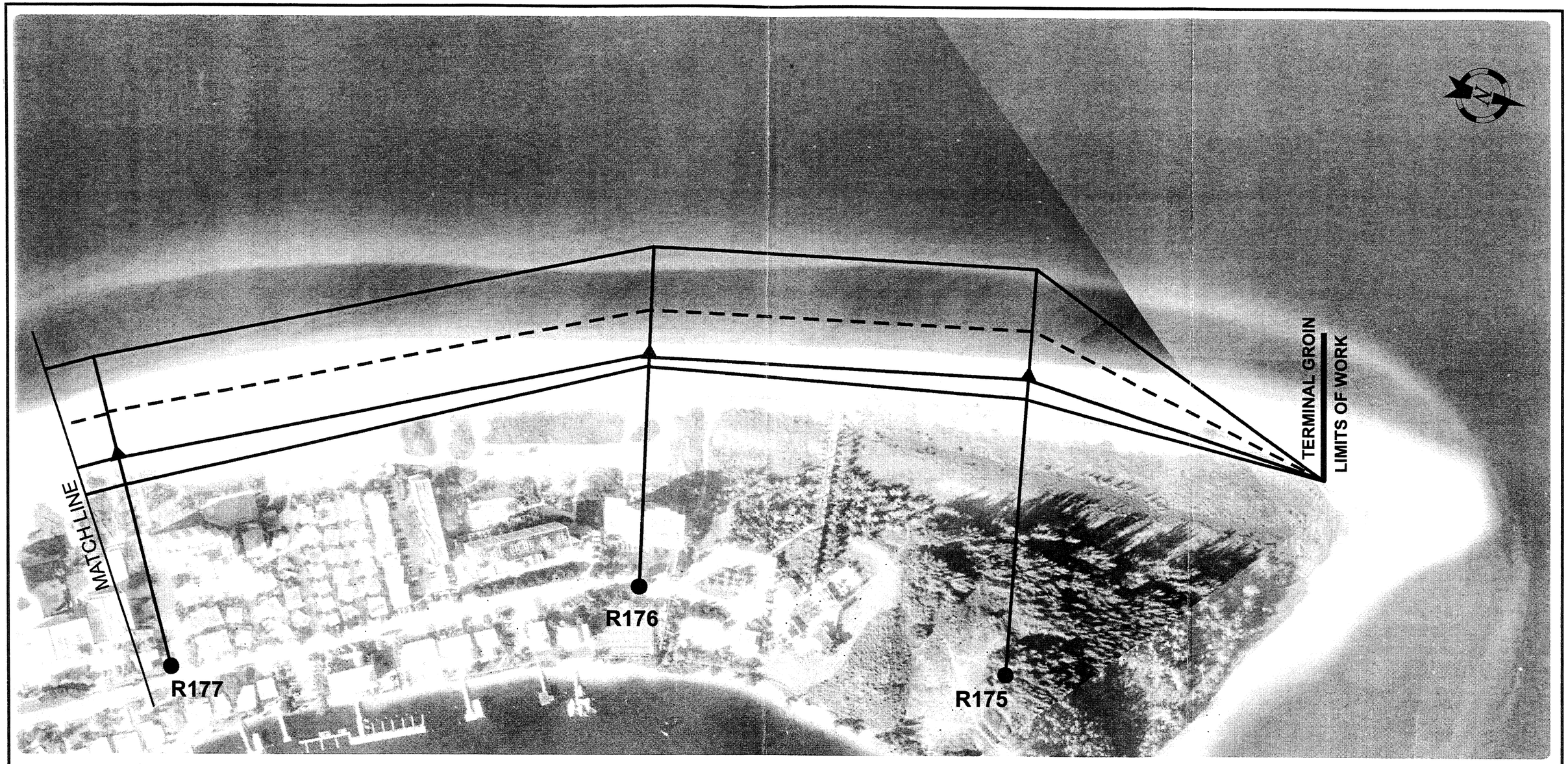

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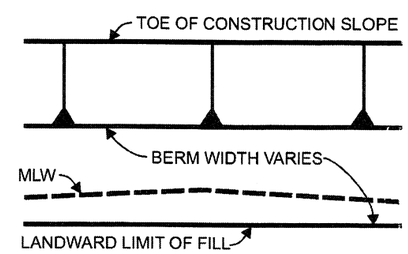

LEE COUNTY, FLORIDA
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ESTERO ISLAND

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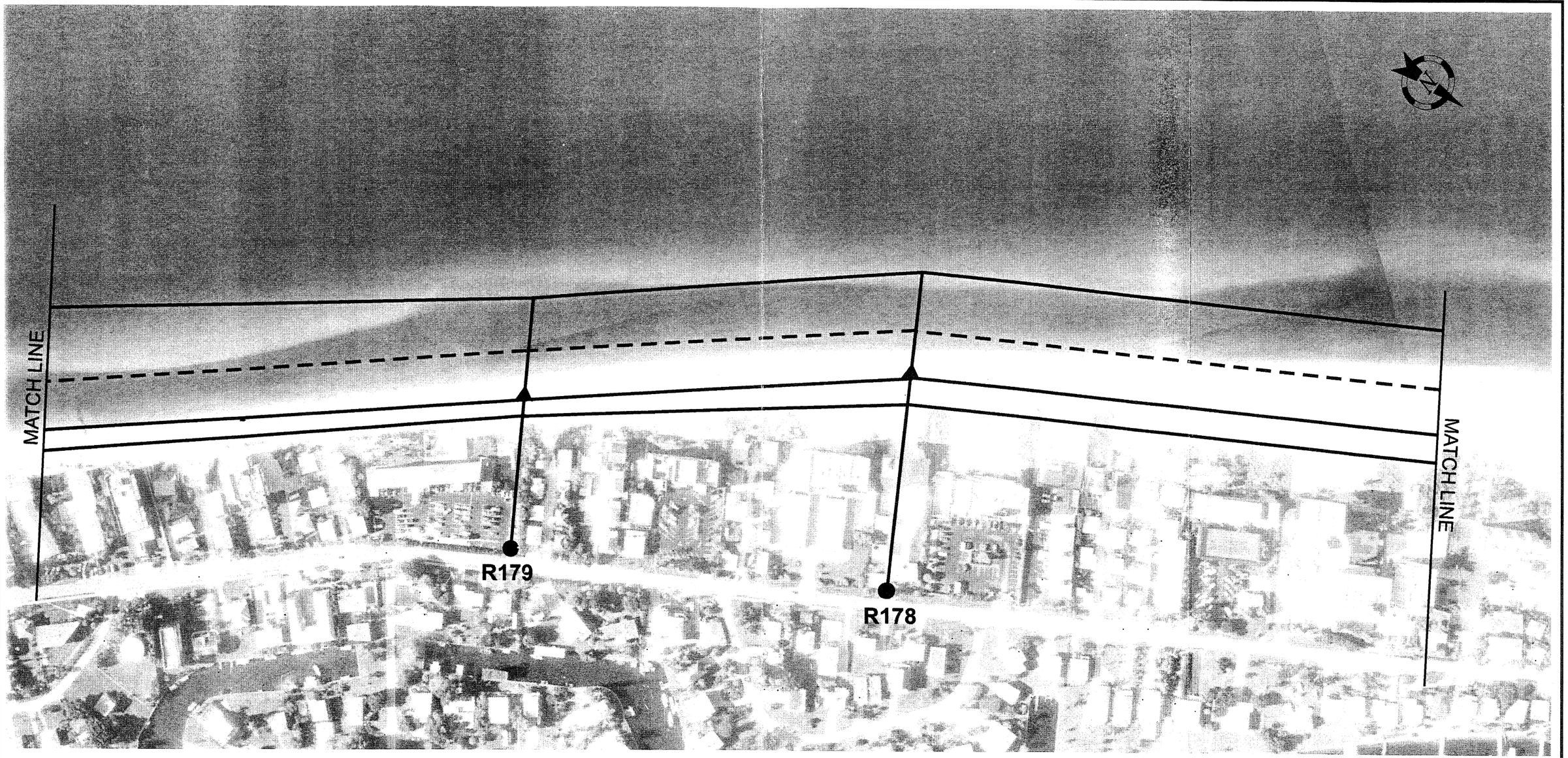

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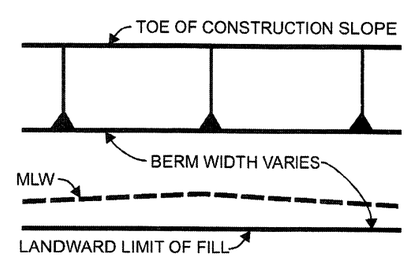

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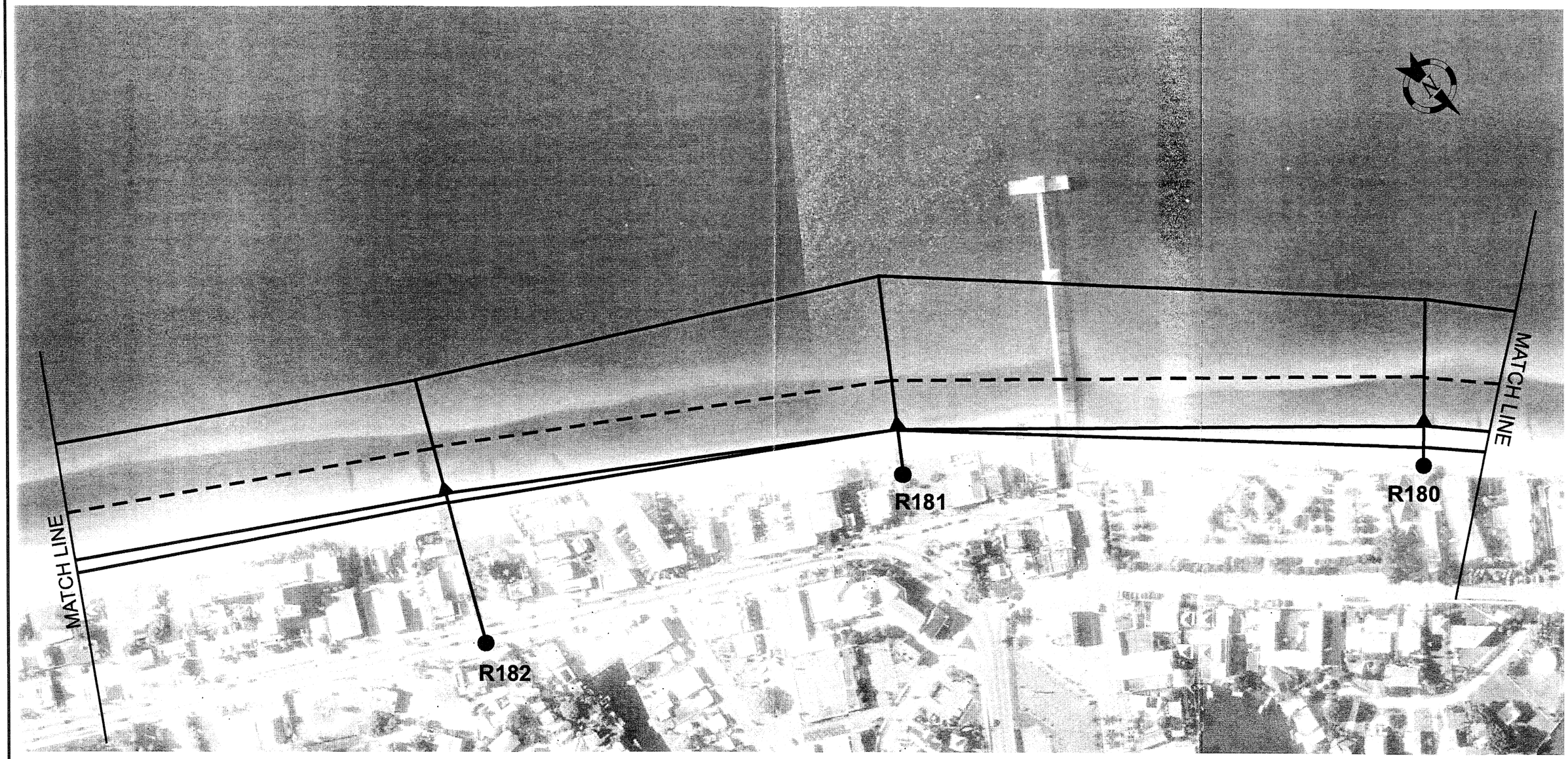

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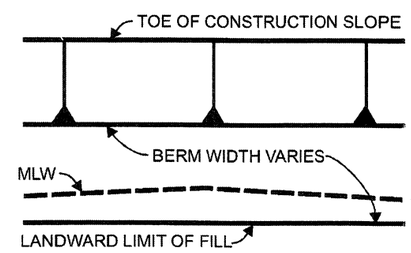

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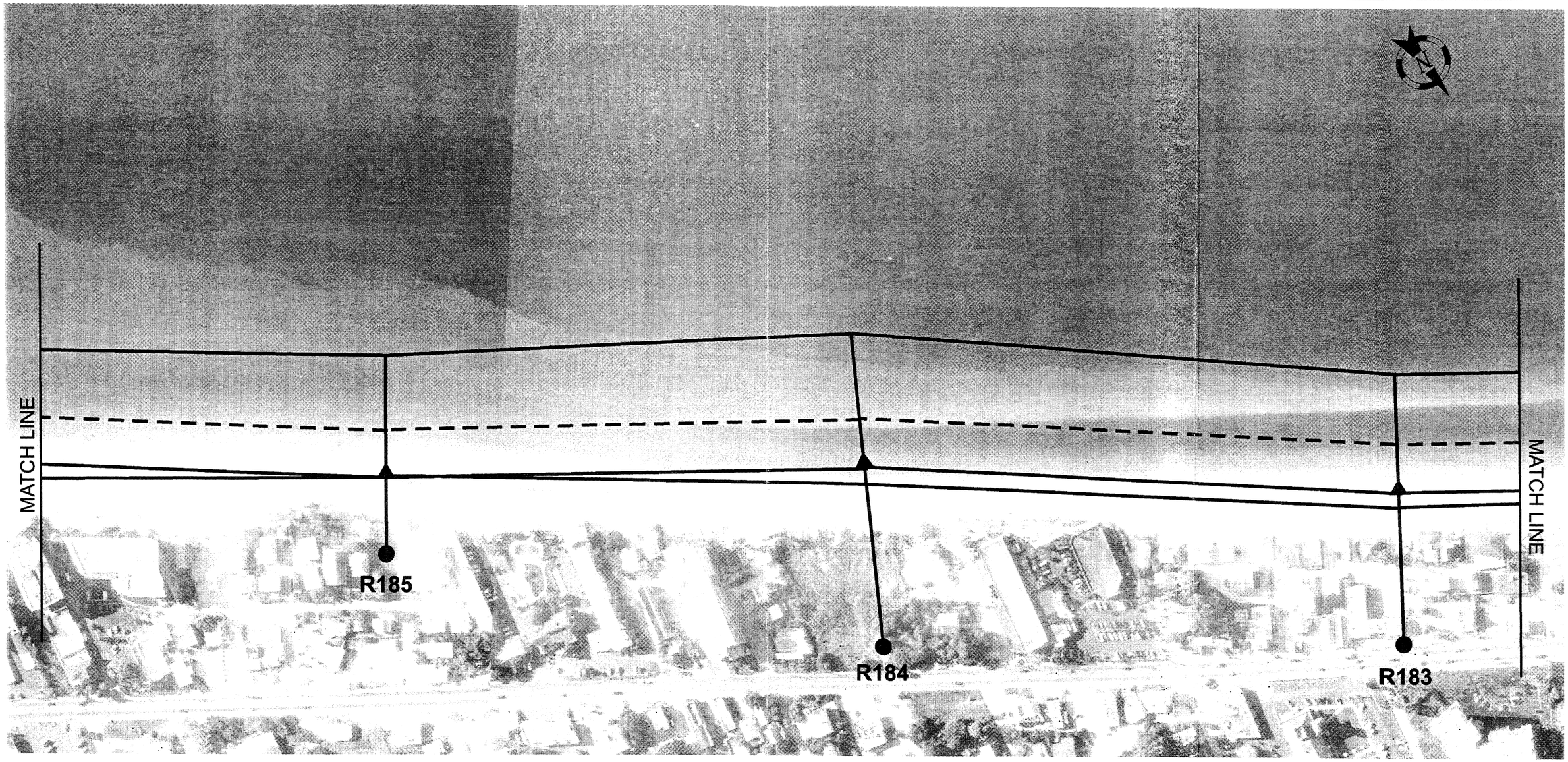

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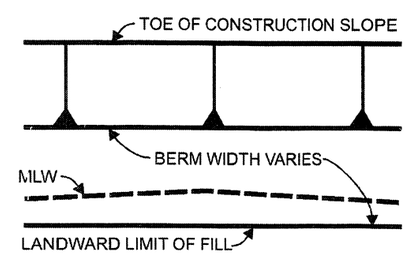

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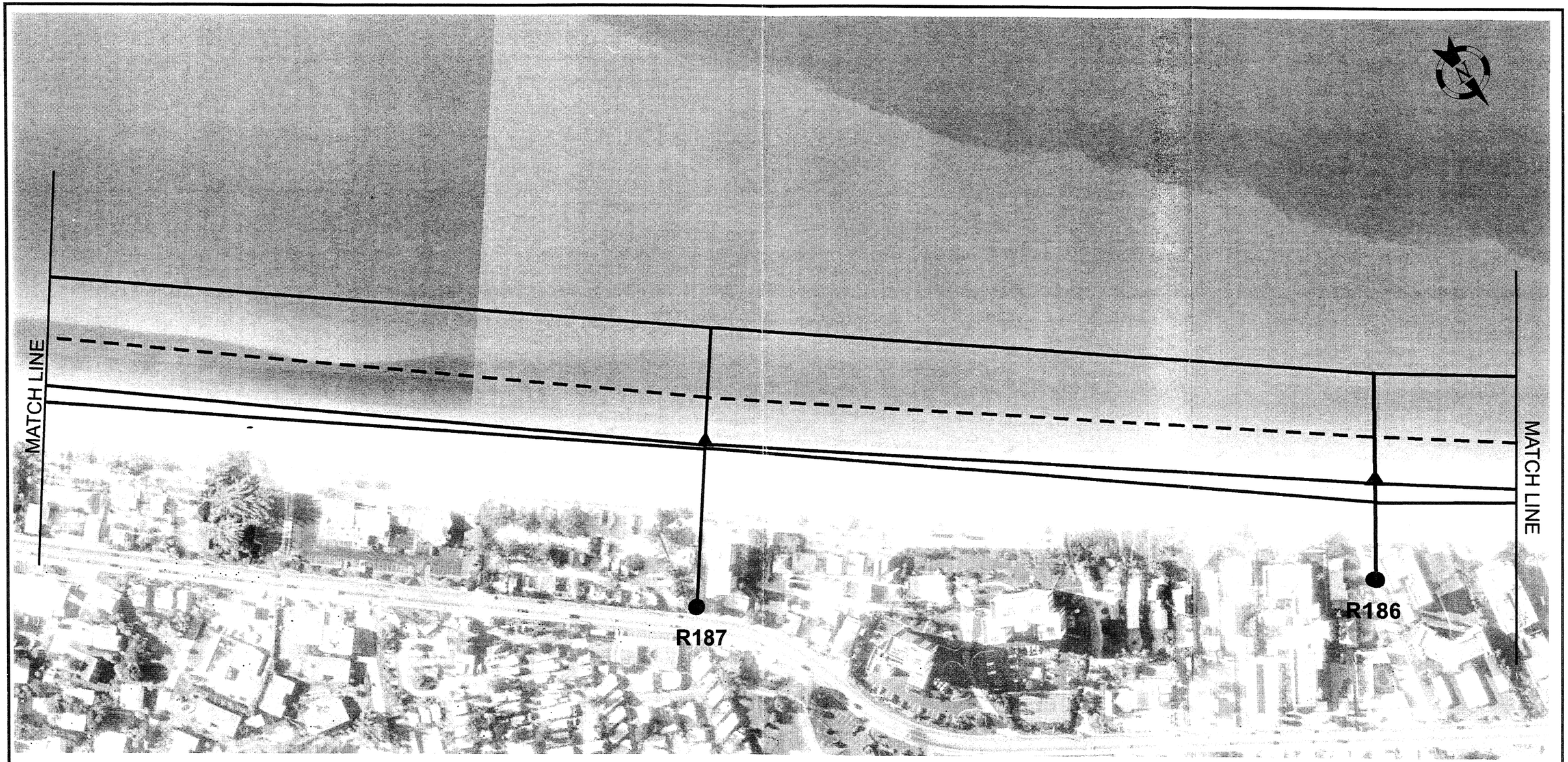

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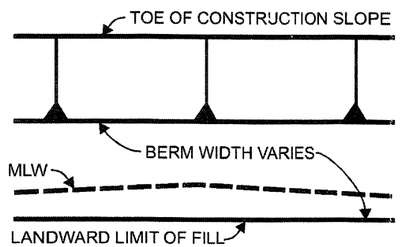

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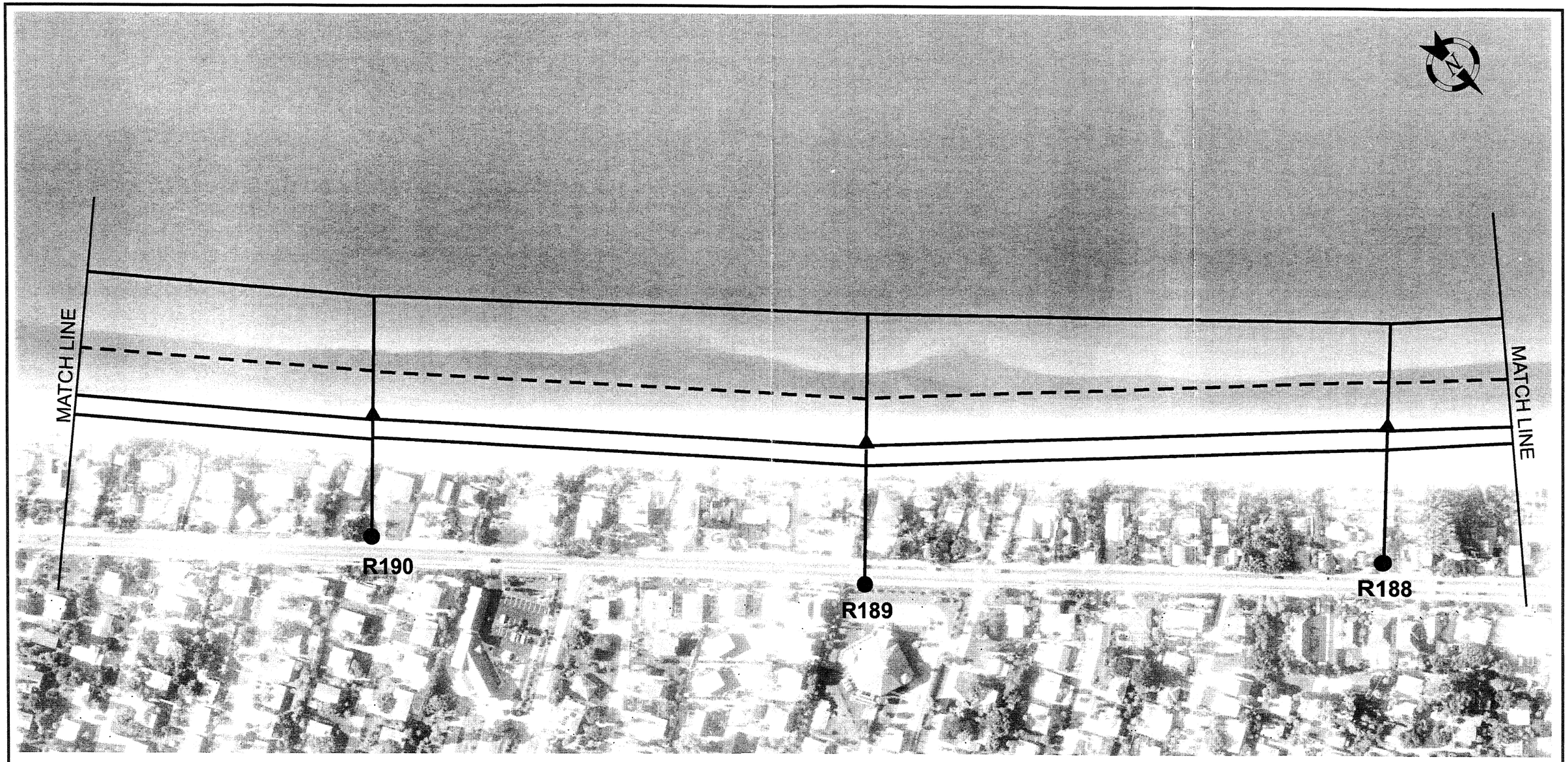

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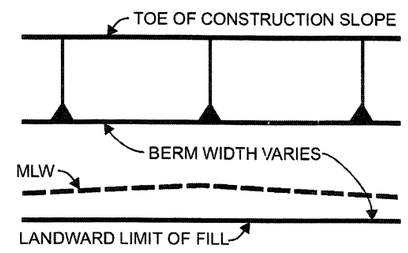

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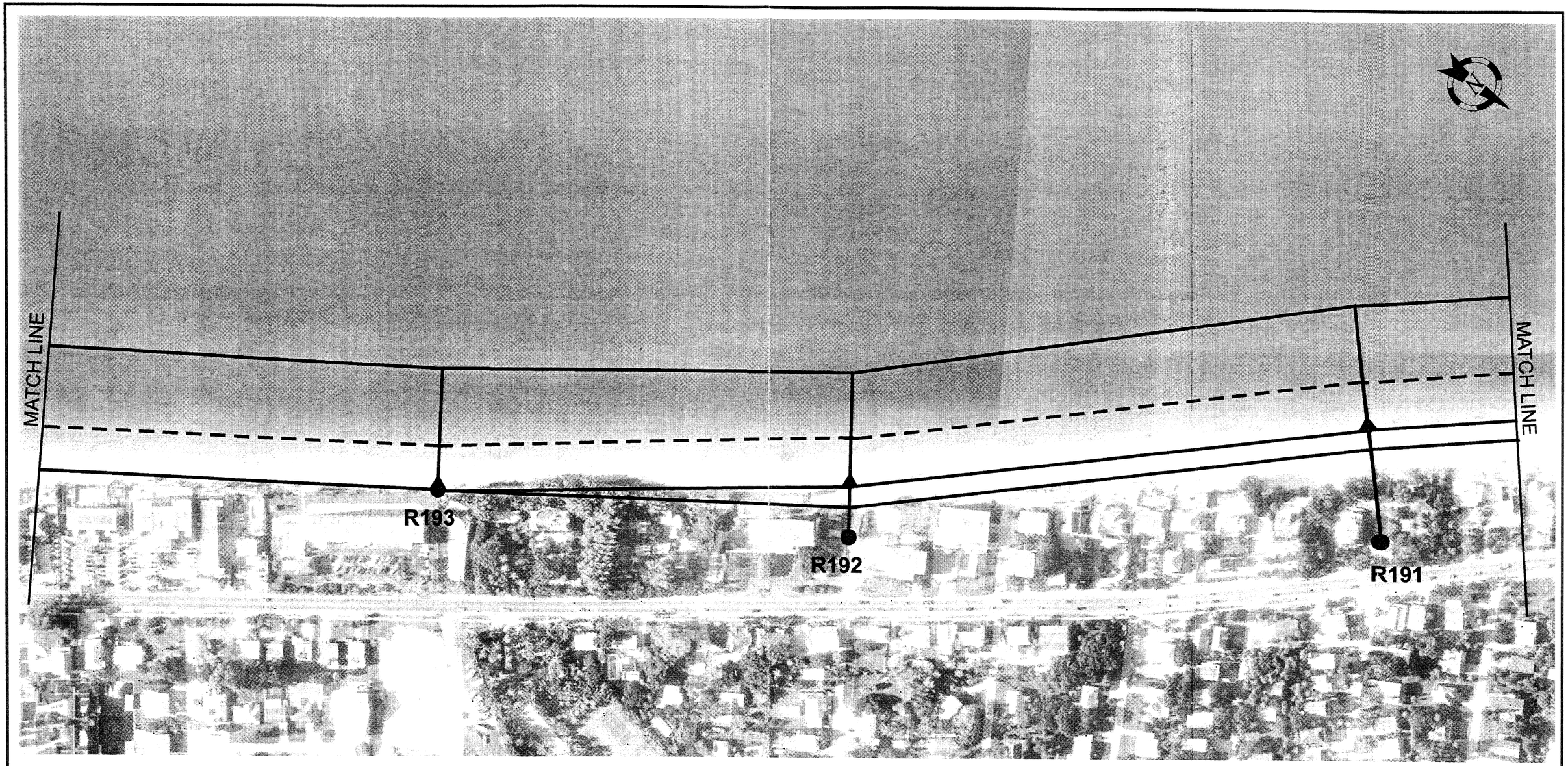

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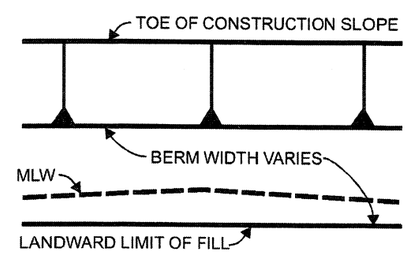

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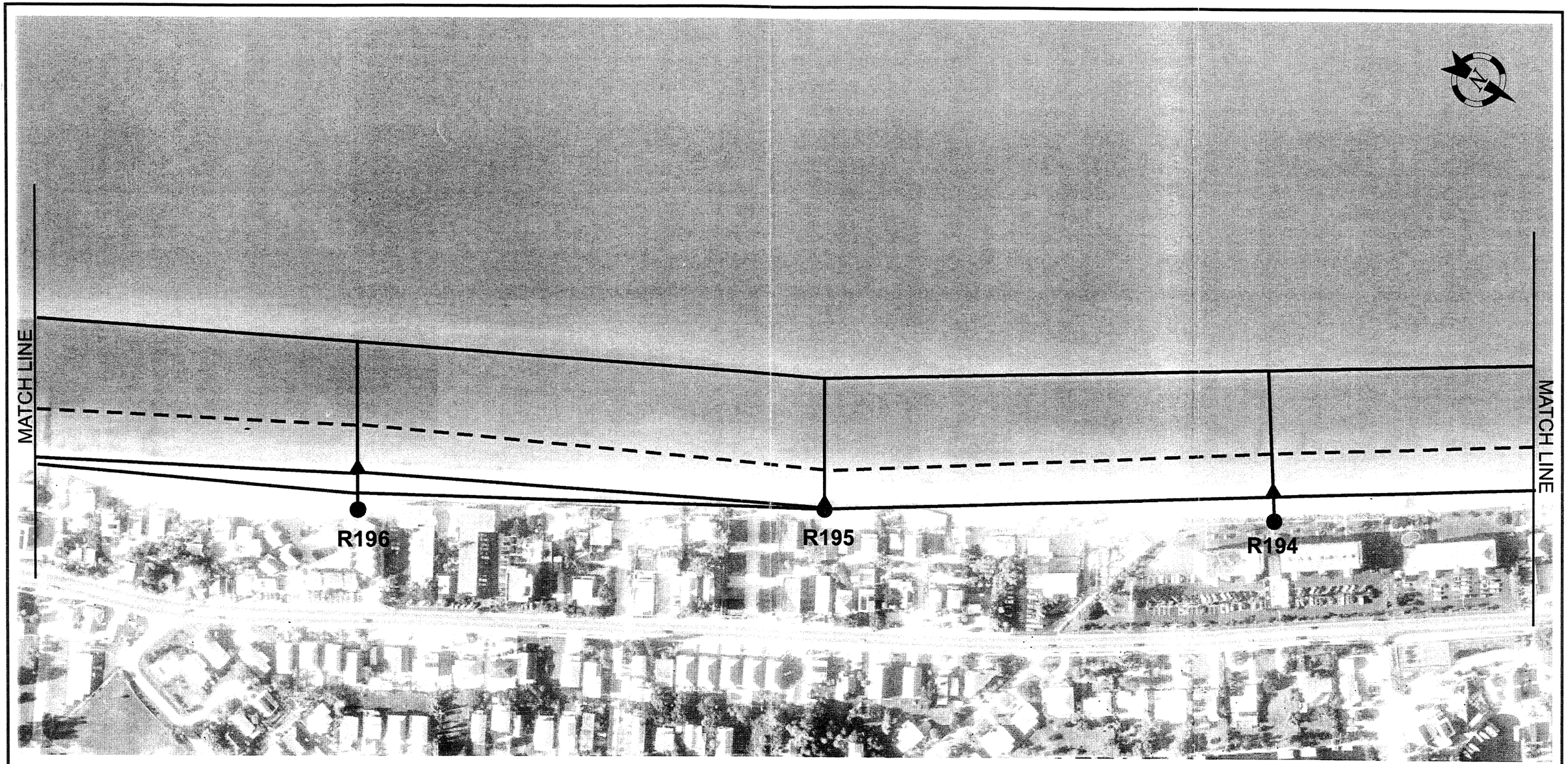

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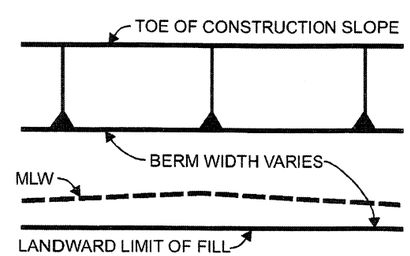

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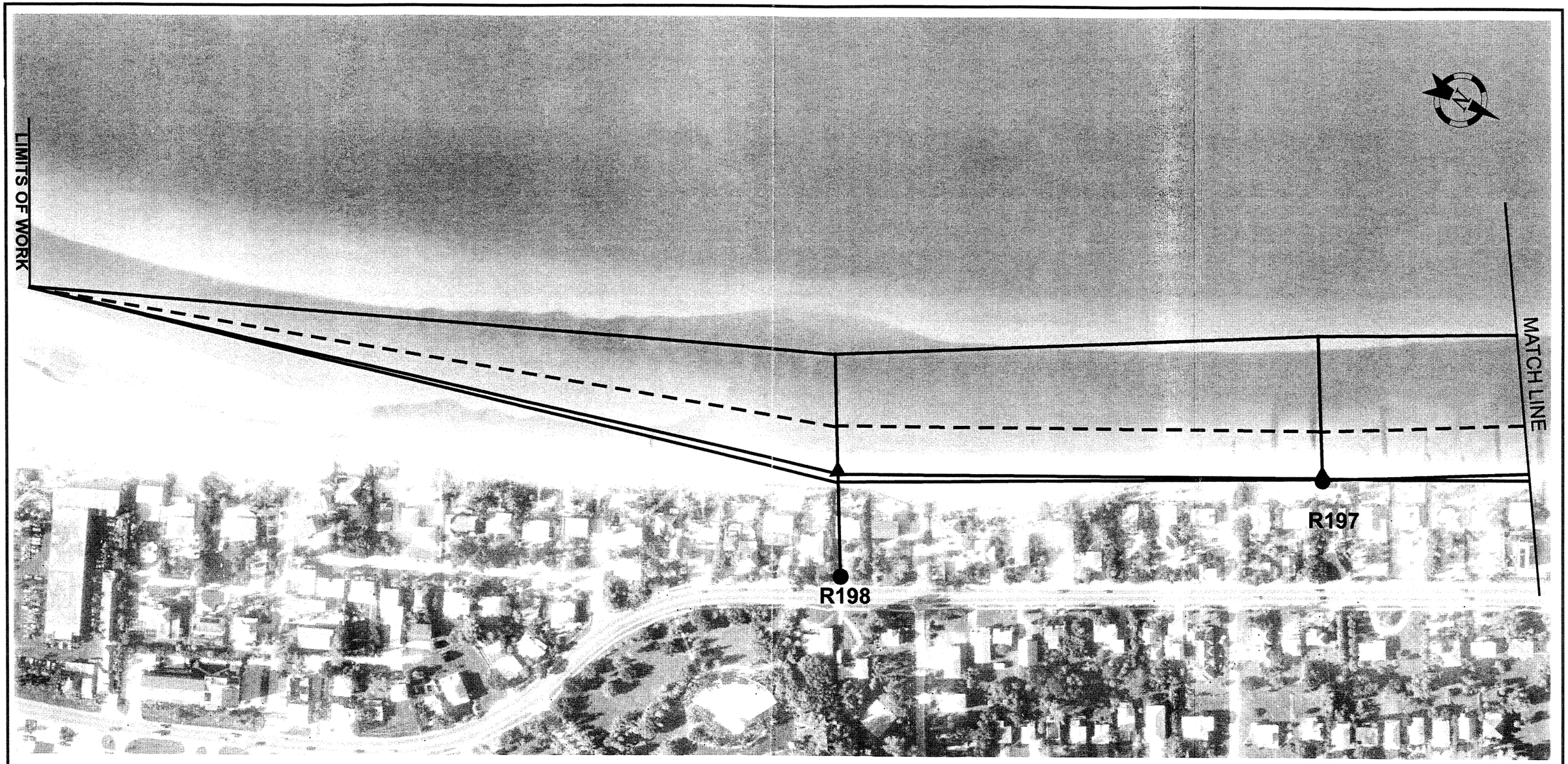

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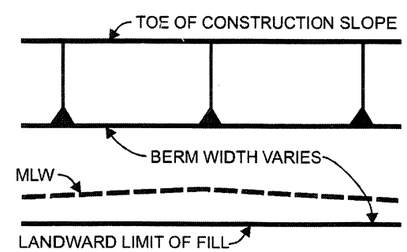

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JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

TO ACCOMPANY GENERAL REEVALUATION REPORT,
, DATED:
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FINAL
ENVIRONMENTAL IMPACT STATEMENT
JUNE 2001

LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
LEE COUNTY, FLORIDA

LEAD AGENCY: Jacksonville District, U.S. Army Corps of Engineers

ABSTRACT: This Final Environmental Impact Statement describes the selected plan and the alternatives evaluated to provide additional shore protection measures along portions of Gasparilla and Estero Islands for the Lee County Shore Protection Project. The recommended plan includes the combination of beach nourishment and the construction of a terminal groin. The plan consists of a protective beach, estimated berm width 40-feet along 4.7-miles on Estero Island. A 240-foot long rubblemound groin would be placed at the northern end of Estero Island. A total volume of 1,023,000 cubic yards of sand would be placed on Estero Island. The Gasparilla plan consists of a protective beach, estimated berm width of 20-feet, along 2.8-miles of shoreline. A total fill volume of 803,000 cubic yards of sand would be placed on Gasparilla Island. The borrow site for the Gasparilla Island segment would be approximately 3,000 feet offshore of the south end of Gasparilla Island. The Estero Island borrow site is located approximately 16-miles west of the island.

For more information, contact Ms. Yvonne Haberer, U.S. Army Corps of Engineers, Planning Division, P.O. Box 4970, Jacksonville, Florida 32232-0019, phone (904) 232-1701 or facsimile (904)232-3442.

U.S. Army Corps
of Engineers
Jacksonville District

SUMMARY

FINAL
ENVIRONMENTAL IMPACT STATEMENT
ON
LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
LEE COUNTY, FLORIDA

Need or Opportunity. Lee County is located on the lower gulf coast of Florida. The proposed work would be performed as part of the Lee County Shore Protection Project. The project area includes 2.8-miles of the southern portion of Gasparilla Island and 4.7-miles of Estero Island. Erosion of the shoreline in the county has been a problem for a number of years. Problems in this area consist of beach erosion, shoreline receding and property damage from tidal flooding and wave action during seasonal storms and hurricanes. Storms threaten $31.7 million and $66.6 million in front row structural improvements on Gasparilla and Estero Islands, respectively, not including infrastructure or land. Homes have been undermined and destroyed and sections of public roads have been washed out, undermined and abandoned. The natural littoral process only partially restores the eroded beaches during favorable weather conditions. Local efforts of storm damage protection by various methods have been largely ineffectual. An absence of sand in the nearshore littoral system has greatly reduced the effectiveness of the protective nature of a natural beach and dune system.

Major Findings and Conclusions. The proposed project can be constructed while protecting the human environment from unacceptable impacts. Benefits of the proposed action would be to reduce loss of public beachfront to continuing erosional forces. The placement of sand on the beach and within the transition fill area 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 the groin would help reduce excessive loss of protective fill at the northerly end of Estero Island. Dredging in the proposed borrow areas would cause a depletion of sand. Adverse impacts would include increased turbidity and sedimentation in the vicinity of the borrow sites and the nearshore environment along the project reaches during construction, some damage to reef habitat along the Gasparilla Island shoreline, and potential impact on nesting or in-water sea turtles. Measures taken to avoid, minimize, and compensate for adverse impacts include compensation of reef impacts with artificial reef construction, use of sea turtle observers and turtle deflecting draghead on any hopper dredge, monitor and relocate sea turtle nests, monitor for and correct problems with scarps and compaction on the beach.

Alternatives. Several design alternatives were proposed to reduce loss of public beachfront due to erosion along portions of Gasparilla and Estero Islands. These alternatives include the placement of beach fill at varying berm widths, structural options such as revetments and groins, and a combination of beach fill and structural options. Five offshore borrow sites were identified for Estero Island. Two offshore borrow sites were identified for Gasparilla Island.

Preferred Alternative. The preferred alternative incorporates initial beach fill with periodic nourishment and the construction of a rubble mound terminal groin at the northern end of Estero Island. The Estero Island berm optimized at a 40-foot berm elevation +5 MLW with a total fill volume of 1,023,000 cubic yards. There would be a 3-year renourishment interval, placing 347,000 cubic yards of material. The Gasparilla berm optimized at a 20-foot berm at elevation +5 MLW and a total fill volume of 803,000 cubic yards. There would be a 7-year renourishment interval, placing 542,000 cubic yards of material.

Areas of Controversy. The Lee County Coastal Advisory Council have concerns regarding the proposed borrow site for the Estero Island project. The proposed site, in part, has already been identified and permitted as a sand source for Captiva and Sanibel Islands.

FINAL
ENVIRONMENTAL IMPACT STATEMENT
ON
LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
LEE COUNTY, FLORIDA

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FINAL ENVIRONMENTAL IMPACT STATEMENT
ON

LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
LEE COUNTY, FLORIDA

1. PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY

The Beach Erosion Control Project for Lee County, Florida, was authorized in accordance with recommendations of the Chief of Engineers in House Document number 91-393, under the provisions of Section 201 of the Flood Control Act of 1965 enacted by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The authorization provides for Federal participation in beach restoration and periodic nourishment along portions of the Gulf shore of Lee County. Captiva Island was included in this authorization and has been constructed.

1.2 PROJECT LOCATION

Lee County is located on the lower gulf coast of Florida, about 90 miles south of the entrance to Tampa Bay and 130 miles north of Key West (see figure 1, vicinity map and project plan view). The 44-mile coastline consists of coastal barrier islands separated from the mainland by shallow tidal lagoons. Gasparilla Island is a narrow low island approximately 6.7 miles long bounded on the north by Gasparilla Pass and on the south by Boca Grande Pass. The southerly five miles of the island lie in Lee County. The gulf shoreline of Estero Island is approximately 7.0 miles in length. The community of Ft. Myers Beach occupies the island. The barrier islands range in width from 200 feet to about 2.5 miles. Natural ground elevations are generally less than ten feet above Mean Low Water (MLW).

1.3 PROJECT NEED OR OPPORTUNITY

The coastline of Lee County consists of coastal barrier islands separated from the mainland by shallow tidal lagoons. Problems in this area consist of beach erosion, shoreline recession and property damage. Gasparilla and Estero Islands have experienced significant erosion and shoreline recession, which has resulted in a loss of beach for recreation and increase in the likelihood of storm damage to shorefront property. Along the recommended project shoreline, storms threaten $31.7 and $66.6 million in front row structural improvements on Gasparilla and Estero Islands, respectively, not including infrastructure and land. Homes have been undermined and destroyed and sections of public roads have been washed out, undermined and abandoned. Major damages result from severe storms, which occasionally sweep across the gulf and cause pronounced erosion and damage. Favorable conditions during periods between storms only partially restore the eroded beaches, and local efforts at storm protection have been ineffectual. An absence of sand in the nearshore

littoral system has greatly reduced the effectiveness of the protective nature of a natural beach and dune system. The purpose of the proposed action is to reduce loss of public beachfront to continuing erosional forces and to prevent or reduce periodic damages and potential risk to life, health, and property in the developed lands adjacent to the beach.

1.4 AGENCY GOAL OR OBJECTIVE

1.4.1 GOAL

The goal of the proposed project is to reduce storm damage to upland development by providing additional shore protection measures along portions of Gasparilla and Estero Islands.

1.4.2 PROPOSED ACTION

The proposed action consists of a protective beach, estimated berm width 20 feet, along 2.8 miles of shore on Gasparilla Island, and a berm width of 40 feet along 4.7 miles on Estero Island. The design berm elevation for Gasparilla is +5 feet Mean Low Water (MLW); the design berm elevation for Estero is +5 feet MLW. A 240-foot long rubblemound groin would be placed at the northern end of Estero Island (see figure 2, typical cross sections). The borrow site for Gasparilla Island has an area of 2.8 square miles, and is composed of two sections: the north - south section lies approximately 3,000 yards offshore of the south end of Gasparilla Island in water depth of 10 to 18 feet MLW; the east - west section is located to the north of Boca Grande Pass. The borrow site for Estero Island has an area of 1.59 square miles, and is located in the Gulf approximately 1.5 miles southwest of Sanibel Island.

1.5 RELATED ENVIRONMENTAL DOCUMENTS.

The following is a list of related documents:

a. Lee County, Florida, Beach Erosion Control Project, Design Memorandum for the First Renourishment Project (Captiva Island Segment) with Environmental Assessment. U.S. Army Corps of Engineers, Jacksonville District, July 1994 (Revised November 1995).

b. Beach Erosion Control Study on Lee County, Florida. U.S. Army Corps of Engineers, Jacksonville District, July 1969.

c. Section 933 Study with Environmental Assessment, Charlotte Harbor, Lee County, Florida. U.S. Army Corps of Engineers, Jacksonville District, July 1990 (Revised April 1991).

1.6 SCOPING AND ISSUES.

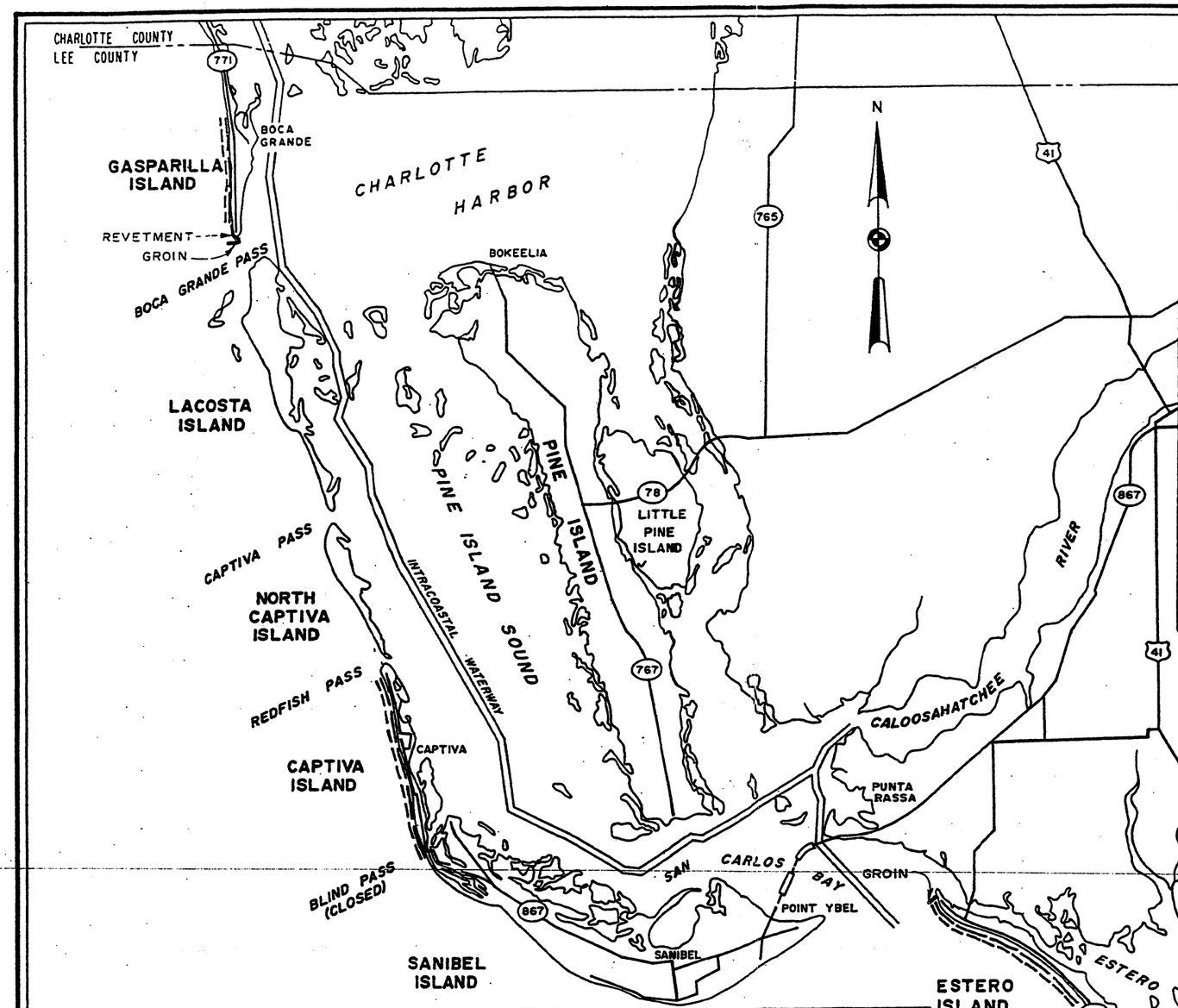
1.6.1 ISSUES EVALUATED IN DETAIL

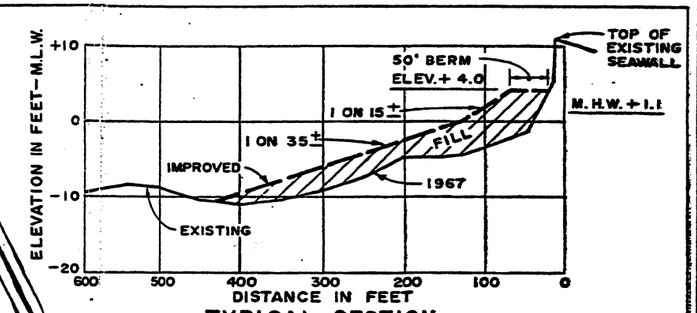
PROJECT: Provides for federal participation in beach erosion control measures for parts of the gulf shore of Lee County through the provision of a protective and recreational beach with a level berm 50 feet wide at elevation 4 feet above m.l.w. and a natural slope as would be shaped by wave action along 2.7 miles of shore on Gasparilla Island, 4.7 miles of shore on Captiva Island, and 4.6 miles of shore on Estero Island; periodic nourishment of each of these reaches as needed for an initial period of 10 years; and for construction of 2,400 feet of revetment and a groin at the southerly end of Gasparilla Island and a groin at the northerly end of Estero Island.

MEAN TIDAL RANGE: Varies from 1.1 feet at the northerly gulf end to 2.0 feet at the southerly gulf end of Lee County.

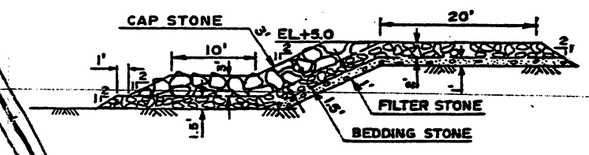
AUTHORIZATION FOR EXISTING PROJECT

ACTS	WORK AUTHORIZED	DOCUMENTS
S. R. 17 DEC. 70 & H. R. 15 DEC. 70	Federal participation in cost of a shore-protection project	H. Doc. 91-395/91/2

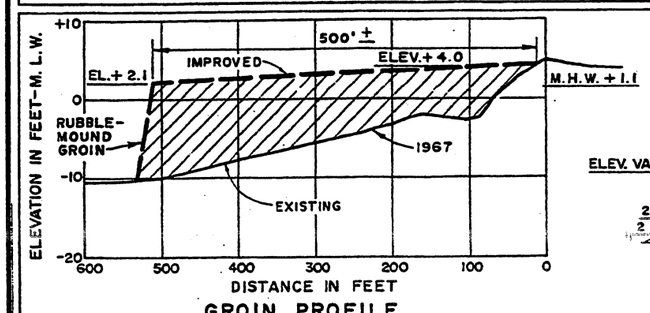




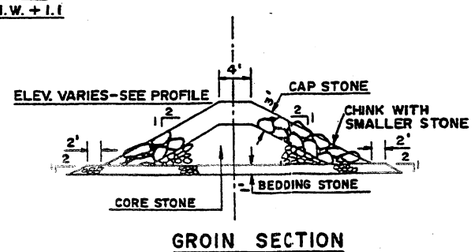
TYPICAL SECTION



REVETMENT SECTION



GROIN PROFILE



GROIN SECTION

LEGEND

——— INITIAL RESTORATION

- - - - - PERIODIC NOURISHMENT AS NEEDED.

LEE COUNTY, FLORIDA
BEACH EROSION CONTROL

SCALE IN MILES
1 0 1 2 3 4 5

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA

6-30-71

FIGURE 4

littoral system has greatly reduced the effectiveness of the protective nature of a natural beach and dune system. The purpose of the proposed action is to reduce loss of public beachfront to continuing erosional forces and to prevent or reduce periodic damages and potential risk to life, health, and property in the developed lands adjacent to the beach.

1.4 AGENCY GOAL OR OBJECTIVE

1.4.1 GOAL

The goal of the proposed project is to reduce storm damage to upland development by providing additional shore protection measures along portions of Gasparilla and Estero Islands.

1.4.2 PROPOSED ACTION

The proposed action consists of a protective beach, estimated berm width 20 feet, along 2.8 miles of shore on Gasparilla Island, and a berm width of 40 feet along 4.7 miles on Estero Island. The design berm elevation for Gasparilla is +5 feet Mean Low Water (MLW); the design berm elevation for Estero is +5 feet MLW. A 240-foot long rubblemound groin would be placed at the northern end of Estero Island (see figure 2, typical cross sections). The borrow site for Gasparilla Island has an area of 2.8 square miles, and is composed of two sections: the north - south section lies approximately 3,000 yards offshore of the south end of Gasparilla Island in water depth of 10 to 18 feet MLW; the east - west section is located to the north of Boca Grande Pass. The borrow site for Estero Island has an area of 1.59 square miles, and is located in the Gulf approximately 1.5 miles southwest of Sanibel Island.

1.5 RELATED ENVIRONMENTAL DOCUMENTS.

The following is a list of related documents:

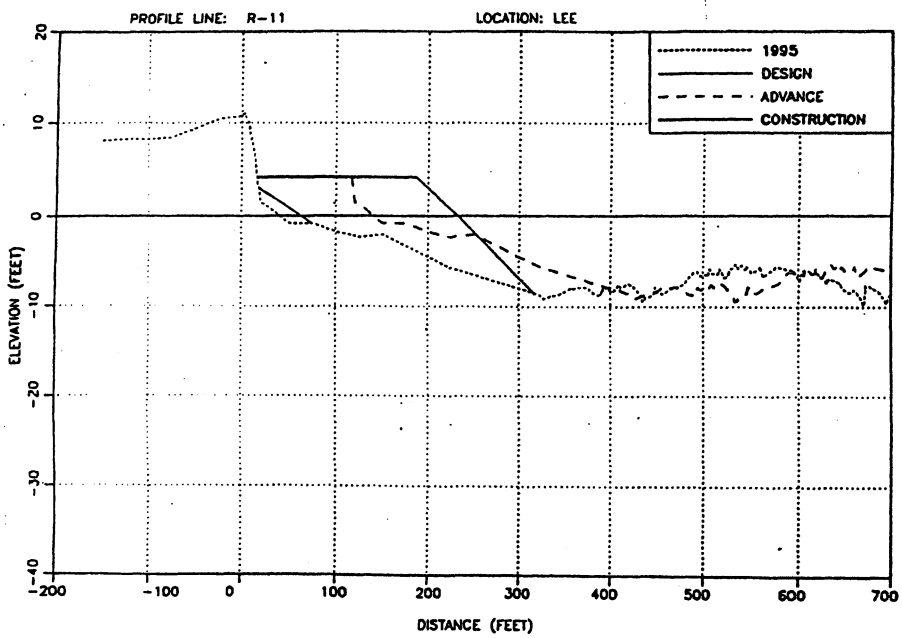
a. Lee County, Florida, Beach Erosion Control Project, Design Memorandum for the First Renourishment Project (Captiva Island Segment) with Environmental Assessment. U.S. Army Corps of Engineers, Jacksonville District, July 1994 (Revised November 1995).

b. Beach Erosion Control Study on Lee County, Florida. U.S. Army Corps of Engineers, Jacksonville District, July 1969.

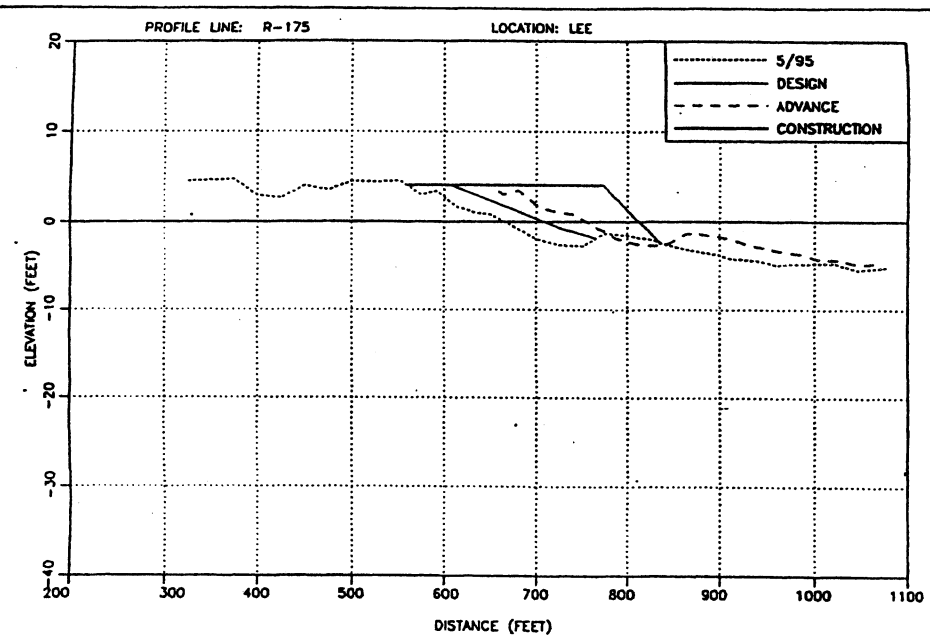
c. Section 933 Study with Environmental Assessment, Charlotte Harbor, Lee County, Florida. U.S. Army Corps of Engineers, Jacksonville District, July 1990 (Revised April 1991).

1.6 SCOPING AND ISSUES.

1.6.1 ISSUES EVALUATED IN DETAIL



TYPICAL CROSS-SECTION - GASPARILLA



TYPICAL CROSS-SECTION – ESTERO

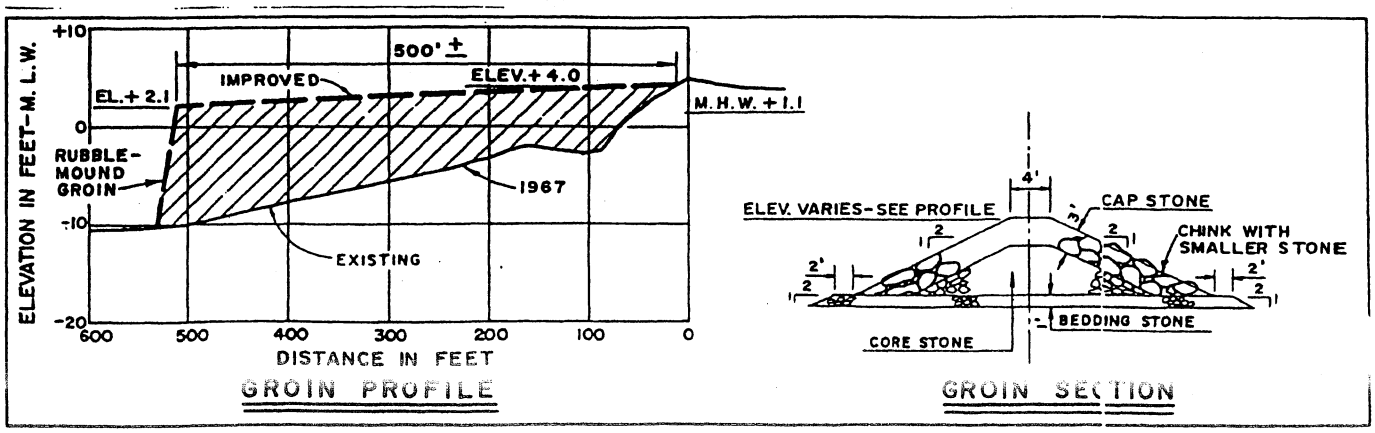


FIGURE 2

The following issues were identified during scoping, and by the preparers of this Environmental Impact Statement, to be relevant to the proposed action and appropriate for detailed evaluation:

a. Impacts on nesting sea turtles, nests, and hatchlings.
b. Impacts on nesting American crocodiles.
c. Impacts on nesting bald eagle.
d. Impacts on manatees.
e. Impacts to hardground/reef communities.

1.6.2 IMPACT MEASUREMENT
The following provides the means and rationale for measurement and comparison of impacts of the proposed action and alternatives.

1.6.2.1 Sea Turtles.
If construction occurs during the sea turtle nesting season, a nest survey and relocation program will be implemented within the identified construction area. It is our goal to minimize impacts to sea turtles and to comply with the requirements of the Endangered Species Act.

1.6.2.2 Hardground and Reef Impacts.
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. Our desire in selecting an alternative is to keep impacts to these resources to the minimum practicable in consideration of other project requirements.

1.6.2.3 Other Impacts.
Bases for impact measurement and comparison are stated more specifically in section 4.0 on ENVIRONMENTAL EFFECTS and other sections of this document and its appendices.

1.7 PERMITS, LICENSES, AND ENTITLEMENTS.

Water Quality Certification (WQC) will be applied for as required by section 404(b)(1) of the Clean Water Act. The (WQC) will be submitted to the Florida Department of Environmental Protection by the U.S. Army Corps of Engineers for the project.

If conducted during the sea turtle nesting and hatching season, the proposed action will require daily sea turtle nest surveys and nest relocations. A permit from FDEP to handle sea turtles and relocate nests will be required for the person(s) performing the surveys and nests relocations associated with the proposed action.

2. ALTERNATIVES

The alternatives section is the heart of this EIS. 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 decisionmaker and the public.

Several design alternatives were proposed to reduce loss of public beachfront due to erosion along portions of Gasparilla and Estero Islands. These alternatives include the placement of beach fill at varying berm widths, structural options such as revetments and groins, and a combination of beach fill and structural options.

The numerical shoreline change model GENESIS (Generalized Model for Simulating Shoreline Change) was the primary tool used to evaluate the different alternative plans. The GENESIS model was executed using advanced nourishment berm widths of 0 (maintain existing shoreline), 20, 40, 60, 80, 100, and 120-feet. The alternative plans were evaluated based on analyses of historic shoreline trends, numerical coastal modeling, analyses of costs and benefits, and effects on the environment. The recommended plan is the alternative that reduces erosion along portions of Gasparilla and Estero Islands in a manner that provides the greatest National Economic Development (N.E.D.) benefits.

2.1 DESCRIPTION OF ALTERNATIVES.

2.1.1 NO ACTION ALTERNATIVE

This alternative assumes that the erosion in each of the study areas will continue with no solutions or remedial measures being constructed. The no action alternative 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 gulf shoreline on Gasparilla and Estero Islands. Beach compatible material would be obtained from offshore borrow sites. Gasparilla: Sand would be placed along 2.8 miles of shoreline, extending from FDEP monument R-11 south to R-24. The design berm elevation is +5 feet Mean Low Water (MLW). The design beach slopes are 1V:15H above MLW and 1V:25H below Mean High Water (MHW). The estimated volume of material required for initial nourishment is 803,000 cubic yards. The nourishment interval has been optimized at seven years. Estero Island: Sand would be placed along 4.7 miles of shoreline, extending from FDEP monument R-175 south to R-198. The design berm

elevation is +5 feet MLW. The Design beach slopes are 1V:25H above MLW and 1V:35H below MLW. The estimated volume of material required for initial nourishment is 1,023,000 cubic yards. The nourishment interval has been optimized at three years. Berm widths of 0 (maintain existing shoreline), 20, 40, 60, 80, 100, and 120-feet were considered on both islands.

2.1.3 ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROINS.

This alternative provides the same beach nourishment features as alternative A, but also provides for the construction of a rubble mound terminal groin at the southern end of Gasparilla Island, and at the northern end of Estero Island.

2.1.4 ALTERNATIVE C, BEACH FILL WITH PERIODIC NOURISHMENT. REVETMENT STABILIZATION ON GASPARILLA ISLAND.

This alternative provides the same beach nourishment features as alternative A, but also provides for the construction of a 2,400-foot revetment on Gasparilla Island. This revetment commences at 15th Street and continues south to the southern end of the island. The revetment would extend about 2,050 feet around the gulf shoreline and 350 feet around the bay side of the southerly tip of Gasparilla Island.

2.1.5 ALTERNATIVE BORROW AREAS

2.1.5.1 The borrow site for Gasparilla Island has an area of 2.8 square miles and is comprised of two sections (figure 3). The north-south section, Gasparilla Borrow Area 1, lies approximately 3,000 feet offshore of the south end of Gasparilla Island in water depths of 10-18-feet MLW. The east-west section, Gasparilla Borrow Area 2, lies on the shoal to the north of Boca Grande Pass navigation channel. Water depths range from 2-15 feet MLW.

2.1.5.2 Several possible borrow areas were identified for Estero Island (see figure 4 for locations). Borrow Area "A" is located within the fill channel area on the eastern edge of the study area and consists of deposits of medium to fine sand/shell mix with a high silt content. Borrow Area "B" is located approximately 16-miles west of Estero Island and 1.5-miles southwest of Sanibel Island. This borrow area consists of 5 to 10 foot thick layers of shell and sand. Within Borrow Area B, is an area identified as B-1 (figure 5). This borrow area covers an area of 1.59 square miles and includes a portion of the Captiva/Sanibel Borow Area-A. Borrow Area "C" is located in the embayment of the San Carlos Bay entrance. Borrow Area "D" is located nearshore off Sanibel Island. Borrow Area "E" is located on the southeastern portion of the study area. Borrow Areas A, B, and C have sediments that are comparable to the native beach composite. Borrow Areas D and E contain sediments that have a much higher shell and silt content than the native beach and will require further study as possible borrow areas.

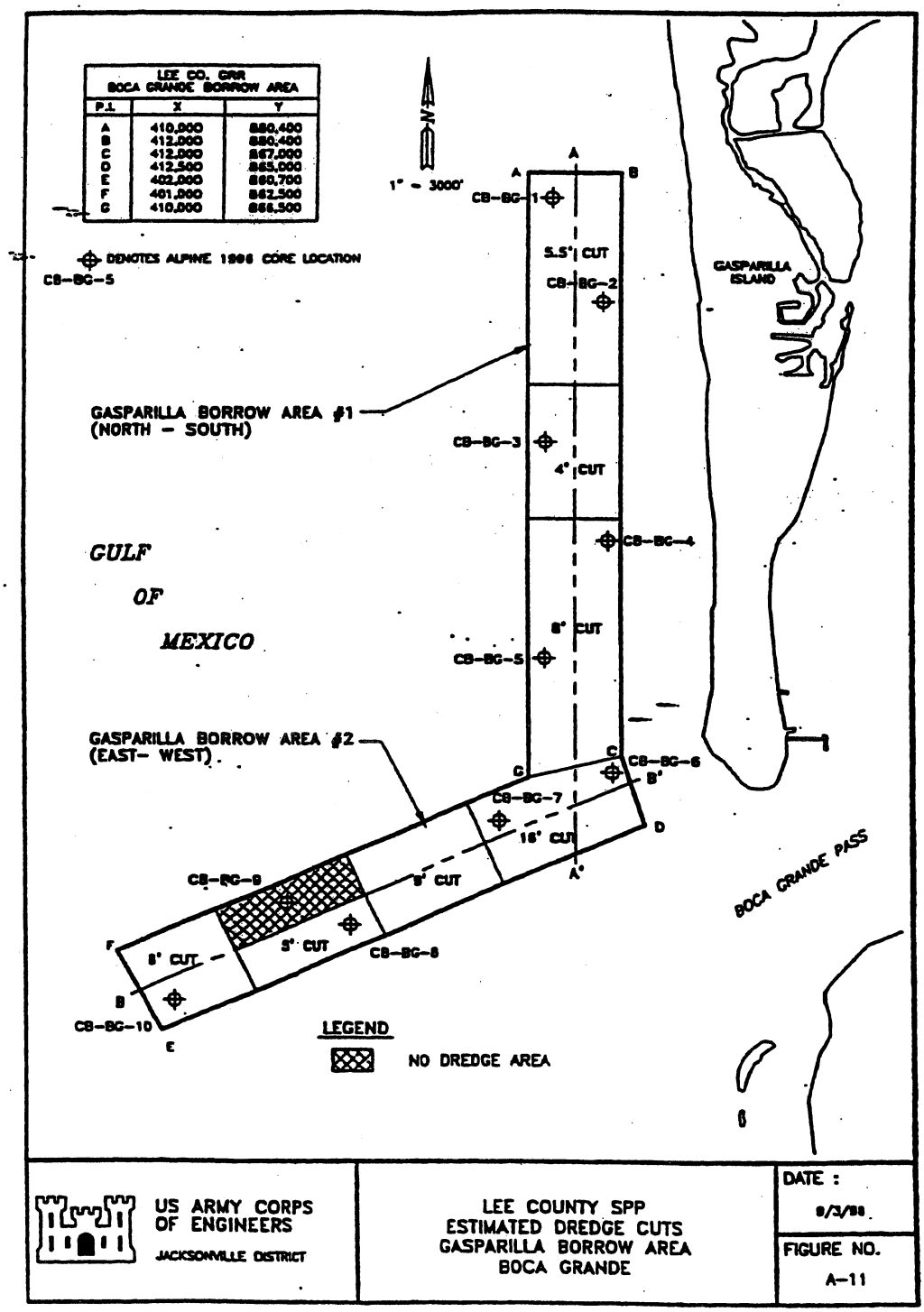


FIGURE 3. GASPARILLA BORROW AREA

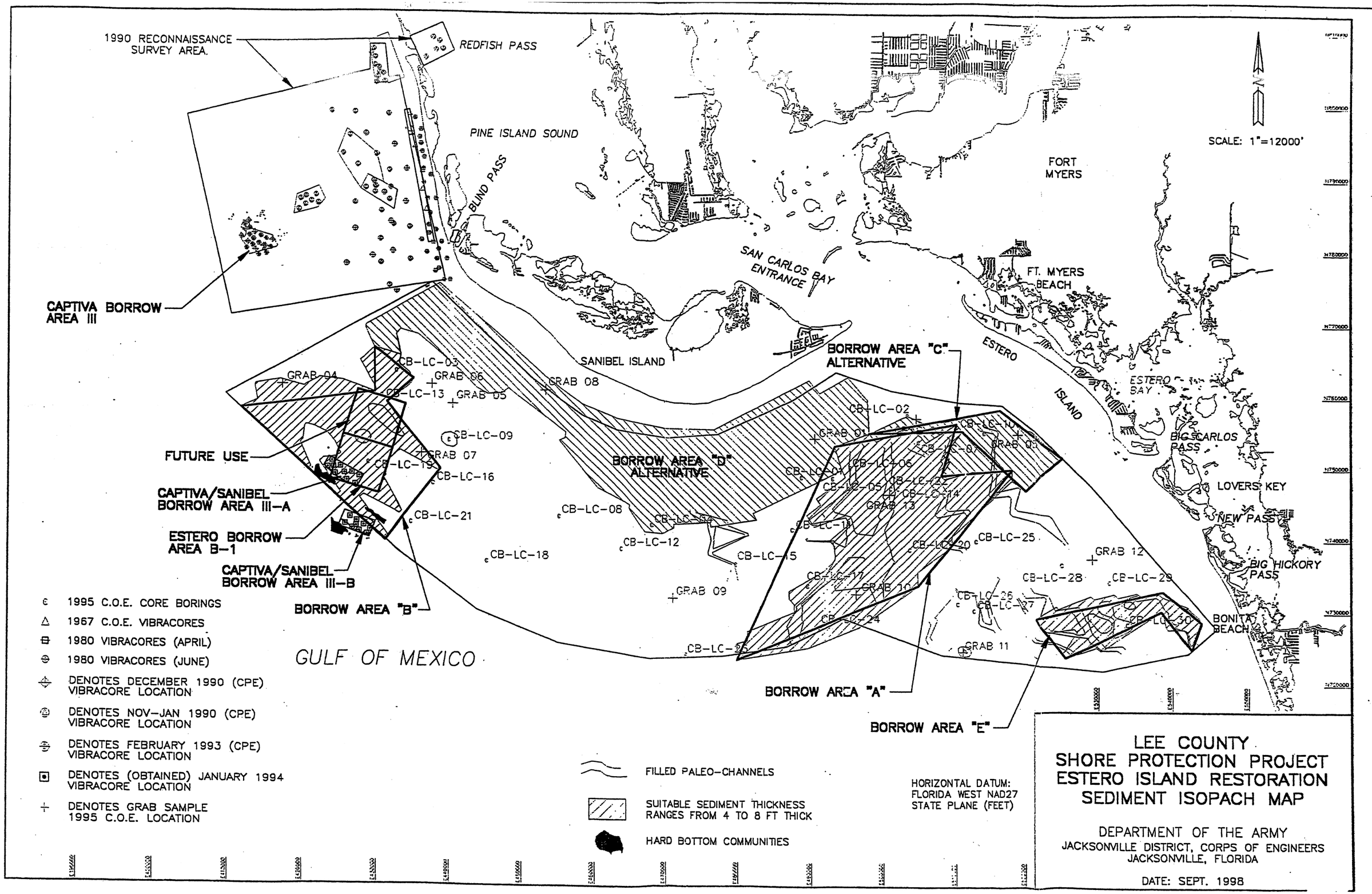


FIGURE 4. ESTERO ISLAND BORROW SITES

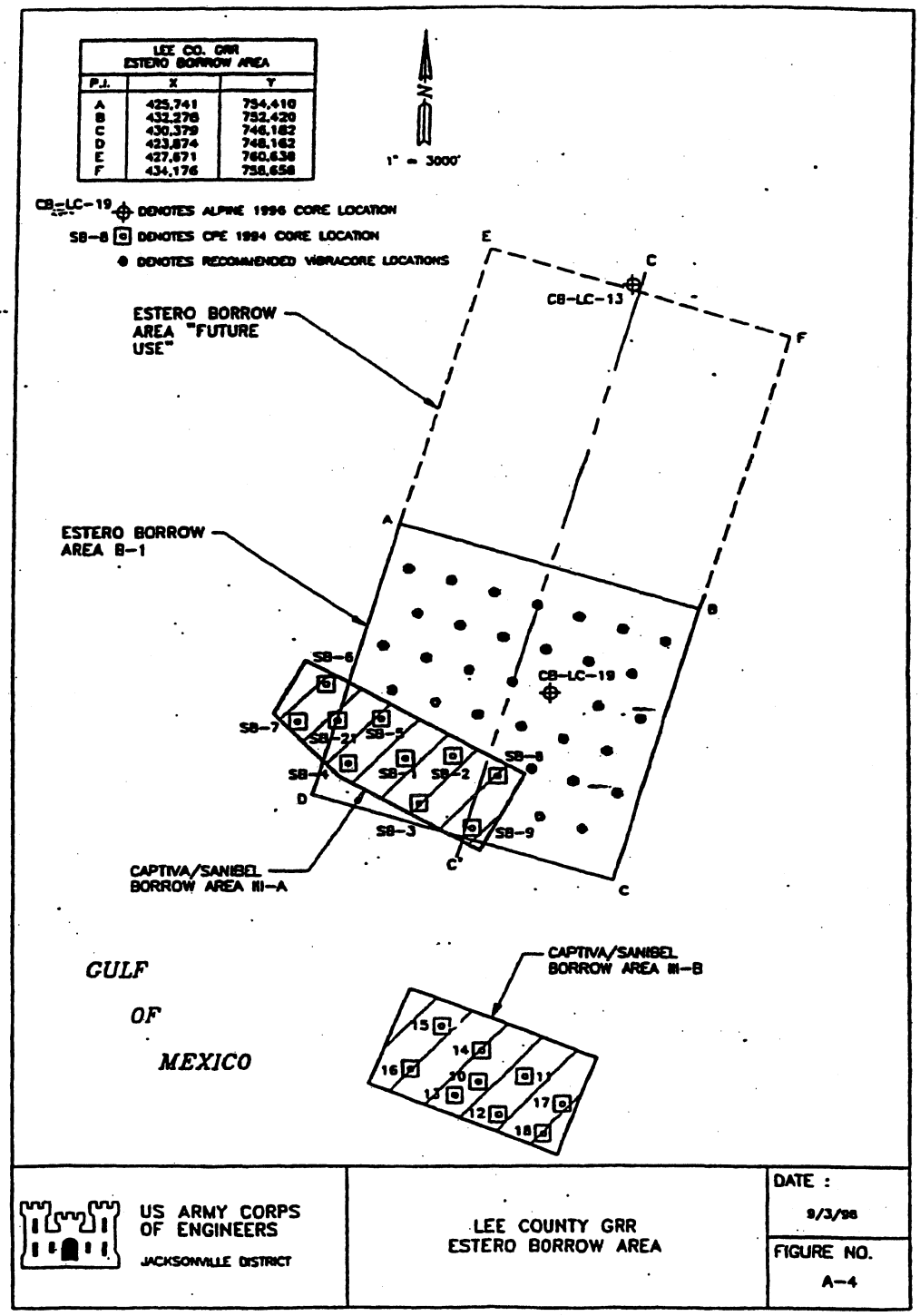


FIGURE 5. ESTERO BORROW AREA B-1

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 Gasparilla and Estero Islands in a manner that provides the greatest National Economic Development (N.E.D.) benefits.

2.3 PREFERRED ALTERNATIVE

Alternative D, the preferred alternative, incorporates initial beach fill with periodic nourishment and the construction of a rubble mound terminal groin at the northern end of Estero Island. Estero Island has a 4.7-mile reach, running from DEP Monuments R-175 to R-198; it also has an 1,800-foot long tapered transition section at the south end. The berm optimized at a 40-foot berm at elevation +5 MLW; it would have a 1V:25H slope down to MLW and a 1V:35H down to existing ground. A construction slope of 1V:10H would be used for placement. The total fill volume would consist of a design volume of 677,000 cubic yards and 347,000 cubic yards of advance fill for a total of 1,023,000 cubic yards. There would be a 3-year renourishment interval, placing 347,000 cubic yards of material. The terminal groin feature for Estero Island provides for a 240-foot rubble mound terminal groin at the northern tip of the island. The crest elevation is defined as +5 feet MLW over the length of the structure. The seaward end of the groin would extend to a depth of approximately -2.5 feet (relative to MTL). The "Genesis" model suggests a maximum region of influence on the order of 2,000 feet south of the structure. The groin would have a height of +6 feet MLW with 1V:2H side slopes. The 240-foot length would require 13,713 cubic feet of armor stone, 3,325 cubic feet of bedding stone, 7,968 cubic feet of foundation stone, 1080 square feet of filter fabric, and 2,400 square feet of vinyl sheet pile. The preferred borrow site for Estero Island would be Borrow Area B-1.

Gasparilla Island has a 2.8-mile reach, running from DEP Monuments R-11 to R-24, it also has a 600-foot taper at the northern end, and a 1,400-foot long taper at the southern end. The berm optimized at a 20-foot berm at elevation +5 MLW; it will have a 1V:15H slope down to MLW and a 1V:25H down to existing ground. A construction slope of 1V:10H will be used for placement. The total fill volume would consist of a design volume of 261,000 cubic yards and 542,000 cubic yards of advance fill for a total of 803,000 cubic yards. There would be a 7-year renourishment interval, placing 542,000 cubic yards of material. The preferred borrow area for Gasparilla Island would be Borrow Area 2.

2.4 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATAION

A terminal groin for the Gasparilla portion of the project was not economically justified based on lack of effect on the renourishment interval. A terminal groin constructed by local interest already exists at the south end of Gasparilla Island. The terminal groin currently acts as a barrier to the longshore transport of sediment from the north to the south. No additional improvements could be gained from any additional terminal structures on Gasparilla Island. Revetment was not reevaluated for this project. due to the hardening effect on the shoreline.

2.5 COMPARISON OF ALTERNATIVES

Table 1 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.

2.6 MITIGATION

Mitigation for hardground impact due to the placement of sand would be performed as part of the proposed project. Mitigation would be accomplished by constructing an artificial reef of limestone boulders or equivalent. A specific mitigation plan will be developed in cooperation with Fish and Wildlife Service, Lee County Division of Natural Resources Management, and the U.S. Army Corps of Engineers.

The protection of potentially significant historical properties located in the vicinity of the Gasparilla Island borrow area will be accomplished by establishing a no dredging zone around the identified anomalies. Refer to Section 4.5 Historic Properties. Section 4.21, Environmental Commitments, discusses other procedures that will be implemented to avoid or minimize potentially adverse environmental impacts.

3. AFFECTED ENVIRONMENT

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

Lee County is located on the Gulf coast of southwest Florida. The average January temperature is 63.8 degrees F, and the average August temperature is 81.5 degrees F. The west coast inshore marine systems are characterized by low-energy conditions and distinct salinity gradients caused by land runoff. Many of these systems are located behind barrier islands. Gasparilla and Estero are typical of the low and narrow barrier islands located on the lower Gulf coast of Florida.

Gasparilla Island is located in the northernmost part of the county and is bounded on the north by Gasparilla Pass, and on the south by Boca Grande Pass. Gasparilla Island is approximately 6.7 miles in length. The southerly five miles are located in Lee County. Natural ground elevations are generally less than 10 feet mean low water. The entire project has been developed. Shore front development, primarily single family homes, is almost continuous along the project shoreline except for Gasparilla Island State Recreation Area property (located southward of R-17).

Estero Island is located in the southern part of Lee County and is bounded on the north by Matanzas Pass, and on the south by Big Carlos Pass. The Gulf shoreline of Estero Island is about 7 miles long. The island varies in width from about 400 feet at the north end to about 3,800 feet at the south end. Natural ground elevations are approximately

Table 1: Summary of Direct and Indirect Impacts for Alternative Plans Considered

ENVIRONMENTAL FACTORS	BEACH RENOURISH-MENT	GROINS	REVETMENT	RECOMMENDED PLAN	PROPOSED BORROW AREAS	NO ACTION
VEGETATION	no seagrass beds present; no impact	no seagrass beds present; no impacts	no seagrass beds present; no impacts	no seagrass beds present; no impacts	no seagrass beds present; no impacts	continued erosion of beach and dune
HARD GROUND	Gasparilla-Impact to nearshore reef habitat Estero-no impact expected	no impact expected	no impact expected	Gasparilla-Impact to nearshore reef habitat Estero-possible impacts to soft corals and sponges	Gasparilla-no impacts expected Estero-possible impacts to soft corals and sponges	no impact
PROTECTED SPECIES	beach fill activities could impact sea turtle nesting or hatching	no impact expected	will harden the shore impacting sea turtle nesting habitat	hopper dredge activities could impact sea turtles or gulf sturgeon; beach fill activities could impact sea turtle nesting or hatching	possible impact to sea turtles or gulf sturgeon with hopper dredge activities at Estero borrow site.	continued erosion could affect sea turtle nesting habitat
FISH AND WILDLIFE RESOURCES	temporary affect on benthic organisms at beach fill site could affect black skimmer nesting activities	temporary and some permanent affect on benthic organisms at construction site	temporary and some permanent affect on benthic organisms at construction site	temporary and some permanent affect on benthic organisms at beach fill site and borrow area could affect black skimmer nesting activities	temporary affect on benthic organisms at borrow area	continued loss of beach habitat
WATER QUALITY	temporary increase in turbidity and suspended sediments within the immediate vicinity of beach fill	temporary increase in turbidity and suspended sediments during construction	temporary increase in turbidity and suspended sediments during construction	temporary increase in turbidity and suspended sediments at borrow and beach fill sites	increase turbidity from dredging and discharge	no impact
HISTORIC PROPERTIES	no impact expected	no impact expected	no impact expected	potential impact to submerged cultural resource at Gasparilla Borrow Area 2	potential impact to submerged cultural resource at Gasparilla Borrow Area 2	no impact
ECONOMICS	compared to recommended plan, would increase the amount of advanced fill at north Estero Island	Gasparilla-lack of effect on renourishment interval; *Estero-reduction in the amount of advanced fill	potential impact due to hardening of the shoreline	reduced costs over the life of the project	uses nearby economic sand source	beach degradation with subsequent loss of valuable property
ENERGY REQUIREMENTS AND CONSERVATION	compared to recommended plan, there would be an increase in energy usage	compared to recommended plan, there would be an increase in energy usage	compared to recommended plan, there would be an increase in energy usage	lower when compared to each alternative	lower when compared to other sand sources	increase energy to control erosion and repair property damage
COASTAL BARRIER RESOURCES	a section of Estero segment located within a CBRA unit; no adverse impact expected	no impact expected	no impact expected	a section of Estero segment located within a CBRA unit; no adverse impact expected	the proposed borrow areas are not located within a CBRA unit; no impact expected	no impact

* Part of Recommended Plan

5 to 10 feet making it one of the more easily flooded barrier islands in Lee County. Estero Island is located wholly in Lee County. The town of Ft. Myers Beach is located on Estero Island. Multifamily residential and commercial development is continuous along the project shoreline.

3.2 VEGETATION

The entire project area of Gasparilla and Estero Islands has been developed. Grounds are generally covered with grasses, herbs and shrubs, and some stands of exotic Australian pine. The offshore environment contains some hardground areas (see Section 3.4.2) containing species of sponges, soft corals and algae, but is devoid of seagrasses.

3.3 THREATENED AND ENDANGERED SPECIES

3.3.1 SEA TURTLES

Loggerheads (*Caretta caretta*), green turtles (*Chelonia mydas*), and leatherbacks (*Dermochelys coriacea*) nest regularly in Florida. Nesting by the hawksbill turtle (*Eretmochelys imbricata*) and the Kemp's ridley turtle (*Lepidochelys kempii*) 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 south 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 1988-1992 (Meyland, Schroeder, and Mosier, 1995). The loggerhead sea turtle is the species most likely to nest in significant quantities on nesting beaches in Lee County. Sporadic nesting of green sea turtles occurs on Gasparilla Island. Loggerheads could be affected if dredging takes place during nesting season when females and males congregate in the nearshore waters off nesting beaches.

3.3.2 WEST INDIAN MANATEE

The estuarine water around the inlets and bays off Lee County provide year-round habitat for the West Indian manatee (*Trichechus manatus)*. However, there is no designated critical habitat present within the project area. No significant foraging habitat is known to exist in the areas around the project sites.

3.3.3 OTHER THREATENED AND ENDANGERED SPECIES

Historically, the Gulf sturgeon (*Acipenser oxyrhnichus desotoi*) occurred from the Mississippi River to Charlotte Harbor. 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). Gulf sturgeon may occasionally be found in the winter months in Boca Grande Pass (NMFS 1999).

American crocodile (*Crocodylus acutus*) nesting activity has been recently recorded within Estero Bay, which is on the opposite side of the island from the project site. Construction activity would not effect the American crocodile. A bald eagle (*Haliaeetus leucocephalus*) nest has been identified approximately 4,340 feet east of the project site on Gasparilla Island. The project site is 2,800 feet beyond the primary and secondary zones established for bald eagle nest LE-25 on Gasparilla Island.

3.4 FISH AND WILDLIFE RESOURCES

3.4.1 BEACH AND OFFSHORE SAND BOTTOM COMMUNITIES

Because of the extensive development in the project area, the majority of wildlife consists primarily of small rodents, birds and reptiles. Florida beaches are important as nesting sites for sea turtles and several species of shore birds. Thirteen species of birds nest on Florida beaches, generally between April and August (Meyers, 1990). Nesting shore bird populations in Florida have declined due to loss of beach habitat to development. On the remaining natural beaches, human visitors disrupt nesting birds more than they do sea turtles, since birds stay at the nest for a longer time (Meyers, 1990). The Tampa Bay and Charlotte Harbor areas once supported large numbers of nesting black skimmers, snowy plovers, American oystercatchers, and royal and sandwich terns (Schreiber and Schreiber, 1978). Gasparilla Island State Recreation Area informed Fish and Wildlife Service (FWS) that black skimmers *(Rynchops niger)* nest annually on the southern end of the Gulf shore of Gasparilla Island. This is stated in the FWS CAR. However, FWS was later informed that this information was not correct. Through further investigation it was determined that there has not been any documented black skimmer nesting activity on Gasparilla Island since 1988. This information was provided by a DEP Park Biologist.

The beaches of Lee County are typical of other west central Florida beaches, which are subject to the full force of ocean waves. These beaches usually have low species diversity, but populations of individual species are often very large. Species such as coquina clams, ghost crabs, annelid worms, mole crabs, and sand drum are highly specialized to survive in this high energy environment (USFWS 1999).

The beach and the adjacent underwater substrate provides valuable habitat for benthic organisms and intertidal invertebrates such as various species of sand dollars, sea urchins, scallops, clams, crabs and numerous other bivalve and gastropod species. Benthic organisms that are commonly found in these sandy areas include the five-notched sand dollar (*Encope emarginata*), Florida fighting conch (*Strombus alatus*), horseshoe crab (*Limulus polyphemus*), lightning whelk (*Busycon contrarium*), beaded starfish (*Astropecten articulatus*), and black urchin (*Diadema sp.*).

Surf zone fish communities are typically dominated by sheepshead (*Archosargus probatocephalus*), grunts (*Haemulon sp.*), and Snappers (*Lutganus sp).* Fish of commercial significance include striped mullet (*Mugil cephalus*), spotted seatrout (*Cynoscion nebulosus*), pompano (Trachinotus carolinus), *grouper (Mycteroperca sp. and Epinephelus sp.*), and red snapper (*Lutjanus campechanus*). Important commercial

shellfish include pink shrimp (*Penaeus duorarum*), blue crab (*Callinectes sapidus*), and stone crab (*Menippe mercenaria*). Sportfish commonly fished for in the area include tarpon (*Megalops atlanticus*), snook (*Centropomus undecimalis*), sheepshead (*Archosargus probatocephalus*), mangrove snapper (*Lutjanus griseus*), and red drum (*Sciaenops ocellatus*).Tarpon are very popular game fish and are primarily fished in the vicinity of passes, particularly Boca Grande Pass, in the spring and summer (USACE 1991).

ESSENTIAL FISH HABITAT: Spanish mackerel (*Scomberomorus maculatus*) and stone crab (*Menippe mercenaria*) are common in the estuarine habitats of Gasparilla and Estero Islands. Juvenile pink shrimp (*Penalus duorarum*) and juvenile red drum (*Sciaenops ocellatus*) are abundant in these areas.

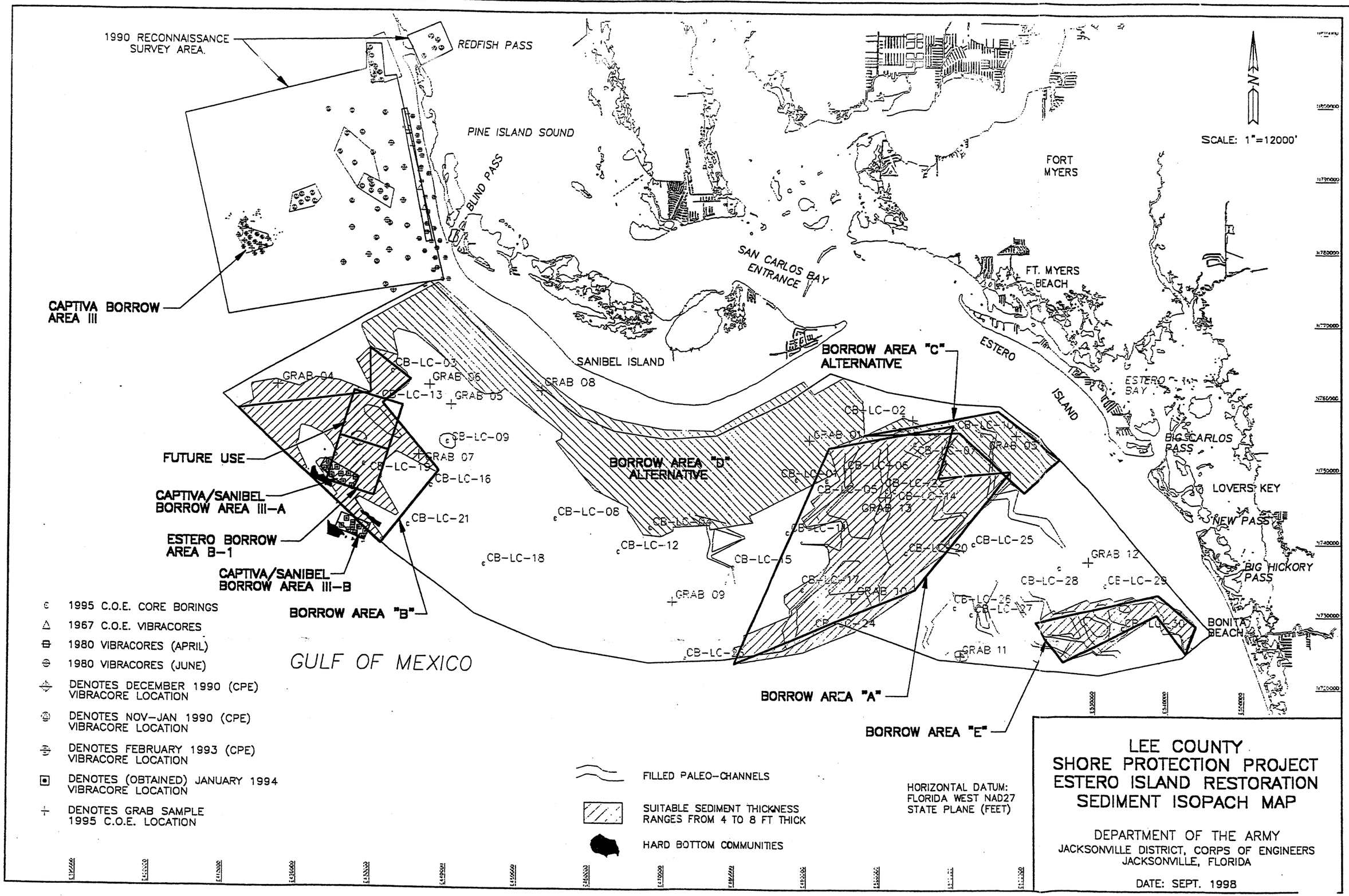
3.4.2 REEF/HARDGROUND COMMUNITIES

Environmental resource surveys were performed to determine the extent of hardgrounds within the study area of Gasparilla and Estero Islands. Aerial photographs and Side Scan Sonar surveys were used to determine sites to be investigated further.

GASPARILLA ISLAND: Three separate types of bottom communities can be found nearshore and offshore of Gasparilla Island. These include, limestone outcrop reefs, submerged rooted algal communities, and submerged unattached algal accumulations. Primarily, the submerged rooted algal communities and limestone outcrop reefs are found outside of the Equilibrium Toe of Fill and should not be affected by the beach nourishment project. Occasional unattached algal accumulations consisting of various macro red and brown algae were found within the project work area. The locations of these unattached algal communities were not identified due to their drifting nature.

Within the Gasparilla project work area, two separate Coquina limestone reefs exist. The first area is a small outcrop reef located 400 feet north of DEP beach monument R-18. The 0.1 acre reef, located approximately 75 feet offshore, is what remains from the 1993 project where sand was dredged from Boca Grande Pass and deposited on the adjacent shoreline. The U.S. Army Corps of Engineers constructed a 0.6 acre artificial reef to offset habitat losses in this area. The second reef area is approximately three-tenths of an acre in size and located at the northern taper of the proposed project. This narrow beachrock reef located on the shoreline between DEP monuments R-10 and R-12 would be affected by the beach nourishment project (figure 6). This reef consists of closely spaced limestone outcrop ledges one to two feet in relief. Sand pockets lie between the rock outcrops. Located offshore and north of the proposed equilibrium toe of fill (between DEP monuments R-09 and R-10) are two small outcrop reefs that should not be affected by the proposed project.

Because of the frequent scouring and pounding that occurs during storms and rough seas, shallow water rock outcrops located close to shore do not usually support a large diversity of plant and animal life. Surface vegetation is usually sparse and limited to small varieties of green, brown, and red algae. When the waters are calm enough,


1990 RECONNAISSANCE SURVEY AREA.
REDFISH PASS
PINE ISLAND SOUND
BLIND PASS
SCALE: 1"=12000'
FORT MYERS
SAN CARLOS BAY ENTRANCE
FT. MYERS BEACH
ESTERO ISLAND
ESTERO BAY
BIG CARLOS PASS
LOVERS KEY
NEW PASS
BIG HICKORY PASS
BONITA BEACH
SANIBEL ISLAND
CAPTIVA BORROW AREA III
BORROW AREA "C" ALTERNATIVE
BORROW AREA "D" ALTERNATIVE
FUTURE USE
CAPTIVA/SANIBEL BORROW AREA III-A
ESTERO BORROW AREA B-1
CAPTIVA/SANIBEL BORROW AREA III-B
BORROW AREA "B"
BORROW AREA "A"
BORROW AREA "E"
GULF OF MEXICO
GRAB 04
CB-LC-03
GRAB 06
CB-LC-13
GRAB 05
GRAB 08
CB-LC-09
GRAB 07
CB-LC-19
CB-LC-16
CB-LC-21
CB-LC-08
CB-LC-12
CB-LC-18
CB-LC-15
GRAB 09
CB-LC-02
GRAB 01
CB-LC-10
CB-LC-07
GRAB 03
CB-LC-06
CB-LC-01
CB-LC-05
CB-LC-22
CB-LC-14
GRAB 13
CB-LC-20
CB-LC-25
GRAB 12
CB-LC-28
CB-LC-29
CB-LC-26
CB-LC-27
GRAB 11
CB-LC-24
GRAB 10
CB-LC-11
1995 C.O.E. CORE BORINGS
1967 C.O.E. VIBRACORES
1980 VIBRACORES (APRIL)
1980 VIBRACORES (JUNE)
DENOTES DECEMBER 1990 (CPE) VIBRACORE LOCATION
DENOTES NOV-JAN 1990 (CPE) VIBRACORE LOCATION
DENOTES FEBRUARY 1993 (CPE) VIBRACORE LOCATION
DENOTES (OBTAINED) JANUARY 1994 VIBRACORE LOCATION
DENOTES GRAB SAMPLE 1995 C.O.E. LOCATION
FILLED PALEO-CHANNELS
SUITABLE SEDIMENT THICKNESS RANGES FROM 4 TO 8 FT THICK
HARD BOTTOM COMMUNITIES
HORIZONTAL DATUM: FLORIDA WEST NAD27 STATE PLANE (FEET)
LEE COUNTY
SHORE PROTECTION PROJECT
ESTERO ISLAND RESTORATION
SEDIMENT ISOPACH MAP
DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA
DATE: SEPT. 1998

FIGURE

small bait fish often congregate around these rocky areas, in turn attracting larger fishes such as flounder, redfish, seatrout, snook and tarpon (USACE 1991).

An unidentified feature was detected in side scan sonar and magnetometer surveys of Gasparilla Borrow Area 1 (north-south section). This feature was investigated further. Groundtruthing results revealed the feature was not an environmental resource. No hardgrounds were detected in Borrow Area 2.

ESTERO ISLAND: There are no natural resources such as exposed limestone outcroppings, submerged aquatic beds, or other similar resources found in the nearshore areas of Estero Island. Groundtruthing surveys identified mollusk beds, occasional sponge and soft coral in the northwest corner of the proposed Estero Island Borrow Area.

3.5 HISTORIC PROPERTIES

An archival and literature review, including a review of the Florida State Master Site File and the current National Register of Historic Places listing, have been conducted to determine if significant cultural resources are located within the area of impact for the proposed project. A remote sensing survey by Mid-Atlantic Technology and Environmental Research was conducted in 1998 in two borrow areas (Gasparilla and Estero) to locate potentially significant submerged cultural resources. A total of 27 magnetic/acoustic anomalies were recorded. Only 14 of these targets were of sufficient signature and duration to warrant further investigations. The State Historic Preservation Officer (SHPO) recommended additional investigations of these 14 anomalies, which were located in the Gasparilla Borrow Area. Diver evaluations conducted by Mid-Atlantic Technology and Environmental Research in 1999 identified three targets as the remains of an iron-hulled vessel and two wooden hulled vessels. Further investigations to test the significance of these historic properties will be undertaken to determine eligibility for listing in the National Register of Historic Places. Consultation will be undertaken to determine the appropriate mitigation measures to avoid impacts to these historic properties. Initial recommendations are to avoid the properties by placing a "200-foot no work" buffer zone around the vessels and note their locations in the Construction, Plans and Specifications.

3.6 COASTAL BARRIER RESOURCES

Designated coastal barrier resources have been identified within the project work area of the Estero Island segment. The northerly tip of Estero Island, where beach nourishment would take place, falls within one of the CBRA units. It has been determined through consultation with USFWS that beach nourishment is allowed in a CBRA unit. However, the source of sand must be from outside of a CBRA unit.

3.7 WATER QUALITY

The waters fronting the project area are classified as Class III by the State of Florida. Class III waters are considered suitable for recreation and the management of fish and wildlife.

3.8 AIR QUALITY

Air quality along Gasparilla Island and Estero Island is good due to the presence of either on or off shore breezes. No air quality permits are required for this project.

3.9 NOISE

Ambient noise levels in the project area are low to moderate. The major noise producing sources are breaking surf , and adjacent residential and resort areas. The sources are expected to continue at their present noise levels.

3.10 AESTHETIC RESOURCES

Gasparilla and Estero Islands possess visually pleasing attributes including the waters of the Gulf of Mexico and existing beaches. The islands are developed along the majority of their lengths.

3.11 RECREATION RESOURCES

Most areas along the shore are primarily developed for residential, resort, and tourist accommodation purposes. Development includes shops, motels, hotels, apartments, condominiums, and other service establishments catering, either directly or indirectly, to tourists visiting the area. The beaches of Estero Island have public access and receive heavy use by swimmers and sunbathers during the winter and spring months. The beaches of Gasparilla Island also have public access and receive moderate use by swimmers and sunbathers. The Gasparilla Island State Recreation Area is located near DEP beach monument R-17, approximately midway of the Gasparilla Island segment of the project. Divers and snorkelers utilize the natural and artificial reefs located offshore of the recreation area.

3.12 HAZARDOUS, TOXIC AND RADIOACTIVE WASTES

The preliminary assessment indicated no evidence of hazardous, toxic or radioactive waste (HTRW) on the project lands. During project construction further HTRW awareness should be practiced. The proposed project sites are mostly underwater, located adjacent to popular recreational beaches. The general project area may have

been remotely used during World War II. The terrain was considered to be very similar to the Pacific War campaign. It is believed that the area was used for bomber and fighter aircraft overflights because of their Pacific Island appearance. The review of the Defense Environmental Restoration Program (DERP) files did not indicate any definite bombing ranges in the region. The probability of finding World War II related HTRW is remote, but not zero.

4. ENVIRONMENTAL EFFECTS

4.1 GENERAL ENVIRONMENTAL EFFECTS

The placement of sand on the beach and within the transition fill area 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 the groin would help reduce excessive loss of protective fill at the northerly end of Estero Island. Dredging in the proposed borrow areas would cause a depletion of sand. The infauna and some of the epifauna within the borrow area will be unavoidably lost during dredging. However, this habitat is not unique and recovery could be expected within one year.

4.2 VEGETATION

Due to the developed nature of the project area, and the absence of seagrasses in the nearshore, no adverse effects to area vegetation are expected.

4.3 THREATENED AND ENDANGERED SPECIES

4.3.1 PROPOSED ACTION: BEACH FILL WITH PERIODIC NOURISHMENT, TERMINAL GROIN ON GASPARILLA

Refer to impacts addressed below for each individual component of the proposed action.

4.3.2 BEACH FILL WITH PERIODIC NOURISHMENT

The primary threats (both direct and indirect) to adult sea turtles in the United States continues to be from human activities. Beach nourishment activities have the potential to impact nesting sea turtles (Nelson and Dickerson 1989). Depending upon the quality of the material obtained from the offshore borrow area and placed onto the nourished beach, the borrow material may be too compact for sea turtles to dig nests and therefore would result in a larger number of false crawls, aberrant nests, and broken eggs (Raymond 1984). If beach construction begins after sea turtle nesting has begun, sea turtle nests may be buried by nourishment activities and could significantly reduce the number of hatchlings successfully emerging from the egg chamber. Because of this, many sea turtle eggs are relocated to another segment of the beach or to a self-release hatchery prior to the start of beach construction (Wolf 1989). The physical movement of sea turtle eggs from the egg chamber to another area represents potential problems. First, not all nests (100%) may be detected by the sea turtle monitor and would therefore be buried by placement of sand on the beach or crushed by construction equipment. Second, any physical handling of sea turtle eggs runs the risk of accidental breakage. The relocation of sea turtle eggs to protective hatcheries could result in decreased hatching success if improperly conducted (Wyneken et al. 1988). Alteration of hatchling sex ratios may result if incubation temperatures in the hatchery are significantly different from that found from the natural beach (Yntema and Mrosovsky 1980, Yntema and Mrosovsky 1982). The significance of all these impacts is dependent upon the density of sea turtle nests and the number of nests that must be relocated. Care will be taken during the dredging process as well as the transport of personnel and materials between the borrow sites and the project beaches to ensure the safety of marine endangered and threatened species, and that the threat of boat collisions with these species is minimized. If it is decided that the use of a hopper dredge is necessary, the Corps will abide by the terms and conditions of the Regional Biological Opinion for the use of hopper dredges issued by the NMFS.

Table 2a: Nesting data for C. caretta on Gasparilla Island, Lee County, Florida.

Year	Beach Length (Km)	Days per Week	False Crawls	Nest #
1993	2.4	7	25	22
1994	2.4	7	20	64
1995	2.0	5	56	152
1996	2.7	7	13	11
1997	3.2	7	0	17

Table 2b: Nesting data for C. mydas on Gasparilla Island, Lee County, Florida.

Year	Beach Length (Km)	Days per Week	False Crawls	Nest #
1993	2.4	7	0	0
1994	2.4	7	1	4
1995	2.0	5	0	1
1996	2.7	7	0	0
1997	3.2	7	1	0

Table 3a: Nesting data for the C. caretta on Estero Island, Lee County, Florida.

Year	Beach Length (Km)	Days per Week	False Crawls	Nest #
1993	11.3	7	40	20
1994	11.3	7	25	27
1995	11.3	7	35	46
1996	11.3	7	53	30
1997	11.3	7	68	28

Table 3b: Nesting data for the C. mydas on Estero Island, Lee County, Florida.

Year	Beach Length (Km)	Days per Week	False Crawls	Nest #
1993	11.3	7	0	0
1994	11.3	7	0	0
1995	11.3	7	0	0
1996	11.3	7	0	0
1997	11.3	7	0	0

The highest density loggerhead nesting in Florida (91.5%) occurs in the southeast region from Brevard through Broward counties. Tables 2a and 3a indicate that the Gulf shore around Lee County does not support what would generally be considered a high density of nesting loggerhead sea turtles. The area supports even fewer numbers of nesting green sea turtles, as shown in tables 2b and 3b. The majority of green turtle nesting occurs from Volusia through Brevard Counties on the Atlantic coast. Although nesting season for *C. caretta* and *C. Mydas* in this portion of the Gulf coast extends from May 15 to October 31, previous nesting data indicates that high numbers of these species are not likely to be found near the offshore borrow areas or the nearshore waters of Gasparilla and Estero Islands. Leatherback, hawksbill, and Kemp's ridley sea turtles are not known to nest in the area. Terms and Conditions outlined in the Fish and Wildlife Biological Opinion will be followed to prevent any significant adverse effects on sea turtles.

The project area is not designated as critical habitat for the manatee, but five mortalities have been recorded near the project site. Because of the nature of the work and the precautions to be taken, as described in the following section, the U.S. Army Corps of Engineers has determined that the planned beach nourishment activities will have no effect on the manatee. Precautions will be taken during construction activities to insure the safety of the manatee.

4.3.3 TERMINAL GROINS

Improperly designed and/or placed groins could potentially interfere with sea turtle nesting and hatching emergence and egress off shore. No adverse impacts are expected on other listed species.

4.3.4 REVETMENT

The construction of revetment stabilization would produce a hardening effect on the shoreline making it difficult for sea turtles to nest. Revetment would have no adverse impact on other listed species.

4.3.5 BORROW AREAS

No adverse impacts to sea turtles, manatees or Gulf sturgeon are expected in borrow areas where pipeline or clam shell type dredges are used. If a hopper dredge is used, the Biological Opinion from National Marine Fisheries Service (May 26, 1999) would apply.

4.3.6 NO ACTION ALTERNATIVE

With the no action alternative, 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 selection. No adverse impacts are expected on other listed species.

4.4 FISH AND WILDLIFE RESOURCES

4.4.1 PROPOSED ACTION: BEACH FILL WITH PERIODIC NOURISHMENT, TERMINAL GROIN ON GASPARILLA

Refer to impacts addressed below for each individual component of the proposed action.

4.4.2 BEACH FILL WITH PERIODIC NOURISHMENT

During the placement of sand on the beach there may be some interruption of foraging and resting activities for shorebirds. This impact would be short-term and limited to the project area. Within the immediate vicinity of the discharge site, elevated turbidity levels may interfere with foraging opportunities by sight feeders such as the brown pelican (*Pelecanus occidentalis*).

Project activities may impact nesting activities for migratory birds such as black skimmers, piping plovers and least terns if construction occurs between April 1 and September 1. In accordance with the Migratory Bird Treaty Act of 1918, as amended (16 USC 703), the Corps will provide protection to nesting migratory bird species that commonly use dredged material disposal sites. If the area can not be avoided during nesting season, then a Site Protection Plan will be included in the Plans and Specs detailing how the impacts on the birds will be avoided, minimized, or otherwise mitigated (refer to Section 4.21, Environmental Commitments).

The disposal of sand on the beach would have temporary impacts to the macroinfaunal community. Some organisms may be buried or lost, but many organisms inhabiting the intertidal zone are well adapted for burrowing and would be able to burrow up through the fill and survive. No long-term adverse effects are anticipated to the intertidal macroinfaunal community due to nourishment activities.

HARDGROUNDS/REEFS - As cited in the Fish and Wildlife Coordination Act Report, The U.S. Fish and Wildlife Service recommended that the Corps mitigate for the loss of about 2 acres of nearshore rock outcrops that would be covered by the authorized project by creating an artificial reef at a 2:1 ratio. The reef is located at the north end of the Gasparilla Island project. During field surveys by the Fish and Wildlife Service and the Corps, time constraints did not allow for precise measurement during field investigations. In view of concerns over the size of the reef subject to project impacts, the nearshore reef was later surveyed by the Corps as recommended by the Fish and Wildlife Service. The survey revealed that the total reef area to be impacted by project construction was 0.3 acres. Survey results were discussed with the Fish and Wildlife Service. It was determined that an artificial reef 0.6 acres in size would be constructed to offset habitat losses.

Additional reefs offshore, close to the Equilibrium Toe of Fill, could experience elevated turbidity levels during project construction.

The 0.1 acre reef which remains nearshore at DEP beach monument R-18 will also be adversely effected by the placement of sand. This particular reef was initially covered when sand was dredged from Boca Grande Pass and deposited on the beach in 1993. The U.S. Army Corps of Engineers previously constructed a 0.6 acre artificial reef to offset habitat losses in this area. No further mitigation is required in this area.

ESSENTIAL FISH HABITAT: Based on analysis discussed in the EIS, it has been determined that beach nourishment activities would not adversely affect the essential habitat of species managed under the Magnuson-Stevens Fisherey Conservation and Management Act (PL 94-265).

4.4.3 GROINS

Construction of a groin or groins would have temporary impacts on the macroinfaunal community on the beach within the construction area. These impacts would be similar to those described for beach nourishment, but on a much smaller scale. It is not expected that groin construction would have any effect on any hardbottom communities.

4.4.4 REVETMENT

The construction of revetment stabilization would produce a hardening effect on the shoreline making it difficult for sea turtles to nest. Revetment construction should not have any effect on hardbottom communities.

4.4.5 ALTERNATIVE BORROW AREAS

4.5.4.1 Gasparilla Island Borrow Areas - The infauna and some of the epifauna within the borrow areas will be unavoidably lost during dredging. However, this habit is not unique, and the area will likely recover within one year (USFWS 1999). Motile forms such as fish and crustaceans may experience some short-term impacts. However, those organisms should be able to escape the area during construction. The short-term adverse ecological impact is more likely to be to non-motile species such as filter feeding, burrowing and attached organisms. Many of the species that are not able to escape the construction area are expected to recolonize within 6 months to a year after project completion.

4.5.4.2 Estero Island Borrow Areas – The potential impacts discussed for Gasparilla Island Borrow Areas would also apply to the Estero Island Borrow Areas with the addition that Sea Systems Inc. (1999) reported signatures of natural features characteristic of soft corals in the northwest corner of the proposed Estero Island Borrow Area. While direct destruction of deep reef fauna near borrow areas is not planned, such destruction has occurred on at least four occasions. During the Sunny Isles, Dade County, renourishment project in 1988, the drag arm of the dredge ran up onto the reef. Unmapped reef areas which protruded into the dredge area were damaged. This also occurred during the Bal Harbor, Dade County, project (USFWS 1999). As recommended by the Fish and Wildlife Service, a 500-foot buffer area will be established around the natural features located in the northwest corner of the proposed Estero Island Borrow Area.

4.4.6 NO ACTION ALTERNATIVE

If no action is taken, the project beaches will continue to erode, eliminating habitat for beach dwelling organisms, shore birds, and nesting turtles. However, impacts

associated with the projects implementation would be avoided. These impacts include effects on some nearshore rock habitat and temporary turbidity with accompanying decline in water quality during construction activities.

4.5 HISTORIC PROPERTIES

Three historic properties have been identified in the Gasparilla borrow area that will be affected by project construction. The properties are historic shipwrecks that have the potential to be a significant cultural resource. Further testing of these properties will be needed to determine their significance according to National Register criteria. Avoidance of these historic properties would be the preferred mitigation measure.

4.6 SOCIO-ECONOMIC

Beach nourishment would provide storm damage protection to upland development and provide increased opportunities for recreational activities.

4.7 AESTHETICS

The nourishment of the beach will maintain the natural appearance of the protective beach along the gulf front of the island. There will only be a temporary reduction in aesthetics during construction; there is no expectation of long-term adverse affects to the visual environment as a result of construction.

4.8 RECREATION

During nourishment activities, the use of the beach in the vicinity of construction would drop or be restricted temporarily. Use of the beach in the immediate area of the discharge pipe and equipment would be restricted for public safety. As portions of the renourished beach become available, use by the general public would increase once more. The improved beaches will provide increased opportunities for recreational activities. The beach nourishment project will result in an average berm width of 20 feet on Gasparilla Island and 40 feet on Estero Island. Beachgoers will benefit from the additional beach available.

4.9 COASTAL BARRIER RESOURCES

Beach nourishment within a Coastal Barrier Resources Act (CBRA) unit is allowed. There is no adverse effects expected with the placement of sand within the CBRA unit located at the northerly tip of Estero Island.

4.10 WATER QUALITY

The project would cause temporary increases in turbidity at the borrow areas and beach disposal sites. These will be temporary conditions and will not affect the area's water quality. A mixing zone variance will be requested from the State of Florida for this project.

4.11 AIR QUALITY

The short-term impacts from emissions by the dredge and other construction equipment associated with the beach nourishment will not significantly impact air quality. The Florida Department of Environmental Protection does not regulate marine or mobile

emission sources (dredge and construction equipment) within Lee County. No air quality permits are required for this project.

4.12 NOISE

There would be a temporary increase in the noise level during construction. The principal noise would stem from the vicinity of the discharge point on the beach and dredge. Construction equipment will be properly maintained in order to minimize the effects of noise. Increases to the current levels of noise as a result of this project will be localized an minor, and will be limited to the time of construction.

4.13 HAZARDOUS, TOXIC AND RADIOACTIVE WASTES

The preliminary assessment indicated that no hazardous, toxic, radioactive or other harmful substances are present within the project area. However, if contaminants are found during project construction, the site must be remediated. These chemicals, if not detected during the site assessment, may be disturbed or released by increasing the water level and hydroperiod, or by removing unnatural structures or features from the landscape. However, our experience has shown that residual HTRW levels when flooded would be difficult to detect because of dispersion and biological activity.

4.14 ENERGY REQUIREMENTS AND CONSERVATION

The energy requirements for this construction activity would be confined to fuel for the dredge, labor and transportation, and other construction equipment.

4.15 NATURAL OR DEPLETABLE RESOURCES

The beach quality sand used to construct the project is the depletable resource. Using sand from the proposed borrow areas will deplete the sand source from the areas dredged at that site. Eventually, the sand would be redistributed over nearshore areas. It is likely that some of the redistributed sand on the Gasparilla segment would return back to the borrow site.

4.16 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 (40 CFR 1508.7). The use of sand from the proposed borrow area will deplete the area of sand and species of relatively non-motile infaunal invertebrates (mollusks). However, many of those species that are not able to escape the construction area are expected to recolonize after project completion. The proposed action would result in long-term benefits, which should outweigh any short-term environmental losses. 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.

4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.17.1 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.

4.17.2 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, the high rate of repopulating expected from these organisms reduces the significance of loss. Impacts from the placement of sand to nearshore hardgrounds would be an irretrievable loss of that resource for the period of time it takes to recover.

4.18 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Species of relatively non-motile infaunal invertebrates 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 after project completion. There would be an unavoidable reduction in water clarity and increased turbidity and sedimentation. This would be limited to the immediate areas of dredging, beach fill operatirces on and near the shore. Removal of material from offshore borrow sites has a long-term impact on the nature of the borrow site. However, these impacts are not substantial since there are no special resources within the borrow site and some resources remain after dredging.

4.19 LOCAL SHORT-TERM USES AND MAINTENANCE/ENHANCEMENT OF LONG TERM PRODUCTIVITY

We recognize that protection of the shoreline is a continual effort. No acceptable and permanent one-time fix has been identified (see section 2.0 on alternatives). Using periodic renourishment is an ongoing effort. Renourishment efforts have a temporary and short-term impact on the biological resources on and near the shore. Removal of material from offshore borrow sites has a long-term impact on the nature of the borrow site. However, these impacts are not substantial since there are no special resources within the borrow site and some resources remain after dredging.

4.20 INDIRECT EFFECTS

Shore protection efforts by the Corps of Engineers do not generally encourage shore front development. The purpose of these projects is generally to protect existing property, structures, or other valuable resources, which already exist near the shoreline and are threatened by storm or erosion damage. Property protection benefits must be substantial enough to justify the cost of the effort.

4.21 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:

(1) Inform contractor personnel of the potential presence of sea turtles and manatees in the project area, their endangered status, the need for precautionary measures, and the Endangered Species Act prohibition on taking sea turtles, manatees and other threatened and endangered species.

(2) Insure the contractor and his personnel are aware of the potential presence of the manatee in the project area, their endangered status, and the need for precautionary measures, the contract specifications will include the standard manatee protection clauses. All small vessels associated with the project will be required to operate at "no wake" speeds at all times while in shallow water, or channels, where the draft of the vessel provides less than three feet clearance from the bottom. Boats used to transport personnel shall be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any work boats shall follow routes of deep water when possible. The contractor shall be held responsible for any manatee harmed, harassed, or killed as a construction of the project. If a manatee is sighted within a hundred yards of the dredging area, appropriate safeguards will be taken, including suspension of dredging, if necessary, to avoid injury to manatees. To minimize potential impacts to manatees, the contract specifications will include the standard protection clauses for manatees.

(3) Implement the following measures to minimize adverse effects to sea turtles:

a. Compact sampling stations shall be at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area); one station shall be midway between the dune line and the high water line; and one station shall be located just landward of the high water line. At each station, the cone penetrometer shall be pushed to a depth of 6, 12, and 18 inches, three times (three replicates). If any two or more adjacent stations have compaction at the same depth greater than 500 psi, the area would be plowed to a depth of at least 36 inches immediately prior to April 1. This process would be completed for three consecutive years following project completion.

b. Nest relocation activities must begin 65 days prior to nourishment activities which occur within the nesting and hatching season (April 1 – November 30) or by April 1, whichever is later. Nest surveys and relocations shall continue through the end of the project or through September 30, whichever is earlier.

c. Nest surveys and relocations would be conducted by personnel with prior

experience and training in nest survey and relocations procedures, and with a valid FWCC permit.

d. Nests would be relocated between sunrise and 9:00 a.m. each day, and the relocation would be to a nearby self-release beach site in a secure setting where artificial lighting would not interfere with hatchling orientation.

e. All material placed on the beach would be sand that is similar to that already existing at the beach site in both coloration and grain size distribution.

f. Nourished beaches would be surveyed for escarpments immediately after construction and prior to April 1, for 3 subsequent years. Any escarpments that exceed 18 inches in height and 100 feet in length would be leveled by April 1.

g. Measures will be taken to reduce nighttime beach lighting by eliminating extraneous lighting to an amount necessary for safe operations and safety of personnel.

h. A report describing the actions taken to implement the terms and conditions shall be submitted to the USFWS within 60 days of completion of the proposed work for each year when activity has occurred. The report shall include the dates of actual construction activities, names and qualifications of personnel involved in nest surveys and relocation activities, descriptions and locations of the hatcheries, nest survey and relocations results and hatchling success of the nests.

i. In the event a turtle nest is dug up by beach construction activities, the contractor shall immediately notify the permitted individual responsible for nest relocation so that the nest can be moved to the beach hatchery.

j. From April 1 to November 30, staging areas for construction equipment would be located off the beach to the maximum extent practicable.

k. The rigid sea turtle deflector draghead or the modified deflector draghead must be used on all hopper dredges used during dredging operations.

l. To the maximum extent possible, hopper dredging would be completed outside of the April 15 to September 30 period.

m. One-hundred percent observer coverage of hopper dredging operations would be required with NMFS approved observers.

n. Any incident involving the death or injury of any listed threatened or endangered species described in this Biological Assessment shall be immediately reported to the U.S. Army Corps of Engineers (Jacksonville) and the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service.

(4). Precautions would be implemented during construction to minimize potential impacts to the environmental resources (soft corals, sponges) located in the northwest corner of the proposed borrow site for Estero Island by establishing a 500-foot buffer zone around these resources.

(5) An artificial reef would be constructed to mitigate for impacts to hardground habitat due to the placement of sand on the beach.

(6) Implement the following measures to minimize adverse impacts to migratory birds:

a. The contractor shall conduct monitoring of the construction area beginning 1 April through 31 August, if construction activities occur during that period.

b. Any nesting activity observed by the contractor will be reported immediately to the Contracting Officer or the Contracting Officer's Representative.

c. If nesting should begin within the construction area, a temporary 200-foot buffer will be created around the nest(s) and marked. The area will be left undisturbed until nesting is completed or terminated, and the chicks fledge.

4.22 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.22.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information of the project has been compiled and this Environmental Impact Statement has been prepared. The project will be in compliance with the National Environmental Policy Act if the Final EIS and Record of Decision are executed.

4.22.2 ENDANGERED SPECIES ACT OF 1973

Consultation was initiated with National Marine Fisheries Service (NMFS) on April 29, 1999. Consultation with U.S. Fish and Wildlife Service (USFWS) was initiated on April 29, 1999. This project has been coordinated under the Endangered Species Act. See correspondence in Appendix C.

4.22.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the USFWS. A Coordination Act Report (CAR) was negotiated on November 16, 1998 and the Draft CAR was completed on November 30, 1999. This project is in full compliance with the Act. See report in Appendix D.

4.22.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 as amended through 1992 (PL 102-575)(16 U.S.C. 470-470t, 110; 80 Stat. 915), the ARCHEOLOGICAL and HISTORIC PRESERVATION ACT (16 U.S.C. 469-469c), and EXECUTIVE ORDER 11593.

An archival and literature review, including a review of the Florida State Master Site File and the current National Register of Historic Places listing, has been conducted to determine if significant cultural resources are located within the area of impact for the proposed project. Mid-Atlantic Technology and Environmental Research conducted

remote sensing survey and diver evaluations in 1998 and 1999. The remains of an iron-hulled vessel and two wooden hulled vessels were discovered that would be impacted by construction activities. Further investigations to test the significance of these historic properties will be undertaken to determine eligibility for listing in the National Register of Historic Places. Initial recommendations are to note its location in the Construction, Plans and Specifications and place a "200-foot no work" buffer zone around the vessels to avoid adverse impacts. Full compliance will be achieved with final consultation with the SHPO and the appropriate mitigation measures in place.

4.22.5 CLEAN WATER ACT OF 1972

The project is in compliance with this Act. The Corps will apply to the Florida Department of Environmental Protection for a Section 401 water quality certification. All State water quality standards would be met. A Section 404(b) evaluation is included in this report as Appendix A.

4.22.6 CLEAN AIR ACT OF 1972, as amended

No air quality permits will be required for this project. Full compliance will be achieved with receipt of comments on the final EIS from the U.S. Environmental Protection Agency (EPA).

4.22.7 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. Full compliance has been achieved with receipt of comments from the State Clearinghouse.

4.22.8 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

4.22.9. 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.

4.22.10 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 (i.e. manatees) in the area, therefore, this project is in compliance with the Act.

4.22.11 ESTUARY PROTECTION ACT OF 1968

No designated estuary would be affected by project activities. This act is not applicable.

4.22.12 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)).

4.22.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

The project has been coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with this act.

4.22.14 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project is being coordinated with the State and is in compliance with the act.

4.22.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

A segment of the proposed project is partially located within a Coastal Barrier Resources Act (CBRA) Unit. The project is has been coordinated with the U.S. Fish and Wildlife Service and is in compliance with the act.

4.22.16 RIVERS AND HARBORS ACT OF 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action is being subject to public notice, opportunity to request a public hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

4.22.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service.

4.22.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

The proposed action may affect migratory birds. The project has been coordinated with the Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission. The project is in compliance with these acts.

4.22.19 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 EIS have been evaluated under Section 404 of the Clean Water Act.

4.22.20 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.

4.22.21 E.O. 11988, FLOOD PLAIN MANAGEMENT

The project is in the base flood plain (100-year flood) and has been evaluated in accordance with this Executive Order. The project would provide flood/storm damage protection.

4.22.22 E.O. 12898, ENVIRONMENTAL JUSTICE

The proposed action would not result in adverse human or environmental effects. Any impacts of the action would not be disproportionate towards any minority or low-income population. The activity does not (a) exclude persons from participation in, (b) deny persons the benefit of, or (c) subject persons to discrimination because of their race, color, or national origin. The activity would not impact "subsistence consumption of fish and wildlife".

4.22.23 E.O. 13089, CORAL REEF PROTECTION

The proposed action would not affect U.S. coral reef ecosystems as defined in the Executive Order.

4.22.24 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Coordination of this DEIS constituted initial consultation with the NMFS under provisions of the Magnuson-Stevens Fishery Conservation and Management Act (PL 94-265). Based on analysis discussed in the EIS, it has been determined that the proposed action will not adversely affect the essential habitat of species managed under the Act.

5. LIST OF PREPARERS

Name	Discipline	Role
Yvonne Haberer	Biologist	Compile and Final Edit
Christine Bauer	Biologist	Main Author, Biological Impact Assessment
Tommy Birchett	Archeology	Historic Properties
Dan Haubner	Civil Engineer	Plan Formulation
Doug Rosen	Coastal Geology	Geotechnical Analysis
Kenneth Dugger	Biologist	Review

6. PUBLIC INVOLVEMENT

6.1 SCOPING AND DRAFT EIS

Scoping letters for the proposed action were sent on August 12, 1996 to Federal, State, county, other local authorities, and other known interested parties and organizations. A copy of this letter appears in Appendix C. The Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) appeared in the Federal Register on November 10, 1998. The NOI was mailed to interested and affected parties by letter dated March 10, 1999. A copy of the NOI can be found in Appendix C. A Notice of Availability (NOA) of the DEIS was sent to interested parties on August 31, 1999 (Appendix C). A notice also appeared in the Federal Register on September 17, 1999 (Appendix C).

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 State Historic Preservation Officer (SHPO), Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, and National Oceanic and Atmospheric Administration.

6.3 LIST OF STATEMENT RECIPIENTS (DRAFT EIS)

The DEIS was circulated to Federal, State, and local agencies, interested groups and individuals for review and comment by letter dated August 30, 1999. A list of those that were sent copies is attached to that letter and can be found in Appendix C.

6.4 COMMENTS RECEIVED

Letters of comment on the Draft EIS were received from the U.S. Environmental Protection Agency (EPA); Florida Department of Community Affairs, State Clearinghouse; Florida Department of Environmental Protection (FDEP); National Geodetic Survey (NGS); Florida Fish and Wildlife Conservation Commission (FWC); Florida Department of State, Division of Historical Resources, State Historic Preservation Officer (SHPO). These letters can be found in Appendix C.

Pertinent comments with the Corps' responses are listed below.

(1) EPA letter dated October 28, 1999.

Comment: EPA stated that with the information provided in the DEIS, the beach nourishment project does not signal any obvious unacceptable environmental problems. However, the information in the Fish and Wildlife Coordination Act Report (CAR) will need to be examined to resolve that this renourishment project will not result in unacceptable environmental impacts to nearshore habitats/activities.

Response: The Fish and Wildlife CAR is included in the Final EIS. Nearshore habitats are discussed in detail.

(2) FDEP letter dated October 8, 1999.

Comment: FDEP is concerned with the impacts of the project on hardbottom communities and, the effects the project will have on the water quality of both the borrow and deposition site.

Response: Anticipated impacts to hardground communities as well as procedures that would be implemented to eliminate, minimize or mitigate for impacts are discussed in Sections 2.6, 3.4.2, and 4.4.1 in the Final EIS. Water quality of both the borrrow and deposition site is discussed in Table 1, Summary of Direct and Indirect Impacts for Alternative Plans and in Section 4.4 in the Final EIS.

(3) FWC letter dated September 23, 1999.

Comment: The FWC commented that they could not find the project to be consistent with Florida Statute 370.12, the Marine Turtle Protection Act, until they review the Biological Opinion containing the Incidental Take Statement.

Response: The Biological Opinion is included in Appendix C of the Final EIS.

(4) NOS/NGS letter dated September 17, 1999

Comment: The NGS is concerned with the construction of the groin on Estero Island and the possibility it will have an impact on navigation. The NOS would like the Corps to provide engineering drawings and surveys of the project upon completion to determine if future editions to NOS Charts need to be made.

Response: This information will be distributed as requested upon completion of the project.

(5) FWC letter dated October 21, 1999

Comment 1: The FWC expressed concern that there had been no coordination with the U.S. Fish and Wildlife Service (FWS) regarding the project prior to the DEIS.

Response: Pursuant to Section 7 (a) of the Endangered Species Act, the Corps requested formal consultation with the FWS and the National Marine Fisheries Service in letters dated April 26, 1999. Additionally, the Corps requested a Fish and Wildlife CAR from the FWS in a letter dated October 20, 1998. There were unavoidable delays in receiving the CAR before the DEIS was printed.

Comment 2 : The FWC expressed concern that the project could potentially impact fisheries habitat and listed species, including the Florida manatee, the loggerhead sea turtle, piping plovers, least terns, black skimmers, and brown pelicans.

Response: These concerns are discussed in Sections 3.3, 3.4, 4.3, and 4.4 of the Final EIS. Additionally, the Biological Opinion and the Fish and Wildlife CAR discusses the potential impacts to fisheries habitat and Endangered Species.

(6) FDEP letter dated October 26, 1999.

Comment 1: Figure 3 is too small to evaluate the extent of hardbottom areas. Drawing should be revised to a larger scale.

Response: Figure 6 has been added to the Final EIS which identifies the equilibrium toe of fill and the 0.3 acres of nearshore hardbottom that would be impacted by the proposed project, Gasparilla Island. Groundtruth/diver verification surveys and detailed maps are available upon request.

Comment 2: All hardbottom resource maps and other should be dated and describe data collection methods and information sources. Resource maps should be based on the most recent data available and confirmed by diver verification. The Draft EIS should describe the results of each side scan and biological survey.

Response: Aerial photographs showing the gulf bottom within the beach fill area are dated July 8, 1995. The side-scan sonar survey of the Gasparilla and Estero Island borrow sites were conducted by Sea Systems Inc. 1998. The USFWS requested that the Corps groundtruth the subject hardbottom locations within the fill areas and borrow sites indicated on the aerial photographs and side-scan sonar survey chart. This was done by HDR Engineering who conducted the biological and groundtruth surveys during the Spring of 1999. Additionally, on August 19, 1999, a USFWS biologist and the Corps project biologist, snorkeled two nearshore hardbottom areas identified by aerial photographs. Details on the project area surveys can be found in the FWS CAR, Appendix D, and in the Final EIS, Section 3.4.

Comment 3: The Engineering Design section of the report (Appendix A) depicts an equilibrium toe of fill which extends approximately 1,000-ft seaward of MHW. The Draft EIS only describes resources within 250-ft. of MHW. All nearshore areas within at least 1,000-ft. equilibrium toe of fill should be adequately described and quantified.

Response: This information can be found in Figure 6 and Section 3.4 in the Final EIS, and in the FWS CAR, Appendix D.

Comment 4: Page 28 of the GRR states that Gasparilla Borrow Area #1 "will not be used due to the location of environmental resources". This implies that the project has been modified to avoid impacts. The hardground resources associated with the borrow areas are not described in the draft EIS.

Response: Borrow Area #1 will not be used due to the anticipated wave regime's effect on the shoreline associated with this borrow area, not due to hardground resources. This change has been made to the revised GRR.

Comment 5: The Boca Grande Pass maintenance dredging permit issued on February 24, 1992 (Permit No. 36-153334-9) included beach disposal of dredged material within the same limits as the proposed Gasparilla Beach nourishment project. Records indicate that side-scan sonar survey information identified patch hardbottom outcrops within the project limits in the vicinity of the USCG lighthouse. To offset the loss of the hardbottom resources due to direct burial, a 0.6 acre artificial hardbottom area was constructed in 1993. The Draft EIS should include a historical description of the hardbottom outcrops and the mitigation that was constructed to offset impacts. The fill limits of the Boca Grande maintenance dredge disposal area should be compared with the proposed Gasparilla beach restoration project. Project specifications should avoid placement of any fill which exceeds the boundaries of the previously permitted hardground impacts.

Response: The Final EIS discusses hardbottom impacts during previous dredge disposal projects and the mitigation constructed to offset impacts (see Sections 3.4, 4.4, and the Final CAR). The referenced permit allows for 700,000 cubic yards of material to be placed over 10,500 feet of shoreline, this results in a placement of 66.6 cubic yards of fill per foot of beach. The project described within this report will place 786,000 cubic yards of material over 14,800 feet of shoreline, resulting in a placement of 53.1 cubic yards of fill per foot of beach. Since the volume of fill per foot of beach (placed within the littoral zone) is directly related to the equilibrium toe of fill, it is not expected that this will present a problem.

Comment 6: The location of the 0.6 acre nearshore artificial reef constructed during 1993 should be depicted on the project drawings.

Response: The location of the 0.6 acres artificial reef will be depicted on the project drawings in the plans and specifications.

Comment 7: The terms and conditions included in the NMFS consultation letter dated May 26, 1999 are not included in the Draft EIS (Section 4.22). The EIS and the draft plans and specifications should be revised to include these conditions.

Response: The Terms and Conditions are included in Section 4.21, Environmental Commitments, of the Final EIS.

Comment 8: The Draft EIS does not reference a USFWS Biological Opinion (BO). Consultation with the USFWS should be conducted. The Final EIS should contain the terms and conditions from the most recent BO.

Response: The Final EIS does contain a Biological Opinion from USFWS dated September 29, 1999. The Terms and Conditions within the BO have been added to Section 4.21, Environmental Commitments, of the Final EIS.

Comment 9: Final consultation with the State Historic Preservation Officer (SHPO) should be conducted to determine appropriate construction measures to protect the cultural resources identified during the 1999 diver investigations.

Response: Refer to Sections 3.5 and 4.5 of the Final EIS. Additionally, refer to Appendix C for SHPO letter dated December 2, 1999.

Comment 10: The draft EIS notes the existence of groins and groin remnants at several locations within the project limits. The department has concerns regarding any structure which serves no public purpose, which is dangerous to or any way endangers human life, health, or welfare, or which proves to be undesirable or become unnecessary. A plan should be provided which clearly identifies all structures to be removed.

Response: A plan will be included in the plans and specifications phase of this project for the removal of such material.

Comment 11: The document does not discuss whether storm water discharge occurs on, over or through the beach within the project area. A plan should be provided which clearly identifies all structures and actions to be taken.

Response: This was a discussion item during the 2 April 1999 Technical Review Conference. Since there will be essentially no increase in the berm height, and relatively few outfalls known to the sponsor, this did not prove to be an issue. A paragraph will be added to the text to document these findings.

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APPENDIX A – SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
LEE COUNTY, FLORIDA

I. Project Description

a. Location The proposed project will be constructed on two barrier islands, Gasparilla and Estero, in Lee County. Lee county is located on the lower gulf coast of Florida, about 90 miles south of the entrance to Tampa Bay and 130 miles north of Key West (see figure 1 of EA). The 44-mile coastline consists of coastal barrier islands separated from the mainland by shallow tidal lagoons. The barrier islands range in width from 200 feet to about 2.5 miles. Natural ground elevations are generally less than ten feet above Mean Low Water (MLW).

b. General Description. The proposed action consists of a protective beach, estimated berm width 20 feet, along 2.8 miles of shore on Gasparilla Island, and a berm width of 40 feet along 4.7 miles on Estero Island. The design berm elevation for Gasparilla is +5 feet Mean Low Water (MLW); the design berm elevation for Estero is +5 feet MLW. The borrow site for Gasparilla Island has an area of 2.8 square miles, and is located in the Gulf just north of Boca Grande Pass. The borrow site for Estero Island has an area of 1.59 square miles, and is located in the Gulf approximately 1.5 miles southwest of Sanibel Island.

c. Authority and Purpose. The Beach Erosion Control Project for Lee County, Florida, was authorized in accordance with recommendations of the Chief of Engineers in House Document number 91-393, under the provisions of Section 201 of the Flood Control Act of 1965 enacted by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The authorization provides for Federal participation in beach restoration and periodic nourishment along portions of the Gulf shore of Lee County. Captiva Island was included in this authorization and has been constructed. The purpose of the proposed action is to reduce loss of public beach front to continuing erosional forces and to prevent or reduce periodic damages and potential risk to life, health, and property in the developed lands adjacent to the beach.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Estero borrow area B contains sand with a composite mean grain size of -0.05 phi (1.04 mm), a phi sorting of 1.53 or poorly sorted, and silt content of 7.40% finer than 0.074 mm and 7.10% finer than 0.062 mm. The Gasparilla borrow area has two sections, a north - south section (1), and east - west section (2). Section 1 contains depths of clean sand usable for borrow material ranging from 4.5 feet to 8.2 feet. The composite mean grain size for the clean sand is 1.80 phi (0.29 mm), with a composite phi sorting of 0.96 or moderately sorted, and silt

content of 3.30% finer than 0.074 mm and 2.20% finer than 0.062 mm. Section 2 contains suitable sediment ranging in thickness from 2.5 feet to 18.5 feet. The composite mean grain size for the clean sand is 1.25 phi (0.42 mm), with a composite phi sorting of 1.74 or poorly sorted, and silt content of 2.42% finer than 0.074 mm and 2.05% finer than 0.062 mm.

(2) Quantity of Material. The estimate of the total volume of sand available for beach nourishment in the Estero borrow area is 3,500,000 cubic yards. Gasparilla's borrow area was partitioned into sections to estimate volumes of potential clean sand usable for beach fill. The estimated volume of sand available from Gasparilla borrow area sections 1 and 2 are 6,100,000 cubic yards and 7,780,000 cubic yards, respectively.

(3) Source of Material. Three offshore borrow sites have been proposed for the project, as described in the following section.

e. Description of the proposed Borrow Site.

(1) Location and Size. The borrow site for Gasparilla Island has an area of 2.8 square miles, and is located in the Gulf just north of Boca Grande Pass. The borrow site for Estero Island has an area of 1.59 square miles, and is located in the Gulf approximately 1.5 miles southwest of Sanibel Island.

(2) Type of Site. The borrow areas are located offshore of Lee County, Florida, in the open Gulf of Mexico. The submerged terrain in the borrow area vicinity consists of the floor of the Gulf of Mexico. The sea floor at this location is characterized by a large sandy area with no seagrasses.

(3) Type of Habitat. The borrow area is characterized by a sandy bottom. There are no known seagrass beds or rock outcrops in the borrow areas. Soft corals and sponges have been identified in the north west corner of the proposed Estero Island Borrow Area.

(4) Timing and Duration of Dredging. The timing of project construction is proposed for the year 2001. The 2.8-mile segment at Gasparilla Island is estimated to be accomplished over a 5-month period; the 4.7-mile segment at Estero Island is estimated to be accomplished over a 10-month period.

f. Description of Proposed Fill Site.

(1) Size and Location. The beach renourishment area includes 2.8 miles of shoreline on Gasparilla Island, and 4.7 miles of shoreline on Estero Island.

(2) Type of Site. The Gasparilla Island shoreline has been relatively stable

along the northern portions but has suffered increasing erosion toward the south end. Net southerly transport for this island is the second highest net transport rate calculated for the entire Lee County coast. Most of this sediment is trapped within the ebb-tidal delta system of the Boca Grande Pass. Natural ground elevations are generally under 10 feet MLW. Existing hardened shoreline features in the project area are listed below, relative to FDEP shoreline monuments:

Rock groin	R-13.6
Pre-cast groins	R-14.5 to R-15.3
Seawall	R-10.3 to R-15.4
Seawall/groins	R-18

Estero Island has well developed beach ridges of late Holocene age (5,000 years B.P.) Natural ground elevations are only around 5 to 10 feet making it one of the more easily flooded barrier islands in Lee County. The ends of Estero Island are unstable due to inlets. Existing hardened shoreline features in the project area are listed below, relative to FDEP shoreline monuments:

Seawall/bulkhead	R-180 to R-194
Groin remnants	R-194
Bulkhead	R-195 to R-198
Nine rock groins	R-197

(3) Type of Habitat. The habitat of the fill site includes supratidal dry beach, intertidal swash zone, and subtidal sandy areas. A vegetated dune exits along some portions of the project area as well.

(4) Timing and Duration of Discharge. The project is presently planned for the months of December through March to avoid peak sea turtle nesting season. However, it may be necessary to construct the project between April and November due to planning and cost constraints. Beach restoration and periodic nourishment, if performed from May to October, could cover up nests and interfere with or prevent the natural hatching process. A turtle nest monitoring and relocation program will be established and implemented in the event that construction is performed during nesting season. The duration of discharge is expected to be about 4 months.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The design berm elevation of the construction beach fill for Gasparilla Island will be +5 feet Mean Low Water (MLW). Slopes are to be 1:15 above MLW and 1:25 below MLW. For Estero Island, the design berm elevation will be +5 feet MLW. The beach slopes are to be 1:25 and 1:35 below MLW.

(2) Sediment Type. The borrow area for Estero Island potentially contains over 3,500,000 cubic yards of coarse sand, mean grain size 1.04 mm, with approximately 7% silt. Based on compatibility analysis, the borrow area is suitable as beach fill for Estero

Island. Two borrow areas have been defined for Gasparilla Island: Borrow area 1 contains 6,100,000 cubic yards of clean medium grain sand, mean grain size 0.29 mm, which is moderately sorted (0.96). Compatibility analysis found this borrow area to be unsuitable. Borrow area 2 lies on the shoal to the north of Boca Grande Pass navigation channel, and contains 7,780,000 cubic yards of beach quality fill material. Mean grain size is 0.42 mm with a sorting value of 1.74, or poorly sorted. Compatibility analysis found the borrow are to be suitable as beach fill for Gasparilla Island.

(3) Dredge/Fill Material Movement. The fill material will be subject to erosion by waves with the net movement of material to the south for Gasparilla, and to the north for Estero.

(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 will occur.

b. Water Circulation, Fluctuation and Salinity Determination.

(1) Water Column Effects. During dredging, turbidity will increase temporarily in the water column. The increased turbidity will be short-term; therefore, placement of fill will 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 are wave-induced long shore currents. These currents are driven by the transformation of obliquely incident waves in the nearshore. For Gasparilla the mean longshore current is from north to south. For Estero the mean direction of the longshore current is from south to north. This reversal of the mean longshore current direction in Estero is due to the sheltering effects of Sanibel on the local wave climate. The project will have no significant effect on existing current patterns, current flow, velocity, stratification, or the hydrologic regime of the area.

(3) Normal Water Level Fluctuations and Salinity Gradients. Mean high water in the Gasparilla and Estero project areas is located at elevations of 1.87 feet and 1.42 feet (respectively) National Geodetic Vertical Datum 1929 (NGVD). Salinity is that of normal ocean water.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulate and Turbidity Levels in the Vicinity of the Disposal Site. There may be a temporary increase in turbidity levels in the project areas 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 area. This effect will be temporary, limited to the immediate area of construction, and will have no adverse impact on the environment.

(b) Dissolved Oxygen. Dissolved oxygen levels will not be altered by this project.

(c) Toxic Metals, Organics, and Pathogens. No 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 will be reduced during construction due to increased turbidity. This will be a short-term and localized condition.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. The proposed borrow and fill areas are characterized by a sandy, featureless bottom. There is no attached algae and the effects on phytoplankton, if any, will 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 will have any long-term negative effects 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 will be dredged from the proposed borrow sites will 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 Reef Communities. There are no hardground reef communities located in the immediate nearshore area of Estero Island that would be impacted by beach fill activities. Soft coral located in the Estero Borrow Area will be avoided. Beach fill activities would impact a 0.3 acre reef located at the northern taper of the Gasparilla Island project. This narrow beachrock reef consists of closely spaced limestone outcrop ledges one to two feet in relief. Sand pockets lie between the rock outcrops. Impacts to this hardground community will be appropriately mitigated by constructing an artificial reef. Refer to Section 4.4.1 in the EIS for a more detailed discussion on mitigation.

(5) Endangered and Threatened Species. There will be no significant adverse impacts to any threatened or endangered species or on critical habitat of any threatened or endangered species. Refer to section 4.21 in the EIS for measures that will be implemented to protect threatened and endangered species.

(6) Other Wildlife. No adverse impacts to small foraging mammals, reptiles, or wading birds, or wildlife in general are expected.

(7) Actions to Minimize Impacts. All practical safeguards will be taken during construction to preserve and enhance environmental, aesthetic, recreational, and economic values in the project area. Specific precautions are discussed elsewhere in this 404(b) evaluation and in the environmental assessment for this project.

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 a temporary increase in turbidity at the beach placement site. No adverse impacted 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 will not be violated.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No municipal or private water supplies will be impacted by the project.

(b) Recreational and Commercial Fisheries. Fishing in the immediate construction area will be prohibited while construction is in progress. Recreational and commercial fisheries will not be otherwise impacted by implementation of the project.

(c) Water Related Recreation. Beach and water related recreation in the immediate vicinity of construction will be prohibited during construction activities. This will be a short-term impact.

(d) Aesthetics. The existing environmental setting will not be adversely impacted. Construction activities will cause a temporary increase in noise and air pollution due to equipment, as well as some temporary increase in turbidity. These impacts are not expected to adversely affect the aesthetic resources over the long term and, once construction ceases, these conditions will return to pre-project levels.

(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 will be no cumulative impacts that result 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 will be no secondary impacts on the aquatic ecosystem as a result of the dredging.

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 dredging and placement of fill material will 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 CONSISTENCY EVALUATION

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES
LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS

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 what 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 186 and 187, State and Regional Planning.

These chapters establish the State Comprehensive Plan, which sets goals that articulate a strategic vision of the State's future. It's 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: This proposed project has been coordinated with appropriate Federal, State, and local governmental agencies. 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 public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project involves placing beach compatible material onto an eroding beach. As a protective means for residents, development, and infrastructure located along 4.7 miles of Estero Island and 2.8 miles of Gasparilla Island in Lee County. Therefore, this project would be consistent with the efforts of the 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 resources; submerged lands, spoil islands, and artificial reefs.

Response: The authorized beach nourishment would create increased recreational beach and provide storm protection for the project segments of Estero and Gasparilla Islands. No sea grass beds are located within the proposed fill or borrow areas. Buffer (no work) zones will be used to protect potentially significant magnetic anomalies identified in the vicinity of the Gasparilla borrow area and natural features located in the Estero Borrow Area. Nearshore hardground impacted by the beach fill would be appropriately mitigated by constructing an artificial reef. 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. 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). Historical property investigations were conducted in the project area. A buffer (no work) zone will be established to protect a potentially significant anomaly identified in the Gasparilla borrow area. 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 area for recreational opportunities and protection of development. This will be compatible with tourism for this area and will be consistent with the goals of this chapter.

9. Chapters 334 and 339, Public Transportation.

This chapter authorizes the planning and development of a safe and efficient transportation system.

Response: No long term adverse impacts to public transportation systems are anticipated 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 research studies.

Response: The proposed beach nourishment and groin construction may cause a temporary short-term impact on non-motile species such as filter feeding, burrowing and attached organisms. Motile species such as fish and crustaceans may experience some short-term impacts but should be able to avoid the area during construction and seek more favorable environmental conditions. No adverse impacts to marine fishery resources are expected. 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 habitats. The purpose is 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 fresh water 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 groundwater or surface 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 other petroleum products and, therefore, 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.

Response: The proposed project would not have any regional impact on resources in the area. Therefore, the project is consistent with the goals of this chapter.

16. Chapter 388, Arthropod Control.

This chapter provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project would 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 Protection (FDEP).

Response: 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 project is not located near or on any agricultural lands. Therefore, this chapter does not apply.

APPENDIX C – PERTINENT CORRESPONDENCE

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

September 29, 1999

Colonel Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Attn: Planning Division

Log No.: 4-1-99-F-812
Project: Lee County Shore Protection Project

Dear Colonel Miller:

The U.S. Fish and Wildlife Service (Service) has reviewed the Biological Assessment (BA) for the Lee County Shore Protection Project submitted by the U.S. Army Corps of Engineers (Corps) on April 29, 1999. This document represents the Service's biological opinion on the effects of that action on the threatened loggerhead sea turtle (*Caretta caretta*) and the endangered green sea turtle (*Chelonia mydas*) in accordance with section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*) (ESA).

This biological opinion is based on information provided in the BA for the Lee County Shore Protection Project, the Florida Fish and Wildlife Conservation Commission (FWCC), Florida Department of Environmental Protection (DEP) from field investigations, previous biological opinions prepared for similar actions in the action area as well as other published and unpublished sources of information. A complete administrative record of this consultation is on file in the Service's South Florida Ecosystem Office in Vero Beach, Florida.

CONSULTATION HISTORY

On April 29, 1999, the Corps provided the service with a BA and a letter requesting formal consultation on threatened loggerhead and endangered green sea turtles as a result of the proposed actions associated with the Lee County Shore Protection Project. The BA contained information on sea turtle nesting activity within the project for the years 1993 through 1997. The BA also contained a determination that the project would have no effect on the endangered West Indian manatee (*Trichechus manatus*).

The Service has determined that the information provided is sufficient. We concur with the Corps determination for threatened and endangered sea turtles; formal consultation is initiated;

and a biological opinion is herein provided. The Service concurs with the Corps' determination for the manatee.

On September 7, the Service telephoned the Corps project biologist to request that the due date for the biological opinion be set at September 30, 1999. The Corps agreed to a September 30, 1999, due date.

BIOLOGICAL OPINION

Description of the proposed action

Lee County consists of 44 miles of coastline. The Corps proposes to construct protective beach by depositing 803,000 cubic yards (cy) of beach quality sand along 2.7 miles (4.3 km) of shoreline on Gasparilla Island, and 1,023,000 cy along 4.6 miles (7.4 km) of beach on Estero Island (See Figure 1). These project segments are part of the Beach Erosion Control Project for Lee County, Florida which was authorized by house document number 91-393. Captiva Island was also included in the authorization but has already been constructed. The proposed project includes constructing a 20 foot-wide berm on Gasparilla Island and a 40 foot-wide berm on Estero Island. Both berms would have elevations of +5 feet mean low water (MLW). The borrow site for the Gasparilla Island segment is located northwest of Boca Grande Pass. The borrow site for the Estero Island segment is located approximately 1.5 miles southwest of Sanibel Island.

The Corps has incorporated sea turtle protection measures into the project design. These project features include: (1) relocation of all detected sea turtle eggs 65 days prior to deposition of sand on the beach or by May 1, whichever is later, (2) measuring of compaction of the deposited fill with a cone penetrometer, (3) tilling of the beach if the average cone penetrometer index exceeds 500 cone penetrometer units (cpu), and (4) leveling of any escarpments which exceed 18 inches in height and extend more than 100 feet in length.

Action Area

The action areas include all shoreline where fill is proposed to be deposited. This amounts to 2.7 miles of shoreline on Gasparilla Island between monuments R-10 to R-26 and from R-174 to R-200 on Estero Island.

Status of the species

The Service has responsibility for protecting sea turtles when they come ashore to nest. The National Marine Fisheries Service (NMFS) has jurisdiction over sea turtles in the marine environment. In applying the jeopardy standard under the ESA, the Service has determined that sea turtle species occurring in the U.S. represent populations that qualify for separate consideration under section 7 of the ESA. Therefore, even though sea turtles are wide ranging

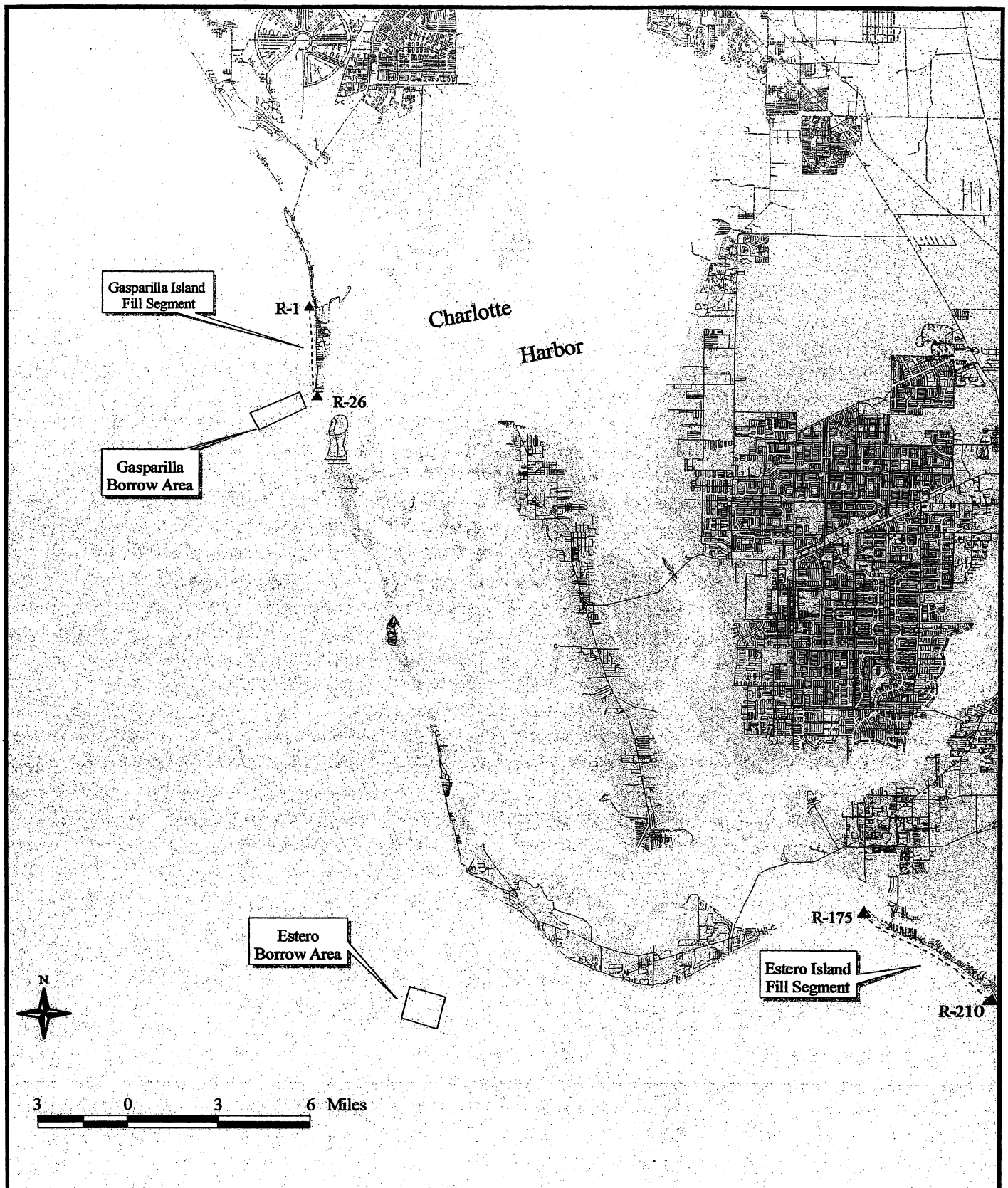


Figure 1. Lee County Beach Project limits and vicinity.

and have distributions outside the U.S., the Service considers only the U.S. populations of sea turtles when making jeopardy or no jeopardy determinations under section 7 of the ESA.

The reproductive strategy of sea turtles involves producing large numbers of offspring to compensate for the high natural mortality through their first several years of life. For at least two decades, several human-caused mortality factors have contributed to the decline of sea turtle populations along the Atlantic coast and in the Gulf of Mexico (National Research Council 1990a). These factors include commercial overutilization of eggs and turtles, incidental catches in commercial fishing operations, degradation of nesting habitat by coastal development, and marine pollution and debris. Therefore, human activities that affect the behavior and/or survivability of turtles on the remaining nesting beaches, particularly the few high-density nesting beaches, could seriously reduce our ability to protect sea turtles.

Loggerhead sea turtle

The loggerhead sea turtle, 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). Total estimated nesting in the southeastern U.S. is approximately 50,000 to 70,000 nests per year (NMFS and Service 1991b).

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 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 (NMFS and 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 (NMFS and Service 1991b).

Recent genetic analyses using restriction fragment analysis and direct sequencing of mitochondrial DNA have been employed to resolve management units among loggerhead nesting cohorts of the southeastern U.S. (Bowen *et al.* 1993; B.W. Bowen, University of Florida, Gainesville, in litt., November 17, 1994, and October 26, 1995). Assays of nest samples from North Carolina to the Florida Panhandle have identified three genetically distinct nesting populations: (1) northern nesting population - Hatteras, North Carolina, to Cape Canaveral, Florida; (2) South Florida nesting population - Cape Canaveral to Naples, Florida; and (3) Florida Panhandle nesting population - Eglin Air Force Base and the beaches around Panama City, Florida. These data indicate that gene flow between the three 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 population (Bowen *et al.* 1993, B.W. Bowen, University of Florida, Gainesville, in litt., October 26, 1995).

Green sea turtle

The green sea turtle (*Chelonia mydas*) was listed under the ESA 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 (NMFS and 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, unpubl. data). Green turtles have been known to nest in Georgia but only on rare occasions (Georgia Department of Natural Resources, unpubl. data). The green turtle also nests sporadically in North Carolina (North Carolina Wildlife Resources Commission, unpubl. data). The first documentation of green turtle nests in South Carolina were reported in 1996 (S. Murphy, South Carolina Department of Natural Resources, pers. comm., 1996). Unconfirmed nesting of green turtles in Alabama has also been reported (R. Dailey, Bon Secour National Wildlife Refuge, pers. comm., 1995).

ENVIRONMENTAL BASELINE

Status of the species in the action area

The following discussion of sea turtle nesting within Palm Beach, Broward, and Dade counties, as well as comparisons to statewide nesting trends, was derived from data provided by Meylan *et al.* (1995) and Meylan (unpub. data). Meylan *et al.* (1995) tabulates the results of nesting surveys throughout Florida between 1979 and 1992. Unpublished data is available for the 1993 and 1998 nesting seasons.

Statewide, loggerhead sea turtle nests account for the vast majority of reported nesting (97.9 percent from 1979 to 1992). During this same period, green sea turtle nests amounted to 0.2 percent of nesting statewide. Nesting totals from 1988 to 1992, while survey efforts remained relatively constant, fluctuated between 37,242 and 68,614. Reported green sea turtle nests fluctuated between 455 and 2,509 during the same period. The most nesting activity by both species occurred outside of the action area in Brevard County. During the Florida nesting seasons from 1979 to 1992, loggerhead sea turtles laid approximately 0.6 percent of their nests in Lee County; green sea turtles did not lay a significant percentage of their nests in Lee County

during the same period. Meylan *et al.* (1995) report that an increase in green sea turtle nesting has been observed statewide. The reason for this increase is unknown and is regarded with cautious optimism.

Sea turtle nesting on the beaches within the project area are surveyed by three separate FWCC permit holders. The beaches of north Gasparilla Island from FWCC marker R-13.5 north are surveyed by Deborah Ricci. The beaches south of R-15.5 are surveyed by Gasparilla State Recreation Area personnel. Due to coastal armoring, no suitable nesting habitat is present between R-13.5 and R-15.5. Estero Island is surveyed by Turtle Time, Inc.

The beach length of surveys on north Gasparilla Island have been variable (see Table 1) as has the frequency of surveys per week. For the nesting years 1990 through 1998, when the beach

Table 1. North Gasparilla Island Nesting Activity.

Year	Survey Length (km)	Loggerhead Nests
1987	0.6	1
1989	0.6	5
1990	5.9	99
1991	5.9	152
1997	2.9	59
1998	1.6	54

length surveyed was relatively larger than previous surveys, the average annual number of loggerhead nests per kilometer was 22. No green sea turtle nests were reported during the period from north Gasparilla Island. Because of the variability in the beaches surveyed, no conclusions can be drawn about trends in nesting activity on north Gasparilla Island.

The south Gasparilla Island surveys have been more consistent. The results of these surveys are given in Table 2 below.

Table 2. South Gasparilla Island Nesting Activity

Year	Survey Length (km)	Loggerhead Nests	Green Sea Turtle Nests
1993	2.4	22	0
1994	2.4	64	4
1995	2.0	152	1
1996	2.7	11	0

Year	Survey Length (km)	Loggerhead Nests	Green Sea Turtle Nests
1997	3.2	17	0
1998	1.1	20	0

These datum show that on average, about 21 nests are laid per kilometer per year in the south Gasparilla Island survey area. In addition, five green sea turtle nests were laid within the area during the survey period. Nesting density ranges from 76 to 5.3 nests per kilometer with no clear trend toward increasing or decreasing annual nesting density.

Estero Island beaches are surveyed by Turtle Time, Incorporated. The results of these surveys are given in Table 3.

Table 3. Estero Island Nesting Activity.

Year	Survey Length (km)	Loggerhead Nests
1989	11.3	5
1990	11.2	15
1991	11.2	13
1992	11.3	18
1993	11.3	20
1994	11.3	27
1995	11.3	46
1996	11.3	30
1997	11.3	28
1998	11.3	61

Records from Estero Island for the period 1989 to 1993 total 71 loggerhead nests. For the period from 1994 to 1998, a total of 192 nests were recorded. This suggests a slight increase in nesting activity on Estero Island over the long term.

Figure 1 combines the data from all survey areas within and adjacent to the project sites in a bar chart of nesting activity per km surveyed. Figure 1 suggests a three- or four-year cycle of increasing nesting density and subsequent decline in nesting activity in the project area.

The loggerhead nesting and hatching season for southern Gulf of Mexico Beaches extends from April 1 to November 30. Incubation ranged from 45 to 95 days. The green sea 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.

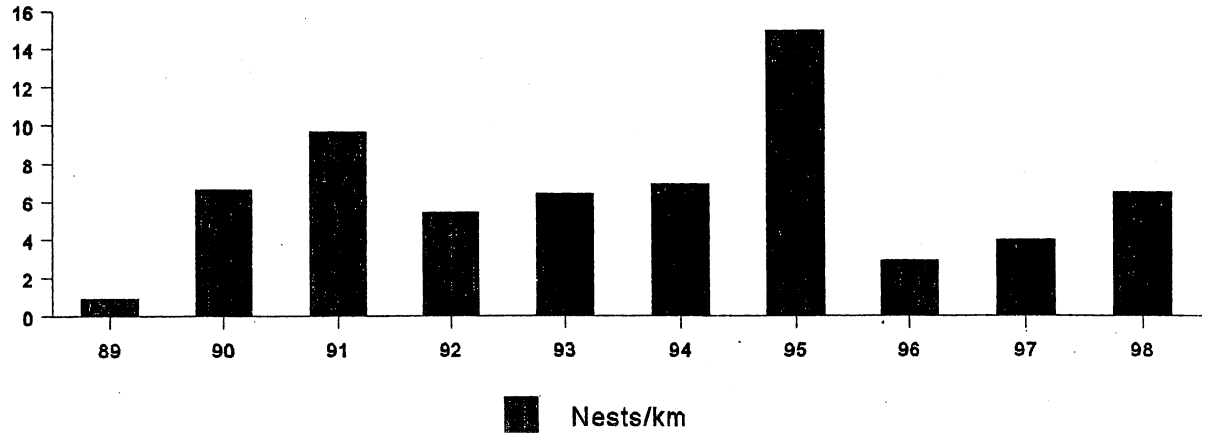
EFFECTS OF THE PROPOSED ACTION

The proposed projects would affect by increasing incidental take due to nest relocation during construction, through missed nests, and through changes in the nesting environment after project construction. Conversely, nesting habitat within the project area will be increased over that which would exist without beach nourishment.

A. Direct effects

Placement of sand on an eroded section of beach or an existing 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 construction. Nourishment during the nesting season, particularly on or near high density nesting beaches, can cause increased loss of offspring from human-caused mortality 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 would reduce these impacts, nests may be inadvertently missed 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 seven percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder 1994).

Figure 1. Annual nests/km surveyed in and near the project site.



1. Nest relocation

Besides the potential for missing nests during a nest relocation program, there is a potential for eggs to be damaged by their movement or for unknown biological mechanisms to be affected. 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, unpubl. 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 (Florida Department of Environmental Protection, unpubl. data). A 1994 Florida Department of Environmental Protection (DEP) 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) (A. Meylan, Florida Department of Environmental Protection, in litt., April 5, 1995).

A final concern about nest relocation is that it may concentrate eggs in an area resulting in a greater susceptibility 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.

2. Equipment

The placement of pipelines and the use of heavy machinery 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.

3. Artificial lighting

Another impact to sea turtles is disorientation (loss of bearings) and misorientation (incorrect orientation) of hatchlings from artificial lighting. Visual cues are the primary sea-finding

mechanism for hatchlings (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). Artificial beachfront lighting is a well documented cause of hatchling disorientation and misorientation on nesting beaches (Philbosian 1976; Mann 1977; Florida Department of Environmental Protection, unpubl. data). In addition, research has also documented significant reduction in sea turtle nesting activity 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, disorient females trying to return to the surf after a nesting event, and disorient and misorient 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.

B. Indirect effects

1. Changes in the physical environment

Beach nourishment may result in changes in sand density (compaction), beach shear resistance (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 the beach after nourishment if the sand becomes compacted. 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 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 one 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 root rake with tines at least 42 inches long and less than 36 inches apart pulled through the sand is recommended for compacted beaches. Service policy calls for beaches to be tilled if compaction levels exceed 500 psi.

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 time frame for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

2. Escarpments

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). These escarpments can hamper or prevent access to nesting sites. 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.

Cumulative effects:

Cumulative effects include the effects of future State, 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 ESA. The Service is not aware of any cumulative effects in the project area.

CONCLUSION

After reviewing the current status of the loggerhead, green, leatherback and hawksbill sea turtles, the environmental baseline for the action area, the effects of the proposed beach nourishments, and the cumulative effects, it is the Service's biological opinion that the planned actions in the Lee County Erosion Control Project, as proposed, are not likely to jeopardize the continued existence of the sea turtles listed above.

No critical habitat has been designated for the loggerhead or green sea turtles. Critical habitat has been designated for leatherback sea turtles (St. Croix, U.S. Virgin Islands) and for hawksbill

sea turtles (Mona, Culebrita, and Culebra Islands, Puerto Rico). These proposed actions do not affect those areas; thus, there is no effect on designated critical habitat for these two species.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the ESA 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 ESA 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, in order 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 incidental take

The Service has reviewed the biological information and other information relevant to this action. Based on this review, incidental take is anticipated for (1) all sea turtle nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) all sea turtle nests deposited during the period when a nest survey and egg relocation program is not required to be in place within the boundaries of the proposed project; (3) 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; (4) 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; (5) 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 (6) all nests destroyed as a result of

escarpment leveling within a nesting season when such leveling has been approved by the Fish and Wildlife Service.

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 or 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 in Lee County.

1. Only beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence shall be used on the project site.

2. If a beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles shall be conducted. If nests are constructed in the area of beach nourishment, the eggs shall be relocated.

3. Immediately after completion of a nourishment and prior to the next three nesting seasons, beach compaction shall be monitored, and tilling shall be conducted as required to reduce the likelihood of affecting sea turtle nesting and hatching activities.

4. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, monitoring shall be conducted to determine if escarpments are present and escarpments shall be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

5. The applicant shall ensure that contractors doing the beach nourishment work fully understand the sea turtle protection measures detailed in this incidental take statement.

6. During the sea turtle nesting season, construction equipment and pipes shall be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.

7. During the sea turtle nesting season, lighting associated with the project shall be minimized to reduce the possibility of disrupting and disorienting nesting and/or hatchling sea turtles.

Terms and conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. All material placed shall be sand that is similar to that already existing at the beach site in both coloration and grain size distribution. All such fill material shall be free of construction debris, rocks, or other foreign matter and shall generally not contain, on average, greater than 10 percent fines (*i.e.*, silt and clay) passing the #200 sieve and shall not contain, on average, greater than 5 percent coarse gravel or cobbles, exclusive of shell material retained by the #4 sieve.

2. Daily early morning surveys shall be required if any portion of the beach nourishment project occurs during the period from April 1 to November 30. Nesting surveys shall be initiated 65 days prior to nourishment activities or by April 1, whichever is later. Nesting surveys shall 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 construction activities, eggs shall be relocated per the following requirements.

   a. Nest surveys and egg relocations shall only be conducted by personnel with prior experience and training in nest survey and egg relocation procedures. Surveyors shall have a valid FWCC permit. Nest surveys shall be conducted daily between sunrise and 9 a.m. Surveys shall be performed in such a manner so as to ensure that construction activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

   b. Only those nests that may be affected by construction or sand transfer activities shall be relocated. Nests requiring relocation shall 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 construction activities shall cease when construction activities no longer threaten nests. Nests deposited within areas where construction activities have ceased or will not occur for 65 days shall be marked and left in place unless other factors threaten the success of the nest. Any nests left in the active construction zone shall be clearly marked, and all mechanical equipment shall avoid nests by at least 10 feet.

3. Immediately after completion of the beach nourishment project and prior to April 1 for three subsequent years, sand compaction shall be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the FWCC, and Lee County. At a minimum, the protocol provided under 3a and 3b below shall be followed. If required, the area shall 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 shall not be performed in areas where nests have been left in place or relocated. A report on the results of compaction monitoring shall be submitted to the Service prior to any tilling actions being taken. An annual summary of compaction surveys and the actions taken shall be submitted to the Service. This condition shall be evaluated annually and may be modified if necessary to address sand compaction problems identified during the previous year.

a. Compaction sampling stations shall be located at 500-foot intervals along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area); one station shall be midway between the dune line and the high water line (normal wrack line); and one station shall be located just landward of the high water line.

At each station, the cone penetrometer shall 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 shall 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 shall be averaged to produce final values for each depth at each station. Reports shall include all 27 values for each transect line, and the final nine averaged compaction values.

b. If the average value for any depth exceeds 500 psi for any two or more adjacent stations, then that area shall 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 shall be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling shall not be required.

4. Visual surveys for escarpments along the project area shall be made immediately after completion of the beach nourishment project and prior to April 1, for three subsequent years. Results of the surveys shall be submitted to the Service prior to any action being taken. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet shall 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 shall 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 affecting existing nests. An annual summary of escarpment surveys and actions taken shall be submitted to the Service.

5. The applicant shall arrange a meeting between representatives of the contractor, the Service, the FWCC, and the permitted person responsible for egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice shall 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 to November 30, staging areas for construction equipment shall be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment not in use shall be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes that are placed on the beach shall be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes shall be off the beach to the maximum extent possible. Temporary storage of pipes on the beach shall be in such a manner so as to affect the least amount of nesting habitat and shall likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

7. From April 1 to November 30, all on-beach lighting associated with the project shall be limited to the immediate area of active construction only and shall be the minimal lighting necessary to comply with safety requirements. Shielded low pressure sodium vapor lights are recommended to minimize illumination of the nesting beach and nearshore waters. Lighting on offshore equipment shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to avoid excessive illumination of the water, while meeting all U.S. Coast Guard and OSHA requirements. Shielded low pressure sodium vapor lights are highly recommended for lights on offshore equipment that cannot be eliminated.

8. A report describing the actions taken to implement the terms and conditions of this incidental take statement shall be submitted to the South Florida Field 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 and relocation activities, descriptions and locations of hatcheries, nest survey and relocation results, and hatching success of nests.

9. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for egg relocation for the project should be notified so the eggs can be moved to a suitable relocation site.

10. Upon locating a dead, injured, or sick threatened or endangered sea turtle specimen, initial notification must be made to the Service's Law Enforcement Office in Miami, Florida, at (305) 526-2789. Care should be taken in handling sick or injured specimens to ensure effective treatment and care and in handling dead specimens to preserve biological materials in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered or threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

The Service believes that no more than the following types of incidental take will result from the proposed action: (1) all sea turtle nests that may be constructed and eggs that may be deposited and missed by a nest survey and egg relocation program within the boundaries of the proposed project; (2) all sea turtle nests deposited during the period when a nest survey and egg relocation

program is not required to be in place within the boundaries of the proposed project; (3) 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; (4) 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; (5) 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 (6) all nests destroyed as a result of escarpment leveling within a nesting season when such leveling has been approved by the Service. 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. 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 Federal agency 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 ESA directs Federal agencies to utilize their authorities to further the purposes of the ESA 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 main part of the sea turtle nesting and hatching season.

2. Appropriate native salt-resistant dune vegetation should be established on the restored dunes. The Bureau 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 beach nourishment to determine whether sea turtle nesting success has been adversely affected.

4. 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.

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

This concludes formal consultation on the action outlined in the initiation 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.

Thank you for your cooperation in the effort to protect threatened and endangered sea turtles and their nesting habitat. If you have any questions regarding this biological opinion, please do not hesitate to contact Chuck Sultzman of our office at (561) 562-3909, extension 241.

Sincerely,

Kalani D. Cairns

for James J. Slack
Project Leader
South Florida Field Office

cc:
Service, Jacksonville, FL (Attn: Sandy MacPherson)
FWCC (BPSM), Tallahassee, FL
NMFS, St. Petersburg, FL

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Department of Environmental Protection

Jeb Bush
Governor

Florida Marine Research Institute
Division of Marine Resources
100 Eighth Avenue S.E. • St. Petersburg, Florida 33701-5095
Phone: 727-896-8626 • Suncom: 523-1011 • FAX: 727-823-0166

David B. Struhs
Secretary

March 17, 1999

Ms. Christine Bauer
United States Army Corps of Engineers
Jacksonville District
Post Office Box 4970
Jacksonville, Florida 32232-0019

Dear Ms. Bauer:

Below is the nesting data you requested for an environmental assessment of the proposed beach erosion control project in Lee County (Table 1). The data are from 1993 to 1997, the latter is the most recent year of verified data. I will send an addendum that will include 1998's data once it has been verified. Attached are the data for the individual beaches, Gasparilla Island and Estero Island, as you requested (Table 2). Please note that the survey of Gasparilla Island was split in 1997. Both of these areas are included. No leatherbacks (*Dermochelys coriacea*) nested in Lee County during those years.

Table 1. Lee County Nesting Numbers 1993-1997

Year	Survey Length (km)	C.c. nest	C.c. false crawl	C.m. nest	C.m. false crawl
1993	61.6	487	544	0	0
1994	70.0	691	656	4	1
1995	61.6	700	996	3	1
1996	63.2	686	899	0	1
1997	60.8	594	677	0	1

(C.c. represents *Caretta caretta*, loggerheads, and C.m. represents *Chelonia mydas*, green turtles)

Please let me know if I can be of any further assistance. My number is 727-896-8626, ext. 1914.

Sincerely,

Kerri P. Powell
Research Staff

KPP/kpp
Enc.

Table 2. Estero Island and Gasparilla Island Nesting Activity 1993-1997

YEAR	TP	BEACHNAME	BOUNDARIES		LENGTH	START DATE	END DATE	DAYS PERWK	CC NEST	CC FALSE	CC FIRST	CC LAST	CM NEST	CM FALSE	CM FIRST	CM LAST
			NORTH	SOUTH												
1993	003	ESTERO ISL	BODWICH POINT	CARLOS POINT	11.3	4/25	8/31	7	20	40	5/20	7/21	0	0		
1994	003	ESTERO ISL	BODWICH POINT	CARLOS POINT	11.3	4/25	9/10	7	27	25	5/22	8/7	0	0		
1995	003	ESTERO ISL	BODWICH POINT	CARLOS POINT	11.3	4/25	9/1	7	46	35	5/10	8/1	0	0		
1996	003	ESTERO ISL	BODWICH POINT	CARLOS POINT	11.3	4/13	8/31	7	30	53	5/19	7/30	0	0		
1997	003	ESTERO ISL	BODWICH POINT	CARLOS POINT	11.3	4/25	9/19	7	28	68	5/3	7/25	0	0		
1993	SP	GASPAR ISL SRA	2.4 KM N BOCA GRANDE PASS	BOCA GRANDE PASS	2.4	5/1	8/31	7	22	25	5/22	7/28	0	0		
1994	SP	GASPAR ISL SRA	2.4 KM N BOCA GRANDE PASS	BOCA GRANDE PASS	2.4	4/17	8/31	7	64	20	4/29	8/16	4	1	6/24	8/5
1995	SP	GASPAR ISL SRA	LITTLE GASPARILLA PASS	BOCA GRANDE PASS	2.0	5/1	9/30	5	152	56	5/6	8/24	1	0	6/7	6/7
1996	SP	GASPAR ISL SRA	1ST. ST.	BOCA GRANDE PASS	2.7	5/1	9/30	7	11	13	5/31	7/26	0	0		
1997	SP	GASPAR ISL SRA	9TH ST.	BOCA GRANDE PASS	3.2	5/13	7/22	7	17	0	5/13	7/22	0	1		
1997	SP	GASPARILLA ISL NORTH	CHARLOTTE/ LEE COUNTY LINE	9TH ST	2.9	5/7	9/19	VAR	59	0	5/10	7/12	0	0		

(CC represents *Caretta caretta*, loggerheads, and CM represents *Chelonia mydas*, green turtles)

Office of the Secretary
Office of International Relations
Division of Elections
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Division of Historical Resources
Division of Library and Information Services
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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

George M. Strain
Acting Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

December 2, 1999

RE: DHR No. 997901
Request for Survey Review: *Archeological Diver Identification and Evaluation of Fourteen Potentially Significant Submerged Targets for the Lee County Shore Protection Project, Lee County, Florida.*
Submitted By: Mid-Atlantic Technology and Environmental Research, Inc.
441 Blossoms Ferry Road
Castle Hayne, North Carolina 28429

Dear Mr. Strain:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), as well as those contained in Chapter 267.061, *Florida Statutes*, as implemented through 1A-46 *Florida Administrative Code*, we have reviewed the results of the field survey of the referenced project and find them to be complete and sufficient.

Our office has received the draft report *Archeological Diver Identification and Evaluation of Fourteen Potentially Significant Submerged Targets for the Lee County Shore Protection Project, Lee County, Florida*. Based upon our careful review of the information provided in the report regarding the characteristics of the magnetic anomalies, we are making the following recommendations.

The conclusions of the report identify targets G-1, G-2/3, and G-5 as historic shipwrecks. However, only target G-2/3 was stated as having the potential to yield additional information about the shipwreck with which it is associated. It was also stated that treasure hunters have completely destroyed targets G-1 and G-5. After review of the magnetometer data, it is the opinion of this office that significant data may be present at all three anomaly sites and that they should, therefore, be avoided during project operations. A 'no-impact' buffer zone should be established around each of the three sites (G-1, G-2/3, and G-5, **see attached map**). These zones should extend to a radius of 200' from the center of the anomaly as identified by both Florida State Plane Coordinates and UTM Coordinates provided in the Archaeological Diver Identification report.

By establishing these buffer zones, the archaeological materials associated with these sites potentially eligible for listing in the National Register of Historic Places will be protected from possible adverse effect caused by the proposed offshore borrow project.

If you have any questions concerning our comments, please contact Brian Yates, Historic Sites Specialist at (850) 487-2333 or 1-800-847-7278. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

James A. Kammerer

for Janet Snyder Matthews, Ph.D., Director
Division of Historical Resources
State Historic Preservation Officer

JSM/Yby
Encl. (1)

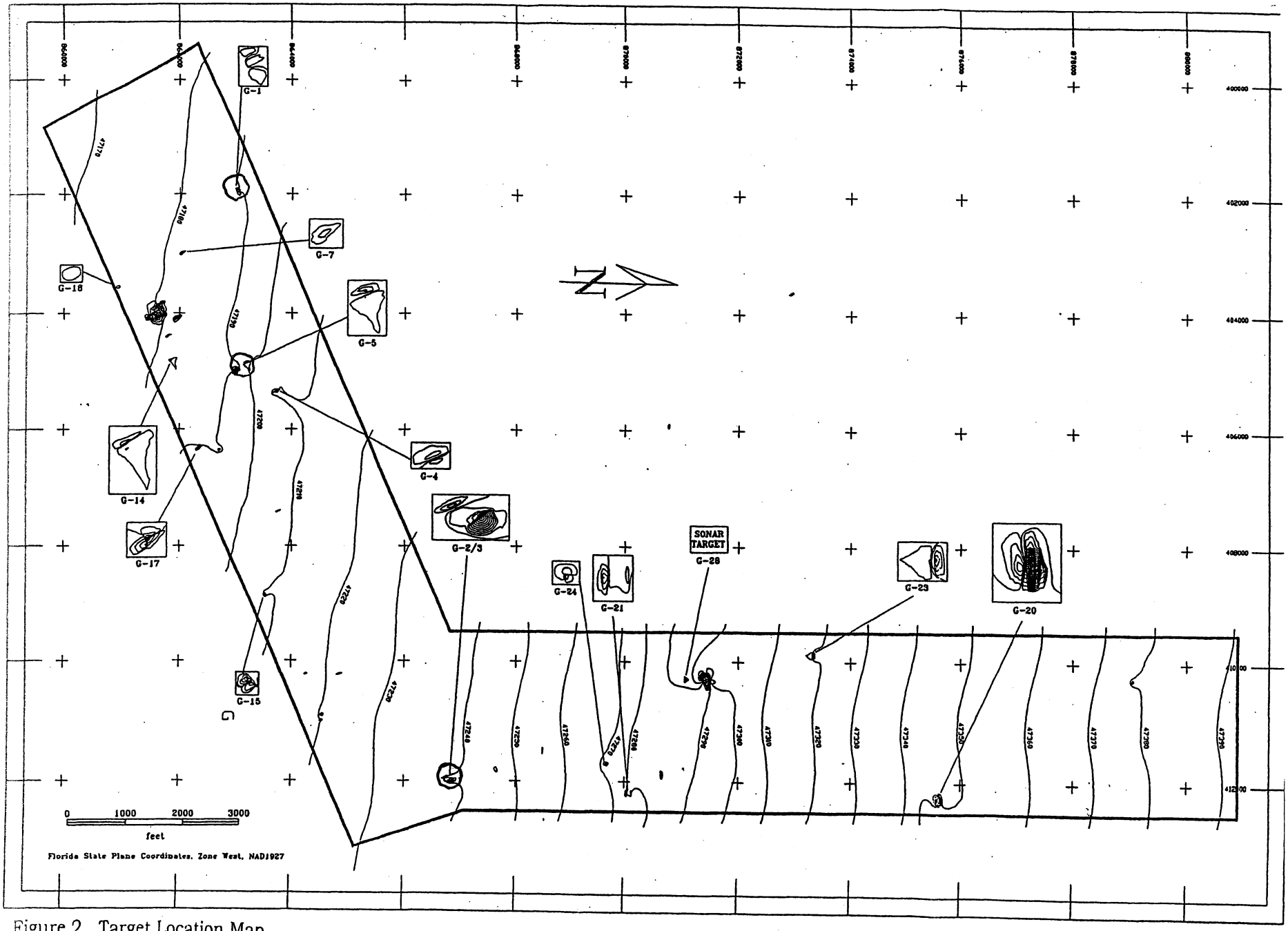

Figure 2. Target Location Map.

UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

September 17, 1999

Mr. James C. Duck
Chief, Planning Division
DOA, Jax District, COE
PO Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

Enclosed are comments on the Draft Environmental Impact Statement for Shore Protection Project Lee County, Florida. We hope our comments will assist you. Thank you for giving us an opportunity to review this document.

Sincerely,

Margaret R. McCalle
for Susan B. Fruchter
Acting NEPA Coordinator

Enclosure

Printed on Recycled Paper

MEMORANDUM FOR: Susan B. Fruchter
Acting NEPA Coordinator

FROM: Charles W. Challstrom
Acting Director, National Geodetic Survey

SUBJECT: DEIS-9909-03 Shore Protection Project Lee County, Florida

The subject statement has been reviewed within the areas of the National Ocean Service's (NOS') responsibility and expertise and in terms of the impact of the proposed actions on NOS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control monuments in the subject area is contained on the National Geodetic Survey (NGS) home page at the following Internet World Wide Web address: http://www.ngs.noaa.gov. After entering the NGS home page, please access the topic "Products and Services" and then access the menu item "Data Sheet." This menu item will allow you to directly access geodetic control monument information from the NGS data base for the subject area project. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, NGS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. NGS recommends that funding for this project includes the cost of any relocation(s) required.

For further information about these geodetic monuments, please contact Rick Yorczyk; NOAA, NOS, National Geodetic Survey, N/NGS; SSMC3 8636, 1315 East West Highway; Silver Spring, Maryland 20910; telephone: 301-713-3230 x142; fax: 301-713-4175.

The text of this Draft Environmental Impact Statement describes beach erosion control measures being undertaken on Gasparilla Island, Captiva Island and Estero Island in Lee County, Florida. This includes 2.7 miles of beach restoration, 2,400 feet of revetment, a 500 foot terminal groin on Gasparilla Island and a 600 foot groin on Estero Island. The groins alone definitely have impact on navigation.

NOS would like USACE engineering drawings and surveys of this project upon completion so that any related shoreline changes or deepening in selected borrow areas can be accurately detailed on future editions of affected NOS Charts.

For further information about these charting activities, please contact Howard Danley; NOAA, NOS, Office of Coast survey, N/CS28; SSMC3 7458; 1315 East West Highway; Silver Spring, Maryland 20910; telephone: (301)713-2732 x105.

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 (727) 570-5517

MAY 26 1999 F/SER3:EGH

Mr. James C. Duck
Chief, Planning Division
Army Corps of Engineer, Jacksonville District
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

This responds to your April 29, 1999 letter with reference to proposed U.S. Army Corps of Engineers (USACE) dredging of offshore borrow areas in the southeastern Gulf of Mexico near Gasparilla and Sanibel Islands. The project purpose is to nourish 2.7 miles of shore on Gasparilla Island with approximately 803,000 cubic yards of material from the Gasparilla Island borrow area located in the Gulf just north of Boca Grande Pass; and to nourish 4.6 miles of shore on Estero Island with 1,023,000 cubic yards of material dredged from the Estero Island borrow area located approximately 1.5 miles southwest of Sanibel Island. The dredging method could be pipeline, hopper, or clam shell dredge. We have reviewed the Project Description and biological evaluation.

This consultation addresses the potential effects to endangered or threatened species (Kemp's ridley, green, loggerhead, hawksbill and leatherback sea turtles, and Gulf sturgeon) under National Marine Fisheries Service (NMFS) purview from the potential use of a hopper dredge. NMFS has previously determined that use of pipeline or clam shell type dredges is unlikely to adversely affect the above-listed species.

Potential Impacts to Listed Species

Of the above-listed sea turtle species, hawksbills are unlikely to be adversely affected because of their rarity due to the absence of close by, nearshore reefs which hawksbills use for foraging and shelter. Leatherbacks, the largest of all sea turtle species, are unlikely to be encountered or adversely affected by hopper dredging because their pelagic lifestyle tends to keep them further offshore. If they did move inshore, their size precludes their vulnerability to entrainment in dredge dragheads. Of the remaining species, loggerheads are the most common sea turtle in the action area, followed by the greens and the relatively rare Kemp's ridleys. Of these three species, only the loggerheads nest in significant quantities on nesting beaches near the proposed borrow sites. Loggerheads could be affected, especially if dredging takes place during nesting season when females and males congregate in the nearshore waters off nesting beaches. Sporadic nesting of green turtles occurs on Gasparilla Island and they are susceptible to entrainment in dredge dragheads as well. Large juvenile Gulf sturgeon and adult Gulf sturgeon (greater than six

years of age) from the Charlotte Harbor, Florida population may be found in the winter months in Boca Grande Pass. Incidental takes of Gulf sturgeon have been reported there by commercial gillnetters, though this is a rare occurrence. Takes of Gulf sturgeon by hydraulic dredges have not been reported, but takes of other sturgeon species (Atlantic and shortnose) by hydraulic dredges have been documented on the Atlantic Seaboard during channel maintenance dredging.

NMFS has previously consulted with Corps of Engineers, South Atlantic District, on the effects of using hopper dredges to dredge East Coast channels and offshore borrow areas (August 25, 1995, April 9, 1997 and September 25, 1997) and with the Corps of Engineers, Galveston and New Orleans Districts, on hopper dredging of Gulf of Mexico channels (September 22, 1995). Because of the potential for adverse effects to listed species from hopper dredges, NMFS incorporated reasonable and prudent measures, terms and conditions, and conservation recommendations into the preceding biological opinions. If USACE, Jacksonville District, intends using a hopper dredge to conduct the described dredging activity, similar terms and conditions would be required to prevent/minimize adverse effects to sea turtles. In the discussion of potential impacts to listed species, which the USACE, Jacksonville District, submitted with their consultation request, they state that "If it is decided that the use of a hopper dredge is necessary, the USACE will abide by the terms and conditions of the Regional Biological Opinion for the use of hopper dredges issued by NMFS." NMFS has modified the terms and conditions of the September 22, 1995 Regional Biological Opinion to suit this project description, which are listed below.

Terms and Conditions:

1. The rigid sea turtle deflector draghead or the modified deflector draghead must be used on all hopper dredges operating in the Gasparilla and Estero Islands borrow areas.

2. Seasonal restrictions:

a. Hopper dredging of the Gasparilla Island and Estero Island borrow areas shall be completed, whenever possible, between December 1 and March 31 ("winter dredging window"), when sea turtle abundance is lowest throughout Gulf coastal and inshore waters, because of the known year round presence of sea turtles in the action area.

b. To the maximum extent possible, hopper dredging shall be completed outside of the April 15 to September 30 nesting season for loggerhead and green turtles in this portion of the Gulf Coast because of the greater potential for sea turtle-dredge interactions during nesting season.

c. Pipeline, clamshell, or other non-hopper type hydraulic dredges may be used year round with no restrictions or observer requirements. The USACE shall give preference to the use of non-hopper type dredges during the April 15 to September 30 nesting season.

3. One-hundred percent observer coverage of hopper dredging operations by NMFS-approved observers is required. The USACE shall arrange for NMFS-approved observers aboard hopper

dredges to monitor the hopper spoil, screening, and dragheads for sea turtles and Gulf sturgeon and their remains, as appropriate. Incidental take reports must be faxed by onboard observers to the NMFS Southeast Regional Office (SERO) (727-570-5517) within 24 hours of any sea turtle or Gulf sturgeon take observed.

4. Any sea turtle or Gulf sturgeon takes must be reported immediately to the NMFS SERO and to the Florida Department of Environmental Protection (FDEP). When possible, sturgeon or turtle carcasses or pieces shall be collected and transferred to FDEP. The USACE shall maintain close communication with the Sea Turtle Stranding Network state representative (Dr. Allen Foley, FDEP St. Petersburg, 727/896-8626, ext.1920), the Florida Marine Research Institute (FMRI) Sturgeon Coordinator (Alan Huff, FDEP St. Petersburg, 727/896-8626, ext. 2016) and Eric Hawk at NMFS SERO, 727/570-5312 in order to be advised of any sea turtle or Gulf sturgeon strandings in the project area that show evidence of draghead impingement. This monitoring will give the USACE and dredge operators an additional tool to know if they are taking sea turtles or Gulf sturgeon, enable them to better evaluate the effectiveness of the onboard observers and operation of the draghead deflector and pre-deflector, and provide additional information on sea turtle and Gulf sturgeon presence. These stranding data will be used to augment monitoring and for management purposes.

5. The USACE must:

a. Advise inspectors, operators and vessel captains about the prohibitions on taking, harming, or harassing sea turtles and Gulf sturgeon, and the civil penalties that apply.

b. Instruct the captain of the hopper dredge to avoid any turtles encountered while traveling between the dredge site and beach disposal area, and to immediately contact the USACE if sea turtles are seen in the vicinity.

c. Notify NMFS immediately if a sea turtle or Gulf sturgeon is taken by any type of dredge.

6. For hopper dredges, 100 percent inflow screening is required whenever possible, and 100 percent overflow screening is recommended. If conditions prevent 100 percent inflow screening, inflow screening may be reduced after consultation with NMFS, but 100 percent overflow screening is then required, and an explanation must be included in the dredging report (see Condition 8 below).

7. Every effort must be made to disengage dredging pumps when the dragheads are not firmly on the bottom to prevent impingement of sea turtles or Gulf sturgeon resting or feeding on the bottom, or in the water column. This precaution is especially important during the cleanup ("skimming" or "trimming") phase of hopper dredging operations—when the draghead frequently comes off the bottom and can suck in turtles and Gulf sturgeon resting in the shallow troughs between the high spots the draghead is trimming off.

8. Reporting: A report summarizing the results of hopper dredging and any documented sea turtle or Gulf sturgeon sightings or takes must be submitted to Mr. Charles Oravetz, NMFS Protected Resources Division, 9721 Executive Center Drive N., St. Petersburg, Florida 33702, within 30 working days of completion of dredging. Beach observer data provided by the Sea Turtle Stranding Network on stranded sea turtles or Gulf sturgeon showing evidence of draghead impingement should be included separately in the report.

NMFS believes the above-listed measures are necessary to prevent probable adverse effects to sea turtles and Gulf sturgeon by potential entrainment of these listed species by hopper dredging activity at the Gasparilla Island and Estero Island borrow areas. Although NMFS believes it is unlikely that these species will be entrained and lethally taken by this activity, observers are necessary to document the extent of such takes, if any, and report them to NMFS for use in future management decisions. One-hundred percent inflow screening is required to maximize the probability that observers will detect takes of listed species. Observer sighting reports are necessary to gather data on the seasonal presence and abundance of listed species at the project site for future management decisions. The recommended dredging windows minimize the potential for take of listed sea turtle species and prevent take of listed sea turtle species by the hopper dredge to the maximum reasonable and prudent extent presently possible, though they increase the potential for take of Gulf sturgeon. Though the potential for dredge interactions with Gulf sturgeon is greatest during the recommended winter dredging window, NMFS believes that the potential benefits to sea turtles of the winter dredging window outweigh the potential adverse effects to Gulf sturgeon.

If the USACE is willing to adopt the conditions outlined above as part of the proposed action, NMFS believes the potential for take of the above-listed marine species would be sufficiently minimized such that formal consultation would not be necessary.

We appreciate the opportunity to comment on this project and work with the USACE to ensure the protection of threatened and endangered species under NMFS purview, and to help the USACE fulfill its mandate under the Endangered Species Act. Please contact Mr. Eric Hawk at 727/570-5312 if you have any questions or if we may be of assistance.

Sincerely,

Charles A. Oravetz

Charles A. Oravetz
Chief, Protected Resources Division

cc: F/SER4 - A. Mager
F/PR3
o:\section7\informal\gaspar.jax
New File: 1514-22 f.1. USACE Jacksonville District
Gasparilla/Estero Islands Beach Renourishment

Planning Division
Environmental Branch

APR 0 4 2000

Mr. Charles Oravetz
Chief, Protected Species Management Branch
National Marine Fisheries Service
9721 Executive Center Drive
St. Petersburg, Florida 33702

Dear Mr. Oravetz:

This is in reference to the proposed Lee County Shore Protection Project, Estero and Gasparilla Islands.

On April 29, 1999, we submitted a Biological Assessment (BA) initiating Section 7 consultation for this project. In the BA, it stated that the use of a hopper dredge may be necessary, but undetermined at that time. In a May 26, 1999 informal consultation letter, National Marine Fisheries Service (NMFS) modified the terms and conditions of the September 22, 1995 Regional Biological Opinion (RBO) for the use of hopper dredges on the Atlantic Coast to suit this project.

Because of the location of the borrow site, it has now been determined that a hopper dredge will be used to collect the material for nourishment on Estero Island. In the modified terms and conditions listed in your May 26, 1999 letter, the NMFS has requested that hopper dredging be completed between December 1 and March 31. The Estero Island renourishment project would take 5-6 months to complete. Therefore, it would not be possible to complete this segment of the project within the winter dredging window. Since there is not a seasonal restriction for hopper dredging along the south Atlantic Coast where sea turtle nesting is more abundant, we are requesting that the seasonal hopper dredging window be waived for this project. This will allow for year round hopper dredging in the offshore borrow area.

Additionally, we request your office prepare an Incidental Take Statement for this project, separate from the RBO for the Atlantic Coast.

For the reasons outlined above, we are initiating Section 7 consultation in accordance with the Endangered Species Act of 1973, as amended. Your concurrence with our determination is requested. If you have any questions or need further information, please contact Yvonne Haberer at 904-232-1701.

Sincerely,

James C. Duck
Chief, Planning Division

Copy Furnished:

Mr. Steve Boutelle, Lee County Division of Natural Resources Management, 1500 Monroe Street, Ft. Myers, Florida 33901
Mr. Roland Ottolini, Deputy Director, Lee County Division of Natural Resources Management, 1500 Monroe Street, Ft. Myers, Florida 33901

Haberer/CESAJ-PD-ER
Dugger/CESAJ-PD-ER
Smith/CESAJ-PD-E
CS Stevens/CESAJ-DP-I 4/4/00
Duck/CESAJ-PD

L:group/pde/haber/leesec7-nmfs-2.doc

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 (727) 570-5517

APR 24 2000

F/SER3:EGH

Ms. James C. Duck
Chief, Planning Division
Army Corps of Engineers, Jacksonville District
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

This responds to your April 4, 2000 letter to the National Marine Fisheries Service (NMFS) Protected Resources Division (PRD) in reference to the proposed Lee County Shore Protection Project, Estero and Gasparilla Islands.

NMFS PRD previously commented on this project (May 26, 1999) in response to an April 29, 1999 letter from the Jacksonville District COE. The project described at the time contemplated the potential use of a hopper dredge. In our response to the COE, the NMFS PRD:

Recommended 1) that preference be given to the use of nonhopper type dredges and 2) that *whenever possible* winter dredging windows be followed (dredging between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal and inshore waters) to minimize interactions with sea turtles and Gulf sturgeon.

Required, to the maximum extent possible, that hopper dredging be completed outside of the April 15 to September 30 nesting season for loggerhead and green turtles in this portion of the Gulf Coast because of the greater potential for sea turtle-dredge interactions during nesting season (i.e. required the COE *to give preference to* the use of nonhopper-type dredges during the April 15 to September 30 nesting season).

Required 1) the use of a rigid sea turtle deflector draghead or the modified deflector draghead on all hopper dredges operating in the Gasparilla and Estero Islands borrow areas, and 2) one hundred percent observer coverage of hopper dredging operations by NMFS-approved observers to monitor the hopper spoil, screening, and dragheads for sea turtles and Gulf sturgeon and their remains, as appropriate.

Authorized the use of pipeline, clamshell, or other nonhopper-type hydraulic dredges year-round with no seasonal restrictions or observer requirements.

You will note that our suggestion of a winter dredging window was only a recommendation, not a requirement. The COE is correct in their assertions that there is not a seasonal restriction for hopper dredging along the southeast Atlantic Coast (south of Titusville, FL) in the September 15, 1997 Regional Biological Opinion (RBO) on southeast Atlantic Coast hopper dredging of navigation channels and borrow areas (which updated the August 25, 1995 RBO), and that sea turtle nesting is more abundant there than in the project area (Gulf Coast). The COE also notes that since the Estero Island renourishment project may take 5-6 months to complete, it will not be possible to complete this segment of the project within the recommended winter dredging window.

NMFS PRD will not object to unrestricted year-round hopper dredging in the project area; however, any sea turtle takes resulting from any hopper dredging activity associated with this project cannot be counted toward the Incidental Take Statement (ITS) for the 1997 Regional Biological Opinion for the southeast Atlantic Coast. A separate ITS cannot be issued without preparation of a separate Biological Opinion. Therefore, NMFS is preparing an Opinion for this activity which lists terms and conditions and includes its own ITS. As requested in your letter, the Opinion will allow the COE to conduct year-round hopper dredging at the Estero and Gasparilla Island borrow sites. You may expect to receive this Opinion within 135 days of receipt of this letter.

On June 8, 1999 NMFS invited the Jacksonville District Corps of Engineers to submit dredging schedules for the entire District for the next five years and suggested that the District request initiation of consultation on a Regional Biological Opinion which would encompass *all* potential dredging sites within the Jacksonville District, including Tampa Bay, as well as the ongoing (at the time) Charlotte Harbor consultation. The COE declined NMFS' invitation on June 28, 1999 noting that it did not believe a regional Opinion was necessary given the few dredging projects within the Jacksonville District, and the relatively large numbers of years between maintenance dredging projects in Tampa Bay. NMFS still believes that a Regional Biological Opinion for all Jacksonville District hopper dredging projects, including navigation channel maintenance dredging and beach renourishment dredging of borrow areas, is appropriate. One of the terms and conditions of the Estero/Gasparilla Islands borrow area hopper dredging Opinion currently in preparation will be to request site information and dredging frequency schedules on planned future borrow area hopper dredging throughout the Jacksonville District including the west coast of Florida.

Please contact Mr. Eric Hawk at the telephone number listed above if you have any questions or if we may be of assistance.

Sincerely,

Katherine M. for

Charles A. Oravetz
Assistant Regional Administrator
Protected Resources Division

cc: F/SER4 - A. Mager
F/PR3

o:\section7\informal\lee-co
File: 1514-22 f.1. FL

STATE OF FLORIDA
DEPARTMENT OF COMMUNITY AFFAIRS
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JEB BUSH
Governor

STEVEN M. SEIBERT
Secretary

October 23, 2000

Mr. James C. Duck
Department of the Army
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

RE: Department of the Army - Draft Environmental Impact Statement for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, Lee County, Florida
SAI: FL9903150164CR

Dear Mr. Duck:

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 Florida Fish and Wildlife Conservation Commission (FWC) notes that impacts to listed species and fisheries habitats should be avoided and minimized to the greatest extent possible. Subsequent unavoidable impacts should be mitigated. Matters of timing and methods of beach renourishment should be coordinated with the FWC and the U.S. Fish and Wildlife Service to protect sea turtles, shorebirds, and manatees. FWC recommends the adoption of Alternative A, beach renourishment without the terminal groin on Estero Island, as the preferred alternative and recommends that these issues be resolved prior to finalization of the EIS. Please refer to the enclosed FWC comments.

The Department of Environmental Protection (DEP) offers comments regarding the general reevaluation report and draft environmental impact statement. Please refer to the enclosed DEP comments.

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Phone: 850.488.8466/Suncom 278.8466 FAX: 850.921.0781/Suncom 291.0781
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CRITICAL STATE CONCERN FIELD OFFICE
2796 Overseas Highway, Suite 212
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HOUSING & COMMUNITY DEVELOPMENT
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Tallahassee, FL 32399-2100
(850) 488-7956

The Department of State (DOS) notes that, of the twenty-seven targets identified, six are considered to have the highest potential of being associated with a significant cultural resource, while nine target sites have moderate potential. Targets identified as having high or moderate potential are recommended for additional investigations and DOS concurs with this recommendation. Please refer to the enclosed DOS comments.

Based on the information contained in the draft environmental impact statement 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 draft environmental impact statement. 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: Janet Snyder Matthews, Department of State
Bradley Hartman, Fish and Wildlife Conservation Commission
Abdul Hatim, Department of Environmental Protection

Florida Fish and Wildlife Conservation Commission

James L. "Jamie" Adams, Jr. Bushnell
Barbara C. Barsh Jacksonville
Quinton L. Hedgepeth, DDS Miami
H.A. "Herky" Huffman Deltona
Thomas B. Lakeland
David K. Meehan St. Petersburg
Julie K. Morris Sarasota
Tony Moss Miami
Edwin P. Roberts, DC Pensacola
John D. Rood Jacksonville

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

September 23, 1999

OFFICE OF ENVIRONMENTAL SERV
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Ms. Cherie Trainor
Florida State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

RE: SAI #FL99031501164CR, Lee County, Department of the Army -Draft Environmental Impact Statement for the Lee County Beach Erosion Control Project

Dear Ms. Trainor:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission has reviewed the referenced document, and offers the following comments.

Placement of sand on the beach can result in the take of marine turtles, their nests, and hatchlings. Such take must be authorized by the U.S. Fish & Wildlife Service under the Endangered Species Act. This authorization is typically done through a Section 7 consultation between the regulatory agency and the Service, which results in a Biological Opinion containing incidental take. Although the draft EIS document indicates that the Corps has initiated consultation with the U.S. Fish & Wildlife Service, incidental take has not been authorized for this project at this time. Thus, we cannot find this project to be consistent with Florida Statute 370.12, the Marine Turtle Protection Act, until incidental take is granted.

The following additional information is necessary to complete our consistency determination.

1. Please provide sand grain information for the native beach, including gradation analysis and mean grain size.

2. Please provide the Terms and Conditions for authorization of Incidental Take by the U.S. Fish & Wildlife Service.

Thank you for the opportunity to comment on this project. Please call me or Dr. Robbin Trindell at 922-4330 if you have questions or require additional information.

Sincerely,

Brian Barnett, for

Bradley J. Hartman, Director
Office of Environmental Services

BJH/RT
ENV 1-3-2
sai1164cr.wpd
cc: B. Fonferek, ACOE- Jax

Florida Fish and Wildlife Conservation Commission

James L. "Jamie" Adams, Jr. Bushnell
Barbara C. Barsh Jacksonville
Quinton L. Hedgepeth, DDS Miami
H.A. "Herky" Huffman Deltona
Thomas B. K. Lakeland
David K. Meehan St. Petersburg
Julie K. Morris Sarasota
Tony Moss Miami
Edwin P. Roberts, DC Pensacola
John D. Rood Jacksonville

ALLAN L. EGBERT, Ph.D., Executive Director
VICTOR J. HELLER, Assistant Executive Director

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October 21, 1999

Ms. Cherie Trainor, Director
Florida State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Blvd.
Tallahassee, Florida 32399-2100

RE: SAI #FL9903150164CR; U.S. Army Corps of Engineers – Draft Environmental Impact Statement (EIS) for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, Lee County, Florida

Dear Ms. Trainor:

The Office of Environmental Services of the Florida Fish and Wildlife Conservation Commission (FWC) has reviewed the referenced Draft Environmental Impact Statement (EIS) for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, and offers the following comments.

This EIS is an evaluation of alternative projects to address beach erosion issues on developed beach fronts on Gasparilla and Estero Islands. The preferred Alternative D consists of beach renourishment of 2.8 miles of Gasparilla Island Gulf-front, at 7-year intervals over 50 years, from an offshore borrow site; and beach renourishment of 4.7 miles of Estero Island, at 3-year intervals over 50 years, from an offshore borrow site, with the construction of a 240-foot terminal rock groin, 6 feet above mean low water, at the north end of the island. The primary purpose of the project is to prevent storm damage to upland development. The EIS concludes that this preferred alternative will have no significant environmental impacts.

As indicated in Appendix C of the document, there has been no coordination with FWC concerning this project. This contrasts significantly with the excellent coordination by the U.S. Army Corps of Engineers on the Matansas Pass dredging project.

Based on our knowledge of current site conditions, site review, and interagency coordination, we disagree with the findings of the Draft EIS. We believe that the proposed

project has the potential to negatively impact fisheries habitats and listed species, including the Florida manatee, the loggerhead sea turtle, piping plovers, least terns, black skimmers, and brown pelicans.

Impacts to listed species and fisheries habitats should be avoided and minimized to the greatest extent possible. Subsequent unavoidable impacts should be mitigated. Matters of timing and methods of beach renourishment need to be coordinated with the FWC and the USFWS to protect sea turtles, shorebirds, and manatees. We further recommend the adoption of Alternative A, beach renourishment without the terminal groin on Estero Island, as the preferred alternative. This groin would have the potential to eliminate shorebird and turtle nesting habitat by altering sand deposition patterns. We recommend that these issues be resolved prior to finalization of this EIS.

Please call me, or Mr. Jim Beever at (941) 575-5765, if we can be of further assistance.

Sincerely,

Bri Barnett, for

Bradley J. Hartman, Director
Office of Environmental Services

BJH/JWB
ENV 1-5-2
leebeach.sai

cc: Colonel Joe R. Miller
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Mr. David N. Dale
Habitat Conservation Division
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Mr. Jay Slack
U.S. Fish and Wildlife Services
P.O. Box 2676
Vero Beach, Florida 32961-2676

Ms. Kim Dryden
U.S. Fish and Wildlife Service
Office of Ecological Services
Southwest Florida Suboffice
3860 Tollgate Boulevard, Suite 300
Naples, Florida 34114

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

October 26, 1999

Cherie Trainor
State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

State of Florida Clearinghouse

RE: CEO/Draft EIS for the Lee County Beach Erosion Control Project, Lee County
SAI: FL9903150164CR

Dear Ms. Trainor:

The Florida Department of Environmental Protection (FDEP) has completed its review of the above referenced General Reevaluation Report with Draft Environmental Impact Statement for the Lee County, Florida, Shore Protection Project (Gasparilla and Estero Islands) and provides the following comments:

1) *Nearshore hardground resources.* The information provided in the Draft EIS on hardground resources does not provide reasonable assurance that impacts will be avoided. The following information is necessary in order to complete our consistency review:

   a) *Detailed maps.* Figure 3 is too small to evaluate the extent of hardbottom areas. Drawings should be revised to a larger scale.

   b) *References and data collection methods.* All hardbottom resource maps and other should be dated and describe data collection methods and information sources. Resource maps should be based on the most recent data available and confirmed by diver verification. The Draft EIS should describe the results of each side-scan and biological survey.

   c) *Equilibrium toe of fill.* The Engineering Design section of the report (Appendix A) depicts an equilibrium toe of fill which extends approximately 1,000-ft. seaward of MHW. The Draft EIS only describes resources within 250-ft. of MHW. All nearshore areas within at least the 1,000-ft. equilibrium toe of fill should be adequately described and quantified.

d) *Borrow area hardgrounds.* Page 28 of the General Reevaluation Report states that Gasparilla Borrow Area #1 "will not be used due to the location of environmental resources". This implies that the project has been modified to avoid impacts. The hardground resources associated with the borrow areas are not described in the Draft EIS. Side-scan sonar, underwater mapping, underwater visual verification, and other data and reports should be referenced in the Draft EIS to adequately document the extent of all resources in the vicinity of the borrow areas. Project modifications to avoid impacts (i.e. buffer zones, pipeline corridors, etc.) should be fully described.

e) *Additional background information.* The Boca Grande Pass maintenance dredging permit issued on February 24, 1992 (Permit No. 36-153334-9) included beach disposal of dredged material within the same limits as the proposed Gasparilla Beach nourishment project. Records indicate that side-scan sonar survey information identified patchy hardbottom outcrops within the project limits in the vicinity of the USCG lighthouse. To offset the loss of the hardbottom resources due to direct burial, a 0.6 acre artificial hardbottom area was constructed in 1993. The Draft EIS should include a historical description of the hardbottom outcrops and the mitigation that was constructed to offset impacts. The fill limits of the Boca Grande maintenance dredge disposal area should be compared with the proposed Gasparilla beach restoration project. Project specifications should avoid placement of any fill which exceeds the boundaries of the previously permitted hardground impacts.

f) *Artificial reef location.* The location of the 0.6 acre nearshore artificial reef constructed during 1993 (as mitigation for direct burial of hardbottom from beach disposal of Boca Grande Pass maintenance dredged material) should be depicted on the project drawings.

2) *NMFS terms and conditions.* The terms and conditions included in the NMFS consultation letter dated May 26, 1999 are not included in the Draft EIS (Section 4.22). The EIS and the draft plans and specifications should be revised to include these conditions.

3) *USFWS terms and conditions.* The Draft EIS does not reference a USFWS Biological Opinion. Consultation with the USFWS should be conducted. The final EIS should contain the terms and conditions from the most recent Biological Opinion.

4) *Cultural resources.* Final consultation with the State Historic Preservation Officer (SHPO) should be conducted to determine appropriate construction measures to protect the cultural resources identified during the 1999 diver investigations.

5) *Groins and groin remnants.* The draft EIS notes the existence of groins and groin remnants at several locations within the project limits. The department has concerns regarding any

structure which serves no public purpose, which is dangerous to or any way endangers human life, health, or welfare, or which proves to be undesirable or become unnecessary. Such groins have been removed during the construction of other federally-authorized beach restoration projects in Florida when deemed to have a potential adverse impact on the coastal system in accordance with Chapter 161, Florida Statues. An additional concern related to the creation of a public safety hazard by the partial burial of a derelict groin that was formerly clearly visible on the eroded beach. Pursuant to section 373.414, Florida Statue, the department shall require the applicant to provide reasonable assurance that the activity is not contrary to the public interest. In determining whether an activity is not contrary to the public interest the department shall consider and balance whether the activity will adversely affect the public health, safety, or welfare or the property of others. To complete the review and determine consistency with the applicable Florida Statues additional information regarding the groins and groin remnants is needed. Specifically, the location, condition, size and elevation of each groin and its functionality after construction of the beach fill. A plan should be provided which clearly identifies all structures to be removed.

6) *Storm water discharge Structures.* The document does not discuss whether storm water discharge occurs on, over or through the beach within the project area. Storm water discharge structures have been modified or removed during the construction of other federally-authorized beach restoration in Florida in order to avoid potential adverse impact on the coastal systems in accordance with Chapter 161, Florida Statue. Modification or removal may require authorization pursuant to Chapter 373, Florida Statue, and compliance with applicable storm water treatment standards. To complete review and determine consistency with applicable Florida statues additional information regarding storm water discharge structures and flows is needed. A plan should be provided which clearly identifies all structures and actions to be taken.

The Department appreciates the opportunity to review this draft environmental impact statement. If I may be of further assistance, please contact me at (850) 487-2231.

Sincerely,

Abdul Hatim
Environmental Specialist
Office of Legislative and Governmental Affairs

ah/

cc: Paden Woodruff- Beaches and Coastal Systems
Mark Latch- Recreation and Parks

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
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Katherine Harris
Secretary of State

DIVISION OF HISTORICAL RESOURCES

Ms. Cherie Trainor
State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

October 14, 1999

OCT 28 1999
State of Florida Clearinghouse

RE: DHR Project File No. 996536
Cultural Resource Assessment Request
SAI# FL9903150164CR
Draft Environmental Impact Statement for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands.
Lee County, Florida

Dear Ms. Trainor:

In accordance with the provisions of Florida's Coastal Zone Management Act and Chapter 267, *Florida Statutes*, as well as the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the referenced projects for possible impact to historic properties listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical or architectural value.

We have reviewed the referenced draft environmental impact statement. A review of our files indicates that the borrow areas have previously been reviewed by this office in March 1999 (DHR #991351). It was our recommendation then and still is, that of the twenty-seven targets identified, six are considered to that the highest potential of being associated with a significant cultural resource. Nine target sites have moderate potential, and the remaining are considered to have a low potential of being associated with a cultural resource. Targets identified as having high or moderate potential are recommended for additional investigations. We concur with these recommendations. At this time we have not yet received any additional information or survey report concerning the diver investigations for the fourteen targets. Therefore, this office is unable to provide any comments on sections 3.8 and 4.6, both dealing with historic properties.

If you have any questions concerning our comments, please contact Scott Edwards, Historic Preservation Planner, at 850-487-2333 or 800-847-7278.

Sincerely,

Laura A. Kammerer

for Janet Synder Matthews
State Historic Preservation Officer

JSM/Ese

xc: Jasmin Raffington, FCMP-DCA

COUNTY: Lee

Message:

DATE: 09/01/1999
COMMENTS DUE-2 WKS: 09/15/1999
CLEARANCE DUE DATE: 10/15/1999
SAI#: FL9903150164C

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPB POLICY UNITS
Agriculture Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm Marine Fisheries Commission X OTTED State Transportation	South Florida WMD	Environmental Policy/C & ED RECEIVED SEP 08 1999 State of Florida Clearinghouse

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evalutation and is categorized as 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 - Draft Environmental Impact Statement for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, Lee 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: OTTED

Reviewer: M Blakeslee

Date: Sept 3 1999

COUNTY: Lee

Message:

DATE: 09/01/1999
COMMENTS DUE-2 WKS: 09/15/1999
CLEARANCE DUE DATE: 10/15/19
SAI#: FL9903150

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPB POLICY UNITS
X Agriculture Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm Marine Fisheries Commission OTTED State Transportation	South Florida WMD	Environmental Policy/C & ED

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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_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.

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___ 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 - Draft Environme. Impact Statement for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, Lee 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 of Forestry
Forest Resource Planning
& Support Services Bureau
3125 Conner Blvd., Mail Stop C23
Tallahassee, FL 32399-1650

Division/Bureau: _____

Reviewer: _____

Date: 9-14-99

COUNTY: Lee

Message:

DATE: 09/01/1999
COMMENTS DUE-2 WKS: 09/15/1999
CLEARANCE DUE DATE: 10/15/1999
SAI#: FL9903150164

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPB POLICY UNITS
Agriculture Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm Marine Fisheries Commission OTTED State X Transportation	South Florida WMD	Environmental Policy/C & ED Rec'd at DOT 9/7/99

RECEIVED
SEP 17 1999
State of Florida Clearinghouse

The attached 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 - Draft Environmental Impact Statement for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, Lee County, Florida.

Cherie Trainor

To: **Florida State Clearinghouse**
Department of Community Affairs
2555 Shumard Oak Boulevard
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(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:
Florida Department of Transportation
District One - Southwest Area Office
P.O. Box 1030
Fort Myers, FL 33902-1030

Division/Bureau:

Reviewer: J. Philips / R. Slayback

Date: 9-15-99

FAXED 9-15-99

COUNTY: Lee

Message:

DATE: 09/01/1999
COMMENTS DUE-2 WKS: 09/15/1999
CLEARANCE DUE DATE: 10/15/1999
SAI#: FL9903

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPB POLICY UNITS
Agriculture Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm Marine Fisheries Commission OTTED State Transportation	South Florida WMD	X Environmental Policy/C & ED

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Sep 8 1999

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State of Florida Clearinghouse

The attached 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 - Draft Environm. Impact Statement for the Lee County Beach Erosion Control Project - Gasparilla and Estero Islands, Lee 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

- [ ] No Comment/Consistent
- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

From:
Division/Bureau: OPB / Env.
Reviewer: Carliane Johnson
Date: 10-22-99

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

OCT 28 1999

Mr. James Duck
Chief, Planning Division
Jacksonville District, Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232
Attention: Ms. Yvonne Haberer

Subject: Draft Environmental Impact Statement (DEIS) for the Lee County, Florida, Shoreline Erosion Protection Project, Gasparilla and Estero Islands

Dear Mr. Duck:

Under the authority of Section 309 of the Clean Air Act and Section 102 (2)(C) of the National Environmental Policy Act (NEPA), EPA, Region 4 has reviewed the subject document, an evaluation of the consequences of placing approximately 1,000,000 and 800,000 cubic yards of beach quality sand along the shorelines of Estero and Gasparilla Islands, respectively. The recommended plan also calls for construction of a terminal groin to stabilize the deposited sand at the northern end of Estero. Both segments will use initial construction and maintenance material obtained from offshore sites. Because Estero Island is so distant (16 miles) from the currently proposed borrow site, a hopper dredge will probably have to be employed to transport the material to offshore pump-out equipment for subsequent translocation to the beach. The local sponsor is in the process of seeking alternative borrow sites which are closer in order to lessen project costs. When/if that occurs, these new sites will need to be assessed by involved state/federal parties. On the other hand, the borrow area for the Gasparilla Island segment is much more proximate (3000'); hence, hydraulic pipeline equipment will be used for direct beach placement.

While the information provided about nourishing the subject beaches does not signal any obvious unacceptable environmental problems, the U.S. Fish and Wildlife Coordination Act Report (CAR) which normally details the ramifications of these type actions is not contained in the document. As a result of staff contacts, we understand that the CAR was unavoidably delayed, but will be accessible for assessment in the final document. Therefore, a rating of EC-2 has been assigned. That is, the information in the CAR will need to be examined to resolve that this renourishment project will, in fact, not result in unacceptable environmental impacts to nearshore habitats/activities, e.g., sea turtle nesting or adjacent hardbottom communities.

If you wish to discuss this matter in the meanwhile, Dr. Gerald Miller (404-562-9626) will serve as initial point of contact.

Sincerely,

Heinz J. Mueller, Chief
Office of Environmental Assessment

MEMORANDUM

South District

Date: October 8, 1999

To: James C. Duck, Chief, Planning Division,
U.S. Army Corps of Engineers

Though: Lucianne Blair, Program Administrator
Submerged Lands and Environmental Resources Program

Though: Mark Miller, Environmental Manager
Submerged Lands and Environmental Resources Program

From: John Armor, Environmental Specialist
Submerged Lands and Environmental Resources Program

Subject: Comments on the draft EIS for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands

Dear Mr. Duck,

Thank you for the opportunity to comment on the Draft EIS for the Lee County Beach Erosion Control Project for Estero and Gasparilla Islands. Our comments focus on three important areas of the document. First, we are concerned with the effects the project will have on the water quality of both the borrow and deposition site. We are also concerned with the impacts of the project to hard bottom communities and the associated natural resources. Finally, we would like to offer our opinion that the correct form of proprietary authorization should be a public easement rather than a consent of use.

Section 62-302, Florida Administrative Code (F.A.C.) allows for a maximum turbidity level of 29 NTUs above natural background conditions outside an approved mixing zone. According to the draft EIS, a variance may be applied for to relieve this restriction. We have concerns that if a variance is granted to temporarily degrade water quality, that the effects of any generated turbidity may be severe and extensive. We would like to suggest that best management practices be used to the fullest extent practicable in an attempt to both limit the size of the mixing

zone and the level of turbidity that is generated. These precautions should be taken at the borrow and deposition sites and should remain in place until such generated turbidity has subsided.

We are also concerned with the impacts the project may have on hard bottom areas within or close to the project area. The draft EIS does not seem to adequately address potential impacts that may result from the deposition of sand on hard bottom communities or impacts from the borrowing devises. In addition, no map of hard bottom communities is provided for the borrow areas or for the Estero deposition site. The map of hard bottom communities off Gasparilla Island is of too small scale to sufficiently illustrate the extent and location of these areas. The sections of the draft EIS that address hard bottom communities do not explain the methods by which the hard bottom communities were located.

Lastly, it appears as though the borrow sites are on land owned by the Board of Trustees of the Internal Improvement Trust Fund (BOT) by virtue of sovereignty and therefore Chapter 253, F.S. and Section 18-21, F.A.C. should apply. Chapter 18-21.005(1)(d)7, F.A.C. requires that a public easement be obtained from the Florida Department of Environmental Protection as Staff to the BOT for borrow areas in association with beach renourishment projects. The deposition sites should qualify for a consent to use sovereign submerged lands pursuant to 18-21.005(1)(a)7, F.A.C.

Once again, we would like thank you for the opportunity to comment on the draft EIS. I hope you find our comments helpful. If you should have any questions about our comments place do not hesitate to call me at (941) 332-6975 (extension 193).

AUG 12 1996

Planning Division
Environmental Branch

TO WHOM IT MAY CONCERN:

The Jacksonville District, U.S. Army Corps of Engineers is conducting a study to address measures for providing hurricane and storm damage protection along the shoreline of Gasparilla and Estero Islands, Lee County, Florida. The Lee County Shore Protection Project was authorized by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. Captiva Island was included in this authorization and has already been constructed.

As shown on the enclosed map, Gasparilla and Estero Islands are barrier islands located on the west coast of Florida in Lee County. Alternatives being considered for Gasparilla Island include no action, beach restoration, revetment, and terminal groin. Alternatives for Estero Island include no action, beach restoration, and terminal groin.

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 of comment or inquiry should be addressed to the letterhead address to the attention of Planning Division, Environmental Coordination Section and received by this office within thirty days of the date of this letter.

Sincerely,

GEORGE M. STRAIN
Acting Chief, Planning Division

Enclosure

bcc:

CESAJ-DP-I

Hammond/CESAJ-PD-ER/2389/mw
Dugger/CESAJ-PD-ER
Smith/CESAJ-PD-E
Strain/CESAJ-PD-P
Salem/CESAJ-PD

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Planning Division
Environmental Branch

MAR 10 1999

TO WHOM IT MAY CONCERN:

This references the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands.

Enclosed is a copy of the Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement(DEIS). The original NOI was published in the Federal Register on November 10, 1998. Please note that the estimated date for availability of the DEIS has been changed to on or about April 30, 1999.

We invite your participation and welcome your views, comments, and information regarding important features within the described study area. Letters of comment or inquiry should be addressed to the letterhead address to the attention of Planning Division, Environmental Coordination Section.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

bcc: CESAJ-DP-I
CESAJ-OC

Bauer/CESAJ-PD-ER/3271/als als 3/9/99
Dugger/CESAJ-PD-ER
Smith/CESAJ-PD-E
Duck/CESAJ-PD

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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
Planning Division
Environmental Branch

MAR 10 1999

TO WHOM IT MAY CONCERN:

This references the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands.

Enclosed is a copy of the Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement(DEIS). The original NOI was published in the Federal Register on November 10, 1998. Please note that the estimated date for availability of the DEIS has been changed to on or about April 30, 1999.

We invite your participation and welcome your views, comments, and information regarding important features within the described study area. Letters of comment or inquiry should be addressed to the letterhead address to the attention of Planning Division, Environmental Coordination Section.

Sincerely,

EP Rasach, for
James C. Duck
Chief, Planning Division

Enclosure

[Federal Register: November 10, 1998 (Volume 63, Number 217)]
[Notices]
[Page 63034-63035]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr10no98-48]

DEPARTMENT OF DEFENSE

Corps of Engineers, Department of the Army

Intent To Prepare a Draft Environmental Impact Statement (DEIS) for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands, Lee County, Florida

AGENCY: U.S. Army Corps of Engineers, Department of Defense.

ACTION: Notice of intent.

SUMMARY: The Jacksonville District, U.S. Army Corps of Engineers intends to prepare a Draft Environmental Impact Statement for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands, Lee County, Florida.

FOR FURTHER INFORMATION CONTACT:
Kenneth Dugger, 904-232-1686, Environmental Branch, Planning Division, P.O. Box 4970, Jacksonville, Florida 32232-0019.

SUPPLEMENTARY INFORMATION: The Beach Erosion Control Project for Lee County, Florida, was authorized in accordance with recommendations of the Chief of Engineers in House Document number 91-393, under the provisions of Section 201 of the Flood Control Act of 1965 enacted by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The authorization provides for Federal participation in beach restoration and periodic nourishment along portions of the Gulf shore of Lee County. Captiva Island was included in this authorization and has been constructed. The proposed action consists of a protective beach, estimated berm width of up to 120 feet, along 2.7 miles of shore on Gasparilla Island, and 4.6 miles on Estero Island. The borrow site for Estero Island has an area of 1.59 square miles, and is located in the Gulf approximately 1.5 miles southwest of Sanibel Island. The borrow site for Gasparilla Island has an area of 2.8 square miles, and is located in the Gulf just north of Boca Grande Pass.

Alternatives: Alternatives considered include no action, non-structural measures, the construction of revetments, perched beaches, breakwaters, beach fills of varying widths, construction of submerged near-shore berms, beach fill transitions, and a beach fill/groin combination. Alternative sand sources in addition to the use of the proposed borrow area for nourishment, include the use of other local offshore sand sources, the use of other sand sources such as upland sources, Bahamian sand, other foreign sands, or other distant sources.

Issues: The EIS will consider impacts on hardbottom communities, protected species, shore protection, health and safety, water quality, aesthetics and recreation, fish and wildlife resources, cultural resources, energy conservation, socio-economic resources, and other impacts identified through scoping, public involvement, and interagency coordination.

Scoping: A scoping letter was sent to interested parties on August

12, 1996. In addition, all parties are invited to participate in the scoping process by identifying any additional concerns on issues, studies needed, alternatives, procedures, and other matters related to the scoping process. At this time, there are no plans for a public scoping meeting.

Public Involvement: We invite the participation of affected Federal, state and local agencies, affected Indian tribes, and other interested private organizations and parties.

Coordination: The proposed action is being coordinated with the U.S. Fish and Wildlife Service (FWS) and the National Marine Fisheries Service under Section 7 of the Endangered Species Act, with the State Historic Preservation Officer, and with the FWS under the Fish and Wildlife Coordination Act. A request and scope of work for a Fish and

[[Page 63035]]

Wildlife Coordination Act Report was forwarded to FWS on October 20, 1998.

Other Environmental Review And Consultation: The proposed action would involve evaluation for compliance with guidelines pursuant to Section 404(b) of the Clean Water Act; application (to the State of Florida) for Water Quality Certification pursuant to Section 401 of the Clean Water Act; certification of state lands, easements, and rights of way; and determination of Coastal Zone Management Act consistency.

DEIS Preparation: It is estimated that the DEIS will be available to the public on or about January 13, 1999.

Dated: October 28, 1998.

Michael A. Moore,

Lieutenant Colonel, U.S. Army Acting Chief, Planning Division.

[FR Doc. **98-30085 Filed** 11-9-**98**; 8:45 am]

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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

Planning Division
Environmental Branch

AUG 30 1999

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 Draft Environmental Impact Statement (DEIS) for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands.

Any requests for copies should be directed to Ms. Yvonne Haberer at the letterhead address, or phone 904-232-1701, or fax 904-232-3442. The text of the DEIS can be found on our Environmental Documents web page at http://www.saj.usace.army.mil/pd/env-doc.htm. Copies of the DEIS are also available for public review at the following libraries: 1) Ft. Myers-Lee County Public Library, 2050 Lee Street, Ft. Myers, Florida 2) Johann Fust Community Library, Gasparilla Road & 10th Street, Boca Grande, Florida.

Sincerely,

James C. Duck

James C. Duck
Chief, Planning Division

MAILING LIST
FOR REPORT/EIS

REGIONAL DIRECTOR
FEMA INSURANCE & MITIGATION DIV
3003 CHAMBLEE-TUCKER ROAD
ATLANTA GA 30341

NATIONAL MARINE FISHERIES SERVICE
OFFICE OF MARINE REC FISHERIES
WASHINGTON DC 20235

US DEPARTMENT OF AGRICULTURE
THE NATURAL RESOURCES CONSERVATION SERVICE
1001 E BAKER STREET SUITE 403
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FIELD SUPERVISOR
U S FISH AND WILDLIFE SERVICE
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MR HEINZ MUELLER
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CHIEF, SOUTH FLORIDA OFFICE
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CAPTIVA FL 33924

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SOUTH FLORIDA WATER MGMT DIST
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SENATOR TOM ROSSIN
DISTRICT 35
2120 MAIN ST STE 206
FT MYERS FL 33902

REPRESENTATIVE LINDSAY HARRINGTON
DISTRICT 72
SUITE 2110, 115 TAMIAMI TRAIL
PUNTA GORDA FL 33950-3600

REPRESENTATIVE BRUCE KYLE
DISTRICT 73
2120 MAIN STREET, SUITE 208
FT MYERS FL 33901-3010

REPRESENTAIVE GREG GAY
DISTRICT 74
SUITE 307, 3501 DEL PRADO BLVD
CAPE CORAL FL 33904

REPRESENTATIVE CAROLE GREEN
DISTRICT 75
15248 SOUTH TAMIAMI TRAIL, SUITE 200
FT MYERS FL 33908-4207

APPENDIX D

FISH AND WILDLIFE COORDIANTION ACT REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

March 2, 2000

Joe R. Miller
District Engineer
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Attn: Planning Division

Dear Colonel Miller:

In accordance with Fiscal Year 1999, Transfer Fund Agreement between the Fish and Wildlife Service (Service) and the Jacksonville District Corps of Engineers (Corps), this represents the Final Fish and Wildlife Coordination Act Report on the Lee County, Florida, Beach Erosion Control Project at Gasparilla and Estero Islands. The Corps has requested an evaluation of the environmental effects of nourishing 4.7 miles of beaches along the coastline of Estero Island and 2.8 miles of Gasparilla Island. A different borrow site would be used for each project segment. This information is needed to enable the Corps to reformulate and evaluate the authorized project to assure that it conforms to current environmental needs and criteria.

Copies of this report were furnished to the Florida Fish and Wildlife Conservation Commission (FWC) and the National Marine Fisheries Service (NMFS). No comments were received from the FWC. A letter from NMFS concurring with the findings of the Draft Fish and Wildlife Coordination Act Report is included as an attachment to this final report.

Sincerely yours,

James J. Slack
Project Leader
South Florida Ecological Services Office

cc:
FWC, Punta Gorda, FL
NMFS, Panama City, FL
DEP, Beaches and Coastal Systems, Tallahassee, FL (Attn: Keith Mille)

FINAL
FISH AND WILDLIFE COORDINATION ACT REPORT

LEE COUNTY, FLORIDA
SHORE PROTECTION PROJECT

PREPARED BY:
U.S. Department of the Interior
Fish and Wildlife Service
Vero Beach, Florida

FEBRUARY 2000

Gasparilla and Estero Islands,
Lee County
Beach Renourishment Project

Final
Fish and Wildlife
Coordination Act Report

Submitted to Jacksonville District
U.S. Army Corps of Engineers
Jacksonville, Florida

Prepared by: Charles W. Sultzman, Project Biologist
Approved by: Thomas E. Grahl, Assistant Field Supervisor

U.S. Fish and Wildlife Service
Vero Beach, Florida
South Florida Field Office

February 2000

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EXECUTIVE SUMMARY

The Army Corps of Engineers has requested a Fish and Wildlife Coordination Act Report from the Fish and Wildlife Service regarding the environmental impacts of a proposed beach nourishment project in Lee County, Florida. Two borrow sites will be used for the project. The borrow site for the Gasparilla Island segment is located approximately 3,000 feet offshore of the south end of Gasparilla Island. The borrow site for the Estero Island segment is located approximately 16 miles west of the Island. The fill is reported to contain approximately seven percent silt and clay. Some rock outcrops have been reported from the Estero borrow area.

Aerial photographs provided to the Service by the Corps show that there are rock outcrop reefs immediately offshore of the beaches proposed for nourishment at Gasparilla Island. A portion of the Gasparilla Island segment was nourished in 1993 with material obtained from maintenance dredging of Boca Grande Pass. Some of the reefs in the approximated middle of the deposition area were buried by the fill and a small artificial reef was constructed outside the toe of fill, just offshore of the natural reef to compensate for its loss. Some of the natural reef remains exposed above the seafloor. Service observations indicate that approximately 0.1 acres of the mid-project nearshore reef is present within the fill area. No additional mitigation is recommended for the mid-project reef area.

Our observations show that there is approximately two acres of surfzone reef at the northern end of the Gasparilla Island segment. This reef provides habitat for a community of fishes and invertebrates and is easily accessible to snorkelers. The Service recommends that an artificial reef of equal acreage be built in an equally accessible area to mitigate for the loss of this natural reef.

Black skimmers, a migratory shorebird, nests in the southern portions of the Gasparilla Island segment. The Service recommends that fill deposition south of R-17 within this segment be scheduled to occur outside the shore bird nesting season (April 1 to August 30).

A Biological Opinion dated September 29, 1999, was prepared by the Service addressing project effects on threatened and endangered sea turtles. The Opinion, provided as an attachment to this report, concluded that the project is not likely to jeopardize the continued existence of any threatened or endangered sea turtle species. Fill deposition accompanied by sea turtle nest relocation would result in incidental take if summer construction is necessary. If winter dredging is possible, adverse effects on sea turtles would be minimized. Leveling and tilling of the beach prior to the following nesting season are listed among the terms and conditions of the Biological Opinion.

I. INTRODUCTION

Nourishment of the Gulf Coast shoreline of Lee County was authorized under the provisions of section 201 of the Flood Control Act of 1965 and enacted by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The project providing erosion control measures for Gasparilla Island, Captiva Island, and Estero Island is described in House Document 91-395. The Captiva Island segment has been constructed. A General Reevaluation Report with Draft Environmental Impact Statement for nourishment of the Gasparilla Island and Estero Island segments was distributed for review by the Army Corps of Engineers (Corps) in August 1999.

II. PROJECT DESCRIPTION

The project includes deposition of sand over a 2.8-mile reach of shoreline along Gasparilla Island between Florida Departmenrt of Environmental Protection (DEP) monuments R-11 and R-24. The northern project boundary tapers into the existing shoreline, extending the total project length an additional 600 feet. The taper at the southern end of the project is 1,400 feet long. The 20-foot wide berm would have an elevation of +5 mean low water (mlw), sloping at 1V:15H toward mlw. Below mlw, the slope would be 1V:25H. The equilibrium toe of fill would extend approximately 1000 feet beyond the existing mlw. Approximately 803,000 cubic yards (cy) of sand would be obtained from a borrow area located 3,000 feet offshore. The average silt/clay fraction (<0.074mm diameter) of the material is 3.3 percent.

The project also includes construction of a protective beach along the 4.7-mile reach of shoreline on Estero Island from DEP monument number R-175 to R-198. A tapered 1,800-foot long transition section is also included at the south end. The 40-foot wide berm would have an elevation of +5 feet mlw and slope down toward mlw at 1V:25H. Below mlw, the slope would be 1V:35H. After construction, the equilibrium toe of fill would extend approximately 1000 feet offshore from existing mlw. Approximately 1,023,000 cy of sand would be obtained from a borrow area located approximately 16 miles offshore of Estero Island. The average silt/clay content of the source material is reported to be 7.4 percent. A 240-foot long terminal groin is proposed to be constructed at the northern tip of Estero Island to reduce end losses.

III. DESCRIPTION OF STUDY AREA

Lee County is located on the Gulf coast of central Florida (see Figure 1). Gasparilla and Estero Islands are located, respectively, north and south of the mouth of the Caloosahatchee River which empties into the Gulf of Mexico near Sanibel Island. Gasparilla Island is a barrier island between Charlotte Harbor and the Gulf. Estero Island lies between the Gulf

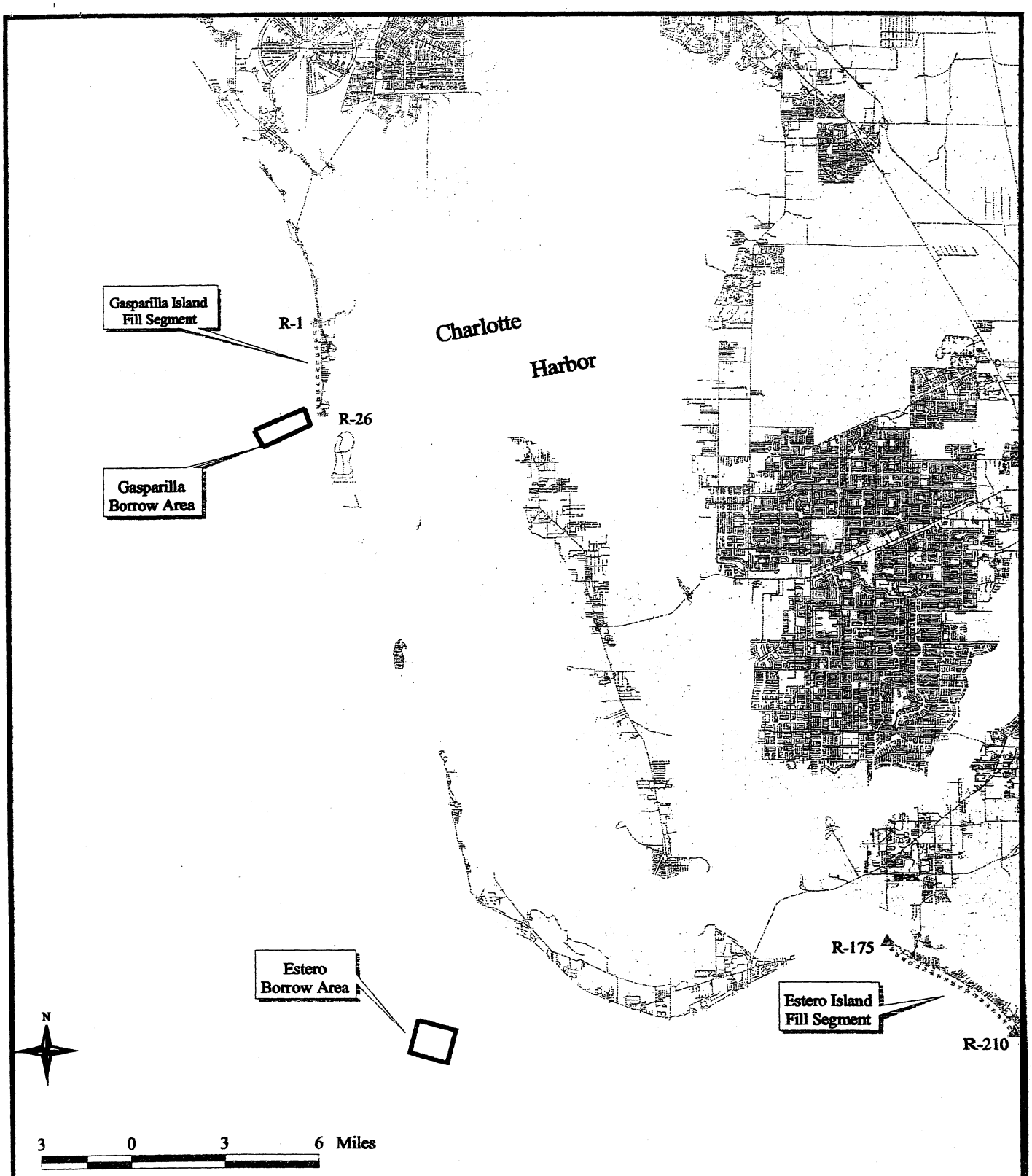

Figure 1. Lee County Beach Project limits and vicinity.

and the narrow waterway, Estero Pass. Gasparilla Island is located in the northernmost part of the county and is developed primarily with low density single family homes. Except for Gasparilla Island State Recreation Area property, located southward from R-17, these residences line the beaches adjacent to the project area. The shoreline along many of these residences has been armored with seawalls and riprap. The town of Boca Grande is located in the center of the island.

Estero Island lies in the approximate center of Lee County, 25 miles south of Gasparilla Island and is separated from Gasparilla Island by Sanibel, Captiva, and North Captiva Islands. The town of Fort Myers Beach is located on Estero Island and consists of high density commercial and multifamily residential development. A high percentage of the coastline of Estero island is also armored to protect these developments from storm waves and tides.

IV. FISH AND WILDLIFE RESOURCES

Fish and wildlife habitats in the project area which could be affected by this beach erosion control project include the intertidal beach zone, borrow area, nearshore reefs and the supralittoral beach which serves as nesting habitat for shore birds and two species of sea turtles.

A. Community Descriptions

Intertidal beach zone

The beaches of Lee County are typical of other westcentral Florida beaches which are subject to the full force of ocean waves. These beaches usually have low species diversity, but populations of individual species are often very large. Species such as coquina clams, ghost crabs, annelid worms, mole crabs, and sand drum are highly specialized to survive in this high energy environment.

Florida has approximately 744 miles of beaches, mainly along the shorelines of barrier islands. Wind and waves are constantly changing the shape of barrier islands and their beaches. On the west coast of Florida, there are general patterns of sand transport or littoral drift. During winter, littoral drift is to the south, whereas during summer, the transport of sand may retreat slightly to the north when southeasterly winds prevail. Inlets, especially those with long jetties, inhibit littoral drift. As a result, beaches on the up-drift or north side of these inlets accumulate sand while beaches on the down-drift side are deprived of this sand.

Borrow area

Numerous species of macroinvertebrates inhabit most of the proposed borrow area. These include hydrozoans, bivalves, gastropods, polychaetes, crustaceans, sea cucumbers, brittlestars, etc. Sea Systems Inc. (1998) performed a side scan sonar survey of both borrow areas. A small area in the northwest corner of the Estero Island borrow area produced signatures characteristic of soft corals.

Nearshore reefs

Limestone reefs provide a stationary foothold to which filter-feeding organisms attach themselves. Wind- and wave-generated currents bring nutrient-rich plankton to these filter feeders which can, with sufficient growth, contribute to the basic structure of the reef. This structure provides an array of habitats for other plants and animals. Florida is endowed with several reef types: subtropical coral reefs, live bottom communities, nearshore sabellariid worm (*Phragmatopoma lapidosa*) reefs, vermetid reefs and deep-water ivory tree coral (*Oculina varicosa*) reefs.

Coral reefs are best developed in the U.S. in Florida. Most of the Florida Keys' coral reefs are well known due to the clarity of the water and the popularity of SCUBA diving. Farther north, through Dade and Broward counties on the east coast and Collier County on the west coast, water clarity and temperature decline as do reef-building corals. The solid substrate is increasingly populated by soft corals (gorgonians) in these higher latitudes. Continuing north, soft corals are fewer, and "live bottom" communities are more prevalent. Live bottom communities are populated by sponges, small (ahermatypic) hard corals, tunicates, bryozoans, algae, and sabellariid worms.

Sabellariid worms can dominate the reef community and form a unique reef type known as "worm reef." These are most often formed in high-energy surf zones particularly between Martin and Brevard counties on the east coast. Such reefs are composed of sand particles loosely cemented together by a mucus secreted by the worms when building their casing. *Oculina* reefs occur in depths greater than 100 feet from St. Lucie County to Duval County. Intertidal vermetid reefs off of the Ten Thousand Islands in Collier County are a remnant of structures formed by the reef-building gastropod, *Petaloconchus* sp.

Coquina limestone reefs occur adjacent to and seaward of the project area. One small reef area at the approximate location of R-18 is a remnant of a reef which was buried in 1993 when 400,000 cy of material dredged from Boca Grande Pass was deposited on the adjacent beach (Corps 1999).

Some of the higher relief rock outcrops probably remained exposed after the 1993 project. Thus, not all of the reef habitat within the fill area was buried. Beach erosion continued and may have resulted in the uncovering of additional rock acreage. The results of a Service (Service) survey of the area on August 19, 1999, show that approximately 0.1 acre of rock outcrop reefs remain within the fill area of the currently proposed project at R-18. Aerial photographs provided to the Service by the Corps show that this acreage was approxoimately 1 acre greater in July, 1995, when the photographs were taken.

An additional reef area approximately 2 acres in size was located by the Service in August, 1999. This narrow beachrock reef is located between R-10, in the northern taper of the proposed fill area, and R-12. To our knowledge, this reef area has not been reported in previous studies of Gasparilla Island nearshore habitats. No nearshore reefs are known to occur within the Estero Island fill area.

Supralittoral beach

Approximately 40 percent of all loggerhead nesting occurs in the southeastern United States, primarily in Florida. Florida's west coast beaches function as nesting habitat for threatened loggerhead sea turtles (*Caretta caretta*) and endangered green sea turtles (*Chelonia mydas*).

Thirteen species of birds nest on Florida's beaches. Due to urban development and other human activities, many of these species have abandoned certain areas while some species, such as the least tern (*Sterna antillarum*), have found alternative nesting sites. Ed Krause (Gasparilla Island State Recreation Area, personal communication 1999), has informed us that black skimmers (*Rynchops niger*), which are protected under the Migratory Bird Treaty Act (16 U.S.C. 701 *et seq.*), nest annually on the Gulf shore of Gasparilla Island from the rear range light located at R-17 to the seawall located at the southern limits of the project.

B. Important Species and Taxa

Epibiota

The most abundant and evident producers on the Gasparilla Island reefs are the epibenthic macroalgae. This algae is fed upon by herbivorous fishes and invertebrates. The exposed rock provides stable substrate for these organisms which, through photosynthesis, produces basic organic material on which much of the reef's food web is based. Attached filter feeding organisms also contribute to this organic base.

Fishes and motile invertebrates

In addition to the algal food which grows on the reefs, fish and motile invertebrates are attracted to the basic structure of the reef. The numerous crevices, holes, and undercut ledges provide refuge from larger predatory fish. The reef also provides a barrier to wave action and currents and substrate for the attachment of demersile adhesive eggs.

Sea turtles

The threatened loggerhead sea turtle nests primarily on beaches from North Carolina to Florida. Approximately ninety percent of loggerhead nesting within the U.S. occurs in Florida (Murphy and Hopkins 1984). The highest density nesting beaches in Florida occur from Canaveral National Seashore, Volusia County, south to John U. Lloyd State Recreation Area in Broward county (Conley and Hoffman 1986). Nesting densities vary from less than one nest per km on average for some beaches in the northeast, southeast, and panhandle of Florida to over 600 nests per km on some stretches of beach in south Brevard County (Ehrhart and Witherington 1986). The most recent estimate for total annual nesting effort in the southeastern U.S. is 50,000 to 70,000 nests (National Marine Fisheries Service and Fish and Wildlife Service 1991). The U.S. loggerhead nesting population, one of the two most significant nesting populations in the world, may represent up to 30 percent of the worldwide loggerhead nesting population (Ross 1982). This is in contrast to other sea turtle species where nesting occurs largely outside the U.S. The loggerhead nesting season is from late April to August with most nesting occurring in June and July.

The endangered green sea turtle nests within the U.S. principally along east central Florida beaches. Nesting densities are much lower than for the loggerhead and range from 1-5 nests per km on most beaches within its major nesting range to 13-20 nests per km on high density green turtle nesting beaches in south Brevard County and south Jupiter Island in Palm Beach County (Conley and Hoffman 1986; Ehrhart and Witherington 1986). Much less nesting occurs on Florida's west coast, but nesting activity here is increasing and the green turtle is expanding its nesting range on the west coast. Nesting occurs from May to September with the peak nesting occurring in July and August.

Black skimmers

A close relative to the terns, black skimmers range though out the Gulf of Mexico and Atlantic coasts (Geological Survey 1999). They feed primarily on fish which they capture by lowering their long lower mandible in the water as they fly, skimming up small prey.

Skimmers breed in colonies in coastal areas of Florida from April to August (Coburn 1977) withdrawing to the northern parts of their breeding range in winter. They nest on sandbars, beaches and gravel roofs, usually laying 3-5 eggs and occasionally up to 7 eggs (Kaufman 1996). The eggs, which are whiteish to blue-green with dark brown markings are laid in a shallow scrape on open sandy ground. Incubation lasts 21-23 days (Kaufman 1996). In the previous century skimmer eggs were harvested commercially and adult birds were killed for their feathers, thus depleting their numbers (Kaufman 1996). Skimmers are very sensitive to disturbance within the nesting colony.

V. PREVIOUS PROJECT AREA SURVEYS

In August 1999, the Corps provided the Service with aerial photographs showing the ocean bottom within the beach fill area. The photographs were dated July 8, 1995. One reef area is clearly visible in the aerials and appeared to encompass approximately two acres of seafloor in the vicinity of R-18. A square formation outside of the proposed toe of fill is also visible. We have been informed by Lee County biologist, Steve Boutelle, that this signature represents an artificial reef constructed as mitigation for the 1993 project. Additional signatures resembling scattered rock outcrops are visible in the vicinity of R-10 through R-12; some of these are outside the equilibrium toe of fill.

The Corps also provided the Service with a copy of a side scan sonar survey of the Gasparilla and Estero Island borrow sites (Sea Systems Inc. 1998). The seafloor charts, included in the report, depict several areas of suspected hard bottom within the northwest quadrant of the Estero Island site. This particular chart includes a 500-foot wide buffer zone. Four of the suspected hardbottom areas lie within the buffer zone and two lie within the borrow area. Of the two features located within the borrow area, the Service is particularly concerned about a circular area, 200 feet in diameter labeled, "apparent natural features characteristic of soft corals previously verified in the area by others." The coordinates of this area are: X=426,000 and Y= 752,350.

Reef acreage estimates based on remote sensing alone can be inaccurate. The Service requested that the Corps hire a private contractor to groundtruth the subject hardbottom locations within the fill areas and borrow sites indicated on the aerial photographs and side scan sonar survey chart. In June 1999, the Corps provided the Service with a consultant's report on environmental resources within the beach fill areas and borrow sites (HDR Engineering Inc. 1999). Many of the diver transects (T-1 through T-18) completed in preparing the report are located offshore and north of the proposed equilibrium toe of fill. Ten additional transects, labeled 1 through 10 in figure 4A of the report, were run closer to shore in the "swash channel." All but three of these transects are located north of the

proposed fill area. Within these ten nearshore transects, only drift and attached red and green algae are reported to be present.

Two transects were run within the Estero Island borrow site; both are located in the vicinity of the two areas already identified as a concern to the Service. The areas were reported to support widely scattered sponges and soft corals and no rock outcrops were observed. The Service also requested that the consultant's surveys include depth recordings of the bottom within the Estero Island fill area. This survey was performed in a sawtooth pattern, as requested and no rock outcrop reefs were located.

VI. FISH AND WILDLIFE SERVICE OBSERVATIONS

On August 19, 1999, Chuck Sultzman, Service biologist, and Yvonne Haberer, Corps project biologist, snorkeled two areas within the proposed Gasparilla Island fill area. The rock outcrop reef at R-18 which lies within the proposed equilibrium toe of fill was located. Measurements of the dimensions of the outcrop were taken; and, although the reef area visible in the 1995 aerial photographs was approximately two acres, the area of exposed rock at the time of our field trip amounted to 0.1 acres. The northern portions of the reef had evidently been buried by shifting nearshore sands between July 8, 1995, when the aerials were taken and our August 19, 1999, field trip. The northern limit of the reef was located 400 feet north of R-18 during our field trip, whereas the aerial photographs delimit a reef area extending approximately 1,000 feet north of R-18 to R-17.

In general, the rock outcrops which remain in this area since the 1993 project support few epifaunal organisms. Due to the paucity of marine algae seen and monor contribution to the total biomass of the community its role in the existing ecosystem seems insignificant. No marine algae or other epifaunal organisms were collected during the field trip.

Reef fishes observed on the reef were also low in abundance and diversity. Seven species were seen: the nurse shark (*Ginglymostoma cirratum*), gray snapper (*Lutjanus griseus*), lane snapper (*Lutjanus synagris*), sheepshead (*Archosargus probatocephalus*), belted sand bass (*Serranus subligarius*), white grunt (*Haemulon plumieri*) and slippery dick (*Halichoeres bivittatus*).

The Service and Corps discovered additional reef acreage at the north end of the proposed Gasparilla Island fill area (see photographs in the appendix). This reef lies inshore of the transects 1 through 3 run by HDR (1999), in the surfzone between DEP markers R-10 and R-12. This reef, evidently a persistent feature, is difficult to detect in the 1995 aerial series. The photographs were taken in the early morning and tall trees present on adjacent oceanfront properties cast shadows over the area, obscuring the reef.

It consists primarily of closely spaced limestone outcrop ledges one to two feet in relief and encompasses a total area of approximately two acres. Sand pockets lie between rock outcrops. The width of the total reef, including sand pockets, was measured 10 times at regular intervals along its length. Width measurements ranged from 4 to 72 feet and averaged 40 feet. The length of the reef is approximately 2,200 feet; thus, the total reef area is approximately 88,000 square feet or about two acres. We estimate that this constitutes approximately one fourth of the reef habitat in Lee County which is accessible to snorkelers. Time constraints did not allow us to make a precise length measurement or to measure the percentage of rock outcrop within the overall reef area.

Epibenthic algae dominated the substrate. Epibenthic species collected are listed in Table 1.

Table 1. Marine epibenthos observed on the surfzone reef, Gasparilla Island, R-10 to R-12.

Algae	Invertebrates
Caulerpa racemosa	*Chthamalus* sp. (barnacle)
Caulerpa mexicana	*Dysidea etherea* (heavenly sponge)
Caulerpa sertularoides	
Spatoglossum schroederi	
Bryothamnion triquetrum	
Eucheuma acanthocladum	
Gracilaria sp.	
Enteromorpha lingulata	

Few fish species were seen on August 19, 1999, due to a 3-foot swell which clouded the water and kept many resident reef fish from venturing out of the sheltered recesses of the reef. However, on the morning of August 20, the swell had subsided, the water cleared slightly and although the sky was overcast, reducing visibility, numerous reef fish species were identified (see Table 2.). The most abundant of these was the sheepshead (*Archosargus probatocephalus*). This species, a valued food fish, was present in large numbers. Photographs were taken on August 20; some of these are included in the Appendix.

Table 2. Fish species observed on nearshore reef at Gasparilla Island, August, 1999.

Species	Common name
Abudefduf saxatilils	sergeant major
Stegastes variabilis	cocoa damselfish
Lutjanus griseus	gray snapper
Luthjanus analis	lane snapper
Mycteroperca microlepis	gag grouper
Archosargus probatocephalus	sheepshead
Anisotremus virginicus	porkfish
Chaetodipterus faber	Atlantic spadefish
Sphoeroides testudineus	checkered puffer
Sciaenops ocellata	red fish
Eucinostomus gula	silver jenny
Halichoeres bivittatus	slippery dick
Megalops atlantica	tarpon

VII. DISCUSSION AND MITIGATION

Beach zone

Sandy beaches are populated by small, short-lived organisms with great reproductive potential. In most instances these communities recover quickly from environmental disturbances. The impacts of this beach erosion project on the beach zone fauna will depend primarily on the quality of the nourishment material. Since the sand proposed to be used for this project is of similar composition to the natural beach, recovery of the beach fauna should occur within a few months.

Borrow area.

The infauna and some of the epifauna within the borrow area will be unavoidably lost during dredging. However, this habitat is not unique and the area will likely recover within one year (Courtenay, *et al.* 1974). Motile fauna expected to inhabit this area would include penaeid shrimp, callenectid crabs, flounder and sole. These species should easily avoid the dredge and no adverse effects to them are anticipated.

Sea Systems Inc. (1999) reported signatures of natural features characteristic of soft corals in the northwest quadrant of the Estero Island borrow area. While direct destruction of deep reef fauna near borrow areas is not planned, such destruction has occurred on at least four occasions. During the Sunny Isles, Dade County, renourishment project in 1988, the drag arm

of the dredge ran up onto the reef (Dade County 1988). Unmapped reef areas which protruded into the dredge area were damaged. This also occurred during dredging for the Bal Harbor, Dade County, project; however, the greatest amount of damage during the Bal Harbor project occurred as a result of suspended sediment resettling onto the adjacent reef areas. Of the 7.7 acres surveyed for damages, more than half of the hard coral colonies were killed (Dade County 1990). Similar incidents have been reported from Broward and Palm Beach counties (Paul Davis, Palm Beach County Department of Environmental Resources Management, personal communication, 1998).

Based on this history, it is possible that another incident resulting in direct damage to reef fauna may occur during dredging for the Lee County project. This potential for direct contact between the dredge and the natural features adjacent to the dredge area can be reduced by designing buffer zones between the dredge area and the reefs which are of sufficient size to allow for navigation and positioning errors by the dredge.

Secondary effects caused by dispersion and settling of sediment suspended by dredging are also possible. The establishment of sufficiently large buffer zones and a monitoring program minimize these impacts. Numerous studies have been conducted to assess the effects of dredging on nearby reef epifauna in an attempt to define the appropriate size of buffer zones to prevent these secondary effects (Goldberg 1980, Goldberg 1984). Unfortunately, the diversity of reef epifauna and the variety of responses to sedimentation observed from different taxonomic groups has made these effects difficult to evaluate. For example, flat hard corals are intolerant of silt and may die back within a study area. Conversely, erect soft corals which shed sediment more easily may increase.

Changing currents tend to reduce the effectiveness of buffer zones. A buffer zone may protect reefs up-current, but not offer any protection for down-current reefs. While the current generally flows from north to south in Lee County, current direction can change and even reverse. Finally, the strength of the current plays an important part in determining where suspended sediment will settle. A fixed buffer zone may protect down-current reefs in a weak current but may be ineffective during a strong current.

Nearshore Reef Zone

No nearshore reefs were located by HDR (1999) during their surveys of Estero Island. If these survey results are accurate, no nearshore reef will be lost at the Estero Island segment.

The 0.1 acres of reef which remain at R-18 will also be lost due to fill deposition.

Six tenths of an acre of mitigative artificial reef was constructed out of limestone boulders to offset habitat losses due to the 1993 project. Thirty-four fish species were observed on the artificial reef during monitoring of the site by Lee County on December 3, 1998 and August 20, 1999 (Steve Boutelle, Lee County Department of Marine Services, personal communication 1999). Based on this evidence of its value as mitigation for the 1993 project, the Service has determined that no additional mitigation is required for the reef area which remains within the proposed fill area in the nearshore at R-18.

The nearshore reef located by the Service at the north end of Gasparilla Island is of low relief and within the construction toe of fill. Thus, the immediate effect of the depositing 803,000 cy of fill on Gasparilla Island according to current project plans will be the loss of all of the approximately two acres of nearshore reef. Additional reefs offshore of the fill area, visible in the aerial photographs provided by the Corps, will be degraded by turbidity and sedimentation. At a minimum, the reef acreage buried by the fill should be mitigated.

Supralittoral beach

The project will result in an increase in nesting suitability for endangered and threatened sea turtles. Some adverse effects may still result even if the project is done outside the nesting season. These include:

1. scarp development at the edge of the beach fill, rendering the beach inaccessible to nesting turtles,

2. entrapment of the hatchlings in the vehicle tracks,

3. alterations in moisture levels or other aspects of the microhabitat within the nest cavity,

4. alteration of unknown beach signature components which may disrupt nest site fidelity, and

5. compaction and cementation of beach sediments which causes reduced nesting success (nesting emergences/total emergence x 100), and aberrant nest cavity construction, which in turn can result in broken eggs.

The has indicated that construction of both project segments may require a full year and will require some fill deposition during loggerhead and green turtle nesting season. This will necessitate relocation of all nests located by state-certified sea turtle nest survey and relocation personnel. Nest relocation results in incidental take and the Corps has been

provided a biological opinion (see attachment) listing reasonable and prudent measures necessary to minimize incidental take.

Black skimmers utilize the supralittoral beach for nesting. Deposition of fill on the southern portions of Gasparilla Island in locations where skimmers have been reported nest between April 1 and August 30 will result in the destruction of skimmer nests. Destruction of migratory bird nests is prohibited by the Migratory Bird Treaty Act (16 U.S.C. 701 *et seq.*).

VIII. FISH AND WILDLIFE SERVICE RECOMMENDATIONS

The Fish and Wildlife Service recommends that the following be included in project planning:

1. The Service recommends that the Corps reduce the length of the Gasparilla Island segment of the project by 2,000 feet to avoid burial of the two-acre reef area located between DEP markers R-10 and R-12.

2. If the Gasparilla Island segment cannot be shortened, the Service recommends that an artificial limestone reef of equal surface area be constructed as mitigation. Rock outcrops at the R-10 to R-12 reef are not continuous. Rock outcrop area may be measured in the field by stretching a measuring tape over no less than 20 east-west transects traversing the total reef area and calculating the proportion of the tape which falls on rock outcrop. This proportion, multiplied by the total reef area will be considered by the Service as a reasonable estimate of the rock outcrop area within the reef.

3. To construct a reef of equal surface area, the Service recommends that the rock outcrop area calculated above be halved and a reef with two times the relief as the natural reef (five feet), be constructed within 100 feet of the natural reefs which are visible in 1995 aerial photographs approximately 1,000 feet offshore of R-10. This placement will ensure that the artificial reef is a sufficient distance from the fill area to reduce long term turbidity and sedimentation effects due to the project. It is likely that unexposed bedrock exists near these natural outcrops to provide support for the artificial reef, preventing if from sinking into the sand.

4. The Service recommends that the proposed location of the artificial reef be acoustically profiled to locate supportive bedrock.

5. The Service recommends that the Estero Island borrow area be reconfigured to include a 500-foot buffer area around all areas reported by Sea Systems (1998) to be "natural features." This would entail moving the northern half of the western boundary of the borrow area approximately 1,000 feet to the east.

6. The Service recommends that the beach south of R-17 on Gasparilla Island project be nourished outside of the reported black skimmer nesting season (April 1 through August 30).

7. We recommend that the terms and conditions of our Biological Opinion, dated September 27, 1999 be incorporated into the project plans.

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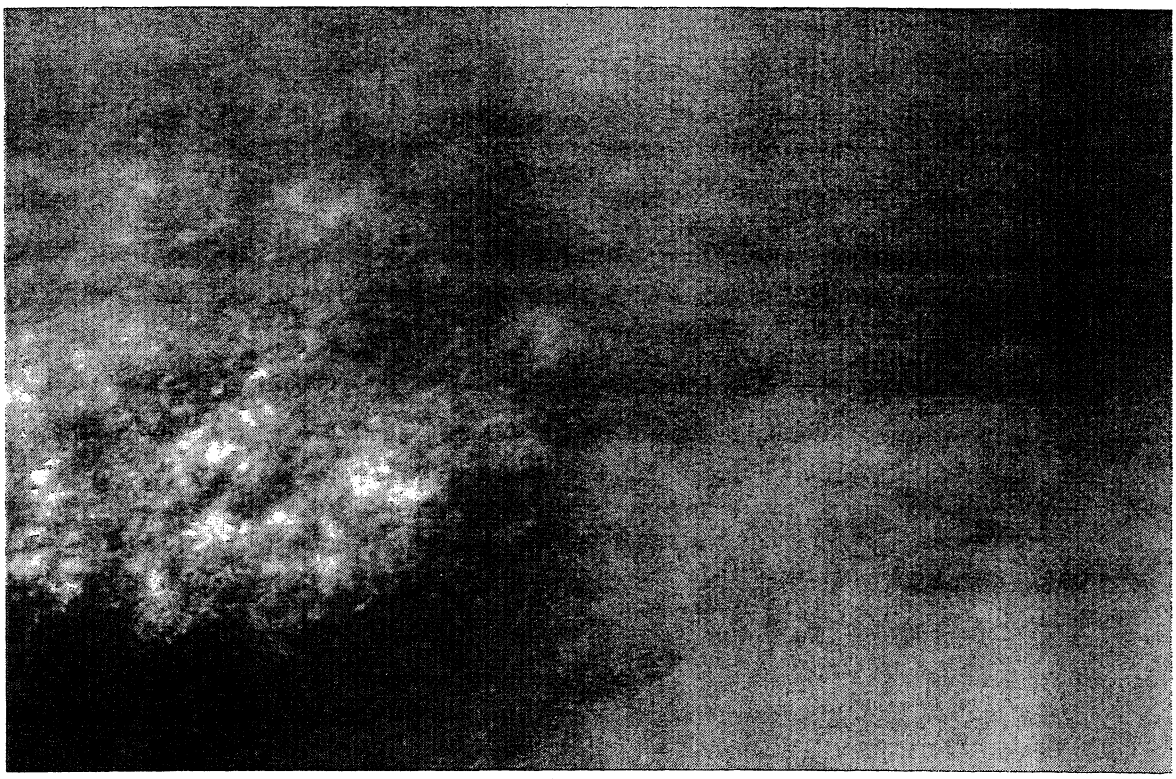
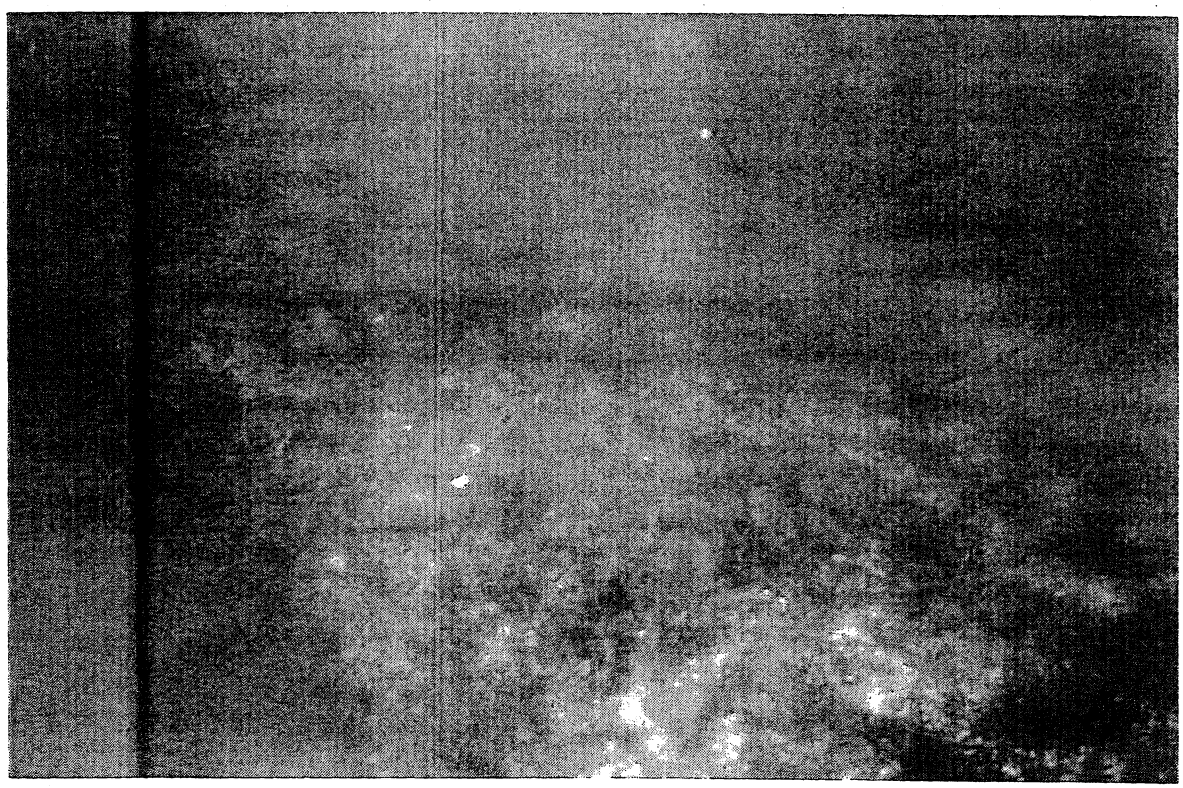
APPENDIX



Gasparilla Island nearshore reef at
R-10 to R-12.



Gasparilla Island nearshore reef.
(Continued)

ATTACHMENTS

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

December 30, 1999

CS

James J. Slack, Project Leader
U.S. Fish and Wildlife Service
South Florida Field Office
P.O. Box 2676
Vero Beach, Florida 32961-2676

Dear Mr. Slack:

The National Marine Fisheries Service (NMFS) has reviewed the Draft Fish and Wildlife Coordination Act Report for the Lee County Shore Protection Project in Lee County, Florida as requested in your letter of November 30, 1999. The NMFS concurs with the findings and recommendations of the Report.

We appreciate the opportunity to provide you with our comments. If we can be of further assistance, please advise. Related comments, questions or correspondence should be directed to Mr. David N. Dale in St. Petersburg, Florida. He may be contacted at 727/570-5311 or at the letterhead address above.

Sincerely,

for Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

cc:
F/SER4
F/SER43

APPENDIX A

ENGINEERING

APPENDIX A

ENGINEERING DESIGN AND COST ESTIMATE
LEE COUNTY, FLORIDA SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT

Prepared For:

U.S. Army Corps of Engineers
Jacksonville District

Prepared By:

Coastal Planning & Engineering, Inc.
Boca Raton, Florida

July 1999

APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATES
LEE COUNTY, FLORIDA SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT

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PROJECT AUTHORITY

A-1. The shore protection project for Lee County, Florida, as described in House Document (HD) 91-395, was authorized by House Resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The authorized project includes shore protection features on Gasparilla Island, Captiva and Estero Islands. The Captiva Island segment of the authorized project has been constructed. This General Re-evaluation Report (GRR) addresses the Gasparilla Island and Estero Island segments of the project only.

Problem Identification

A-2. Segments of Gasparilla Island and Estero Island have been identified as areas for potential shore protection, due to historic erosional trends in these regions and the possibility of future significant storm impacts.

A-3. This study investigates the benefits of beach renourishment of both Gasparilla and Estero Islands, including a terminal groin structure at the north end of Estero Island. Specific aspects of the project proposed are outlined below:

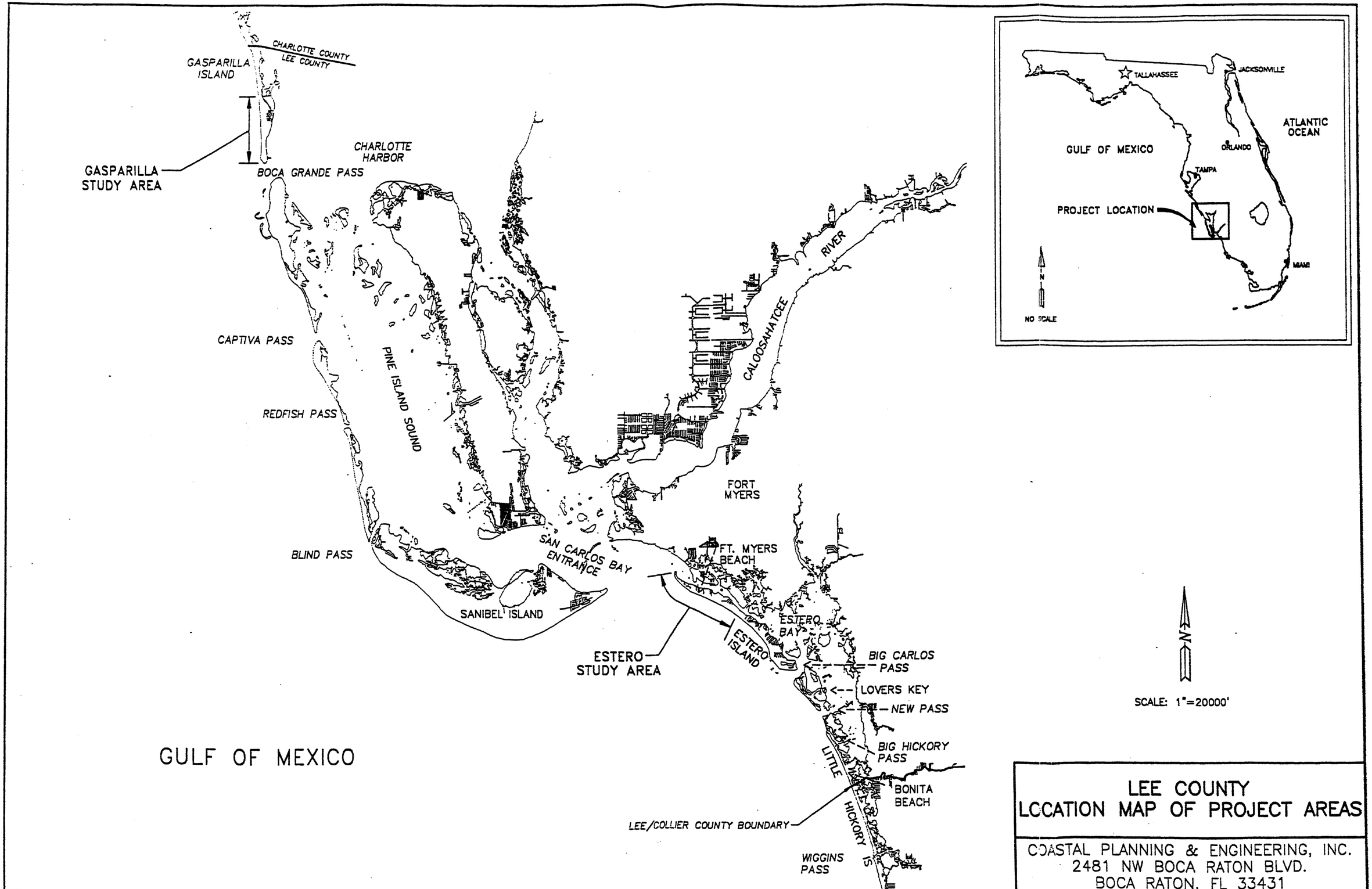
Project Location

A-4. Lee County is located on the lower gulf coast of Florida, about 90 miles south of the entrance to Tampa Bay and 130 miles north of Key West. A project map is provided as Figure A-1. The 44 mile coastline consists of coastal barrier islands separated from the mainland by shallow tidal lagoons. The barrier islands range in width from 200 feet to about 2.5 miles. Natural ground elevations are generally less than ten feet above Mean Low Water (MLW).

NATURAL FORCES

Winds and Tides

A-5. Local winds are the primary generating mechanism of short period waves in the project area. Hindcast wind distribution by direction is presented in Figure A-2 (Hubertz and Brooks, 1989). Typical prevailing winds are from the east through the southeast. During winter months (December through March), winds are often out of the northwest and north. Low pressure cold fronts generally traverse the continental United States from west to east. Severe storms associated with these fronts can cause extensive beach erosion and shorefront damage. 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. Southeast tradewinds make up the typical summer wind climate.



LEE COUNTY
LOCATION MAP OF PROJECT AREAS

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

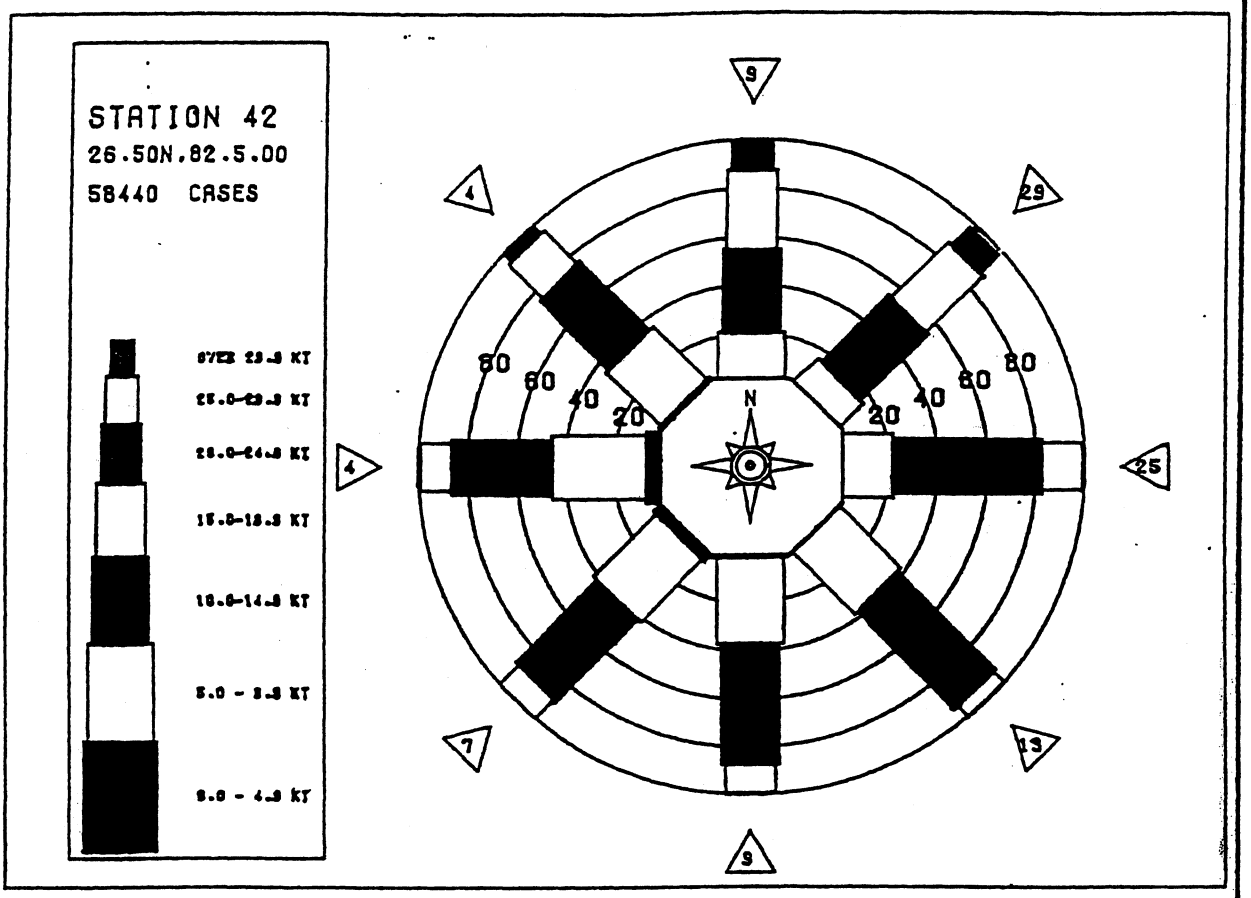


FIGURE A-2

WIND DISTRIBUTION OFFSHORE LEE COUNTY
(FROM HUBERTZ AND BROOKS, 1989)

A-6. 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-7. Tides in the project area are a mixture of diurnal and semi-diurnal types. The tide range and tidal datums vary between Gasparilla and Estero Islands. These are summarized in Table A-1. The mean tidal range for Gasparilla Island is 1.8 feet, and for Estero Island is 0.97 feet.

Table A-1

Tide Range and Levels for Gasparilla and Estero Islands
(in feet relative to NGVD)

	Tide Range	Mean High Water (MHW)	Mean Tide Level (MTL)	Mean Low Water (MLW)
Gasparilla	1.7	0.87	0.04	-0.8
Estero	2.3	1.42	0.27	-0.88

Note : All elevations are listed in feet relative to the National Geodetic Vertical Datum 1929 (NGVD).

A-8. Tidal currents are significant within the project area, due primarily to the presence of tidal inlets. The Gasparilla Island portion of the project is adjacent to Boca Grande pass to the south. This is the largest tidal inlet in the Lee County region with a significant tidal prism, and a cross-section on the order of 183,000 sq. ft. (Godschalk and Associates, 1988). Big Carlos Pass lies adjacent to the southern end of Estero Island, and exhibits a significant tidal current. San Carlos Bay (Matanzas Pass) is adjacent to the northern end of Estero Island, though the tidal current associated with this inlet is minimal due to the overall size of this entrance. Measurements of tidal current velocity were unavailable for this study, though coastal charts indicate that velocities up to 3.7 ft./sec. may be encountered in the region's inlets (Godschalk and Assoc., 1988).

Nearshore Currents

A-9. The primary currents in the nearshore are wave-induced longshore currents. These currents are driven by the transformation of obliquely incident waves in the nearshore. The magnitude of the longshore current is generally greatest in the region immediately landward of the point of depth-induced wave breaking, and is primarily a function of the local wind and wave climate. For Gasparilla Island the mean longshore current is from north to south. For Estero Island the mean direction of the longshore current is from south to north. This reversal of the mean longshore current direction in Estero Island is due to the sheltering effects of Sanibel Island on the local wave climate.

Storm Surge

A-10. Storm surge elevation is defined as the rise of the ocean surface above its astronomical tide level due to storm forces. 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 Lee County are surge and waves caused by extra-tropical and tropical storms. It is possible to classify and predict storm surge elevations for various storms through the use of historical information and theoretical models.

A-11. The Federal Emergency Management Agency (FEMA) has performed investigations to determine 10 to 100 year storm surge elevations for Lee County (NRC, 1983). The methodology used in this study was developed by the National Academy of Sciences. Assumptions made in the analysis include: 1) breaking wave heights are limited to 0.78 of the local still water depth, 2) the wave crest constitutes 70 % of the wave height, and 3) waves are dissipated by features such as sand dunes, dikes and seawalls, buildings, and vegetation. Regeneration of wave heights over areas of large fetch was also considered. Figure A-3 includes the resulting surge elevations and frequency of occurrence for the Lee County coast. For the 100-year return interval, the maximum predicted crest elevation at the local shoreline for Gasparilla Island is 11.6 feet (NGVD), and for Estero Island is 13.2 feet (NGVD).

A-12. Higher frequency of occurrence storms and storm surge elevation for other meteorological induced water-level anomalies were obtained from WIS Report 7 (USACE, 1995). Hindcasting of storm surges was performed utilizing historical wind and pressure fields.

A-13. In addition, the cross-shore sediment transport analysis involved the modeling of beach profile changes in response to specific historical storms. Storm surge hydrographs characteristic of those specific storms were required as input. Those surge hydrogrpahs were obtained from a database of storm information (Scheffner et al., 1994) that was generated by CERC as a product of the Dredging Research Program (DRP). Tasks undertaken to generate this database included: 1) selection of historic storm events (of both tropical and extra-tropical origin), 2) estimation of descriptive storm parameters to be used as input to a planetary boundary layer wind field model, 3) execution of that model to generate temporal and spatial storm-induced wind and pressure fields, and 4) use of that wind and pressure data as input to the large scale hydrodynamic model, ADCIRC, which computes spatial and temporal distributions of storm surge elevations and currents. The resulting DRP database includes storm surge and current data for 486 discrete locations, located throughout the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. DRP Station 213 was selected, based on the proximity of the station to the Lee County study area and the source of the corresponding wave data, WIS Station G1017. More detailed information on the character and use of this storm surge data is provided in the discussion of cross-shore (storm-induced) sediment transport analysis.

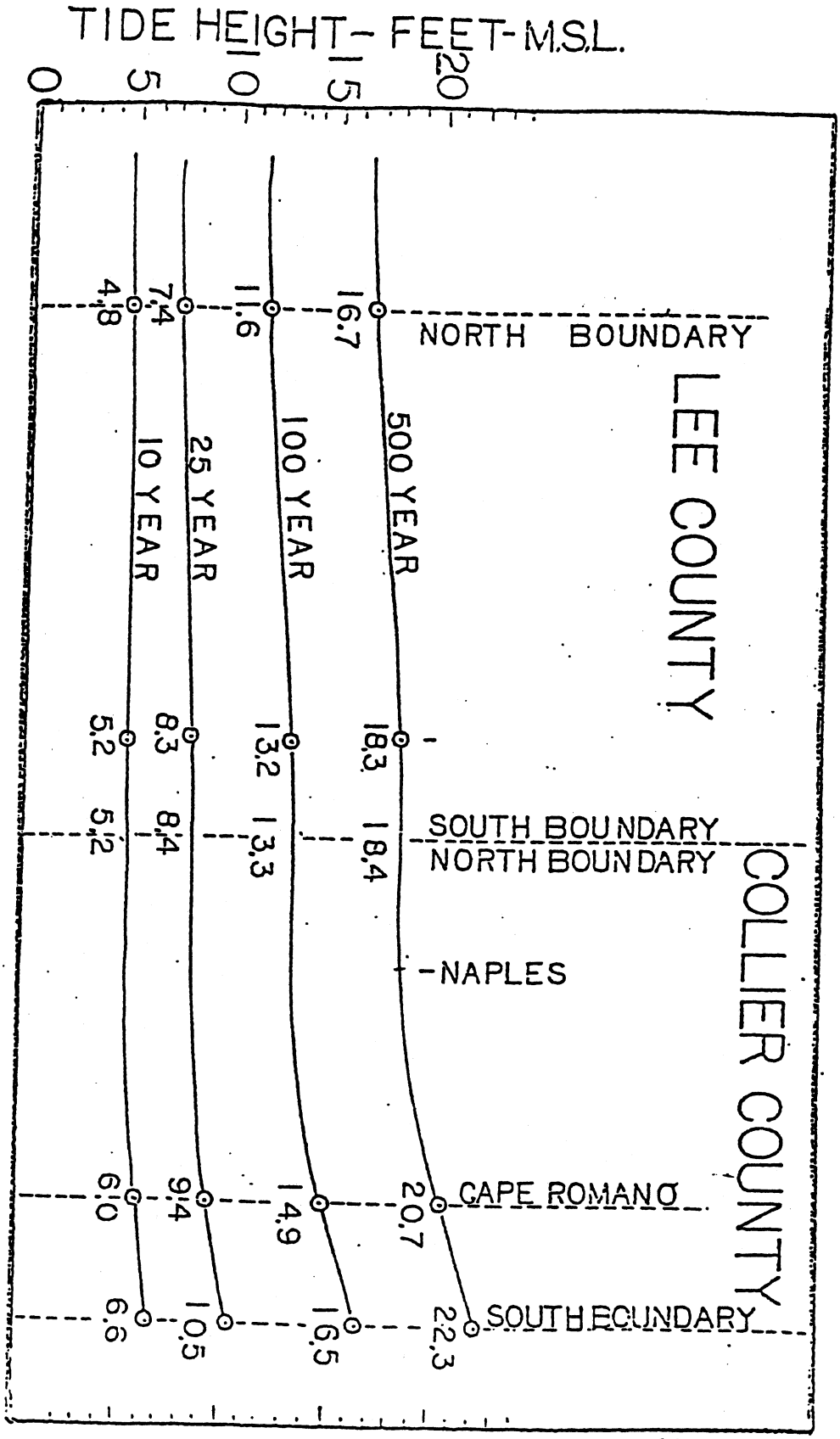


FIGURE A-3

STORM SURGE ELEVATIONS ALONG LEE AND COLLIER COUNTY (FROM GODSCHALK AND ASSOC., 1988)

Recent Storm History

A-14. A total of 21 tropical events have significantly influenced the area over the 104 year period covered within the tropical surge database (Scheffner et al., 1994). This corresponds to a recurrence frequency of roughly one tropical event every five years. The hurricanes of September 1926, October 1944 and Donna in 1960 have been noted for their impact on the region. Within the last decade tropical storms Charley, Marco and Keith, and hurricanes Georges, Andrew, and Gordon have affected the region, though the area did not undergo a direct impact from a major tropical event over this time period.

A-15. Over the period from 1977 to 1993 a total of 9 extratropical storms with a maximum surge amplitude greater than 0.3 meters affected the Lee County coastline. This corresponds to a significant extratropical storm event approximately every two years. The extratropical storm of October 1996 is noted for the significant erosion produced in the region.

Waves

A-16. The waves experienced in the Lee County area are caused primarily by local wind conditions, though significant wave events may occur due to more distant storm events. The limited fetch of the Gulf of Mexico basin, however, limits the size and associated period of significant storm events.

A-17. 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 hindcasts used in this study represent conditions that existed between 1976 and 1995. For this investigation, hindcast results compiled in WIS Report 33 (Brooks and Brandon, 1995) were used. This updated hindcast includes wave information for both extratropical storms and tropical cyclones.

A-18. The wave statistics used for this analysis were obtained from Station G1017 (WIS Report 33) located at latitude 26.50 north and longitude 82.50 west. Water depth at this station is 18 meters or 59 feet. Tables A-2 to A-4 summarize the hindcast wave results for Station G1017. Table A-2 is a summary of the mean significant wave by month and year for the 20-year period. This table is useful in showing the range distribution of wave height throughout the year. Table A-3 shows the largest significant wave height and period by month and year. The percent occurrence of wave height and period for all directions is shown in Table A-4.

A-19. The direction of waves was generally from the northwest to west-southwest. The mean wave height and period for this hindcast is 0.5 meters and 3.9 seconds, indicating a generally mild wave climate. A maximum significant wave height of 11.3 meters occurs within the data. This extreme event is associated with the passage of Hurricane Gilbert through the southern

Table A-2

Wave Height (in meters) by Month and Year (Station G2017)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MEAN
1976	.6	.6	.5	.4	.6	.3	.2	.3	.2	.6	.6	.7	.5
1977	.8	.6	.6	.7	.4	.2	.3	.4	.3	.4	.6	.6	.5
1978	.9	.7	.7	.5	.4	.3	.3	.3	.2	.5	.5	.7	.5
1979	1.0	.6	.7	.6	.4	.3	.4	.3	.8	.4	.6	.6	.6
1980	.6	.6	.7	.6	.4	.3	.3	.3	.3	.4	.7	.6	.5
1981	.7	.8	.8	.4	.5	.3	.2	.4	.3	.4	.5	.6	.5
1982	.6	.5	.5	.5	.4	.5	.2	.2	.3	.5	.5	.7	.5
1983	.6	1.1	1.3	.8	.4	.3	.3	.3	.4	.4	.6	.8	.6
1984	.7	.7	.8	.7	.4	.4	.3	.3	.4	.5	.6	.5	.5
1985	.8	.7	.5	.5	.4	.3	.4	.5	.6	.7	1.1	.6	.6
1986	.6	.6	.8	.4	.4	.3	.3	.4	.3	.4	.5	.7	.5
1987	.9	.6	.9	.6	.3	.3	.3	.3	.2	.7	.7	.6	.5
1988	.7	.7	.7	.8	.4	.4	.3	.3	1.0	.5	.9	.5	.6
1989	.4	.6	.6	.3	.3	.4	.3	.3	.3	.5	.6	.7	.4
1990	.5	.7	.6	.5	.4	.2	.3	.2	.3	.6	.6	.5	.4
1991	.6	.7	.8	.5	.4	.2	.3	.3	.3	.5	.6	.5	.5
1992	.7	.7	.6	.5	.4	.4	.3	.5	.3	.5	.7	.5	.5
1993	.5	.8	.8	.7	.5	.3	.2	.3	.4	.4	.6	.7	.5
1994	.9	.6	.8	.5	.4	.3	.4	.4	.4	.5	.7	.7	.5
1995	.9	.7	.6	.5	.4	.5	.4	.5	.5	.8	.8	.8	.6
MEAN	.7	.7	.7	.5	.4	.3	.3	.3	.4	.5	.6	.6	

Table A-3

Largest Wave Height (in meters) by Month and Year (Station G2017)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
1976	2.3	2.5	1.2	1.0	2.1	.5	.5	.8	.6	1.3	1.6	2.0
1977	2.1	1.4	1.7	1.7	1.1	.9	.6	1.0	1.2	1.3	1.5	1.8
1978	2.9	2.1	2.3	1.7	1.8	.9	.6	.6	.6	1.4	1.0	1.8
1979	3.6	2.3	2.4	1.8	.9	.8	3.0	.6	5.5	1.0	1.4	1.9
1980	1.9	1.8	2.8	2.0	.9	.6	.6	2.1	.6	1.0	1.7	1.6
1981	2.4	1.9	2.9	1.1	1.0	.9	.6	1.3	.8	1.1	1.1	1.6
1982	2.8	1.5	1.9	1.3	.7	2.8	.5	.6	.7	.9	1.7	1.7
1983	1.7	4.1	4.1	2.1	.8	.9	.6	4.7	1.1	.9	1.3	2.1
1984	1.6	3.1	3.4	2.2	1.1	.9	.6	.9	1.1	.9	1.8	1.6
1985	1.7	3.1	1.5	1.2	1.3	.9	4.5	5.1	5.2	3.8	6.5	1.8
1986	2.4	1.6	1.9	1.0	1.3	.7	.9	.9	.7	1.1	1.2	2.1
1987	3.0	1.7	2.2	1.7	.6	.8	.6	.5	.8	2.2	1.5	2.0
1988	2.0	1.7	2.2	3.8	1.4	1.0	.8	.6	11.3	1.2	5.8	1.3
1989	1.1	2.1	1.3	1.0	1.2	.9	.7	.6	.8	1.7	2.2	2.0
1990	2.0	1.7	1.2	1.1	1.4	.6	.8	.6	.6	3.6	1.9	1.3
1991	1.2	3.1	2.6	1.1	1.4	.6	.6	.6	.7	1.1	1.5	1.6
1992	2.0	3.8	1.9	1.3	1.3	1.6	.6	4.3	.7	1.6	1.3	1.7
1993	1.5	2.0	4.5	1.7	1.0	.6	.7	.7	1.1	1.9	1.5	2.2
1994	3.5	1.5	3.4	1.2	1.5	.8	.8	1.0	1.1	1.9	2.2	2.9
1995	2.5	3.2	1.8	1.3	1.1	1.7	1.0	2.0	1.2	3.9	2.4	2.5

MEAN SPECTRAL WAVE HEIGHT	(METERS)	.5
MEAN PEAK WAVE PERIOD	(SECONDS)	3.9
MOST FREQUENT 22.5 DEGREE (CENTER) DIRECTION BAND . .	(DEGREES)	292.5
STANDARD DEVIATION OF WAVE Hmo.	(METERS)	.4
STANDARD DEVIATION OF WAVE TP	(SECONDS)	1.5
LARGEST WAVE Hmo.	(METERS)	11.3
WAVE TP ASSOCIATED WITH LARGEST WAVE Hmo.	(SECONDS)	25.0
PEAK DIRECTION ASSOCIATED WITH LARGEST WAVE HS. . . .	(DEGREES)	259.0
DATE LARGEST Hmo OCCURRED 1988091800		

Table A-4

Percent Occurrence (X1000) of Height and Period for All Directions (Station G2017)

HEIGHT IN METERS	PEAK PERIOD (IN SECONDS) 3.0 4.9	5.0- 6.9	7.0- 8.9	9.0- 10.9	11.0- 12.9	13.0- 14.9	15.0- 16.9	17.0- 18.9	19.0- 20.9	21.0- LONGER	TOTAL
.00- .49	51358	3084	498	140	18	.	.	.	.	16	55114
.50- .99	25863	7319	1193	151	22	1	.	.	.	15	34564
1.00-1.49	1718	4060	1223	260	22	13	2	1	.	17	7316
1.50-1.99	5	817	740	346	20	12	.	.	.	10	1950
2.00-2.49	.	111	199	213	27	3	.	.	4	2	559
2.50-2.99	.	13	62	107	20	3	.	.	.	1	206
3.00-3.49	.	2	19	49	33	7	.	.	.	.	110
3.50-3.99	.	.	9	11	34	4	1	.	.	.	59
4.00-4.49	.	.	1	12	13	.	.	.	.	.	26
4.50-4.99	.	.	.	10	2	.	.	.	.	.	12
5.00+	.	.	.	12	14	.	6	.	.	14	46
TOTAL	78944	15406	3944	1311	225	43	9	1	4	75	

MEAN Hmo(M) = .5 LARGEST Hmo(M) = 11.3 MEAN TP(SEC) = 3.9

portion of the Gulf of Mexico in September of 1988, reiterating the fact that though the mean wave conditions for the region are mild, severe wave events infrequently do occur.

Yearly Depth Limit

A-20. 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) has developed a procedure for estimating the profile closure depth d_c. This depth is based on the approximate extreme wave condition for nearshore significant waves, and may be calculated by:

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

where:

H_e = nearshore extreme significant wave height
T_e = nearshore extreme significant wave period
g = acceleration of gravity constant, 32.3 ft/sec.^{2}.

A-21. Review of the hindcast wave statistics (1976-1995) reveals that waves 8.2 feet in height or greater with wave periods of 10.9 seconds or longer occur 12 hours per year. These values were used as input. The limiting depth was computed by the Hallermeier procedure to be 17.4 feet.

A-22. The yearly depth limit was also calculated using the Birkemeier equation (1985). This approach typically provides a more reasonable estimate compared to the Hallermeier approach, which typically over-predicts the depth of closure. The Birkemeier equation may be stated as:

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

A-23. Using the same input wave condition produces an estimate of the depth of closure of 13.25 feet. This value was deemed the more reasonable estimate, and coincides well with the depth of closure observed in the profile data from the study area for Gasparilla Island. Sequential profile data for Estero Island, however, indicates a significantly shallower depth of closure. This reduced depth of closure may be due to sheltering effects of Sanibel Island on the local wave climate. Based on this observation, a depth of closure of 8 feet was used for Estero Island.

Sea Level Rise

A-24. Long-term measurements of sea level for the Lee County region do not presently exist. The nearest record of long term sea level is from the Key West, Florida tidal records. This data suggests a total sea level rise of 0.98 feet for the time period 1850 to the present. This equates to an annual rate of 0.004 ft./yr. (Maul and Martin, 1993).

A-25. The geologic record of historic sea level variations indicates that both increases and decreases in global sea level have occurred. Some authorities claim that evidence indicates our planet may be entering a new ice age, which would result in a lower sea level. 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. Such changes to absolute global sea level change are known as eustatic sea level change. Total relative sea level change is the sum of the eustatic sea level change and any local change in land elevation.

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 by the year 2100.

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 in feet by the year 2043 would be 0.7 feet based on the historic trend or "low" estimate, and 1.5 feet based on Curve III or "high" estimate.

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. 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 derived from erosion of the shore. Shoreline recession resulting from sea level rise can be estimated using Bruun's Rule, as defined below:

$$x = ab/(h+d)$$

where,

- x = shoreline recession (in feet) attributable to sea level rise.
- h = elevation of shoreline above mean low water (+5.0 feet berm).
- d = MLW depth contour beyond which there is no significant sediment motion (13.25 feet, yearly depth limit).
- b = horizontal distance (1000 feet averaged) from the beach profile berm elevation to the depth contour d.
- a = 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 historic estimate of relative sea level rise is 0.7 feet by the year 2043. The shoreline recession attributed to this low estimate along the shore of the project area would be 38.9 feet, or 0.8 feet per year. The Curve III "high" estimate of sea level rise by the year 2045 is 1.5 feet. The corresponding recession would be 83.3 feet, or 1.6 feet per year.

COASTAL PROCESSES

Historical Shoreline Change

A-32. Gasparilla Island historical shoreline changes for the period from 1860 to 1967 are presented in Figure A-4. This data indicates that in the central portion of the island the shoreline has advanced or remained stable over this time period. Shoreline recession is apparent in the southern region of the island and is more prominent in the vicinity of Boca Grande Pass.

A-33. Estero Island historical shoreline changes for the period 1885 to 1967 are presented in Figure A-5. Over this time period a noticeable recession occurred over the southern half of Estero Island. A region of advance is noted in the northern portion of the island, though a significant erosional region is also present at the northern extreme of the island. This erosional region is centered roughly at the present day FDEP monument R-180.

Recent Shoreline Change

A-34. Gasparilla Island shoreline changes for the period 1982 to 1995 are shown in Figure A-6 and Table A-5. Shoreline position is based on FDEP surveys conducted in May 1982 and May 1989, and the USACE survey conducted in August 1995. For the period from 1982 to 1989 the

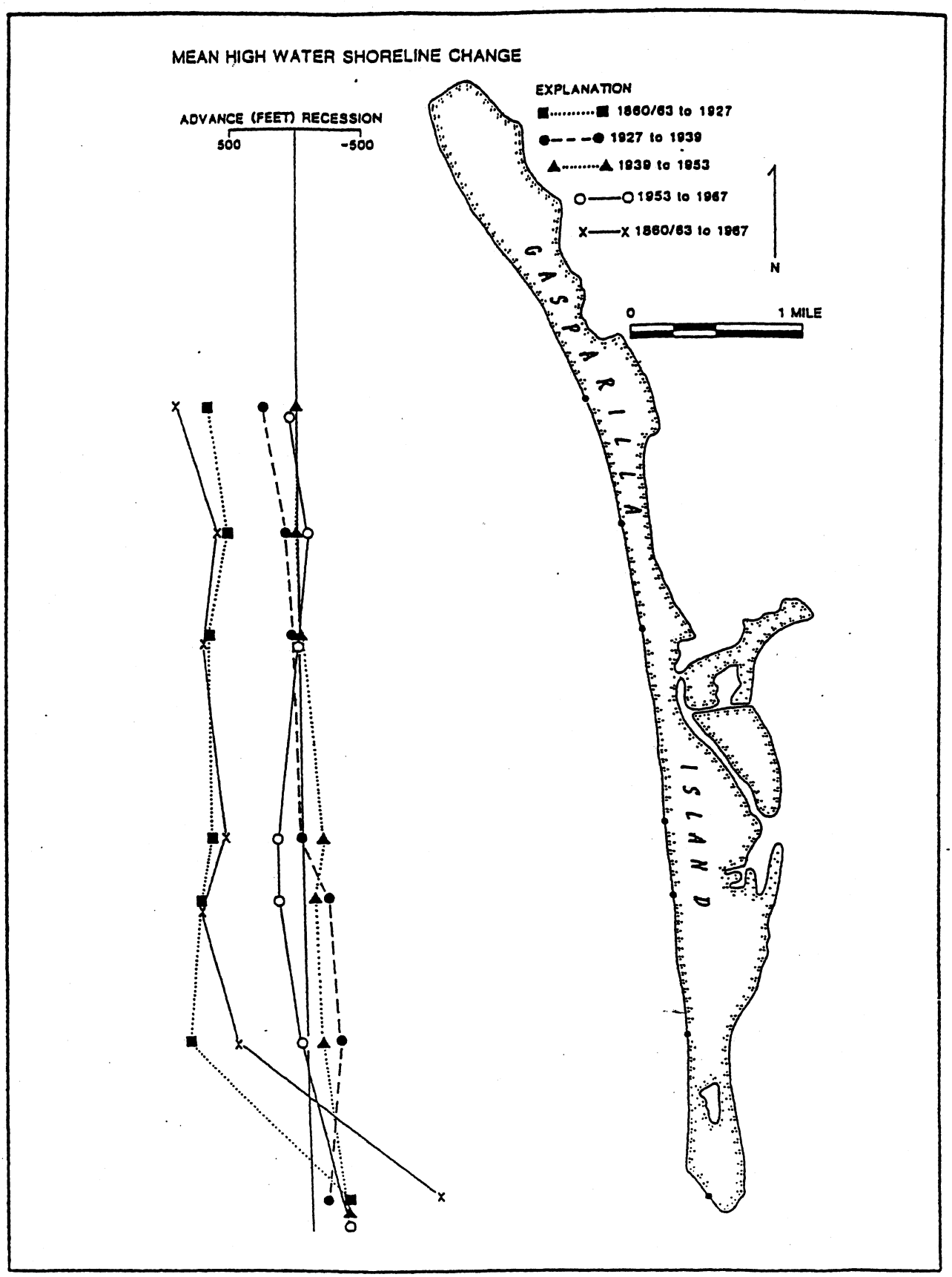


FIGURE A-4

GASPARILLA ISLAND
HISTORICAL SHORELINE CHANGE
(FROM GODSCHALK AND ASSOC., 1988)

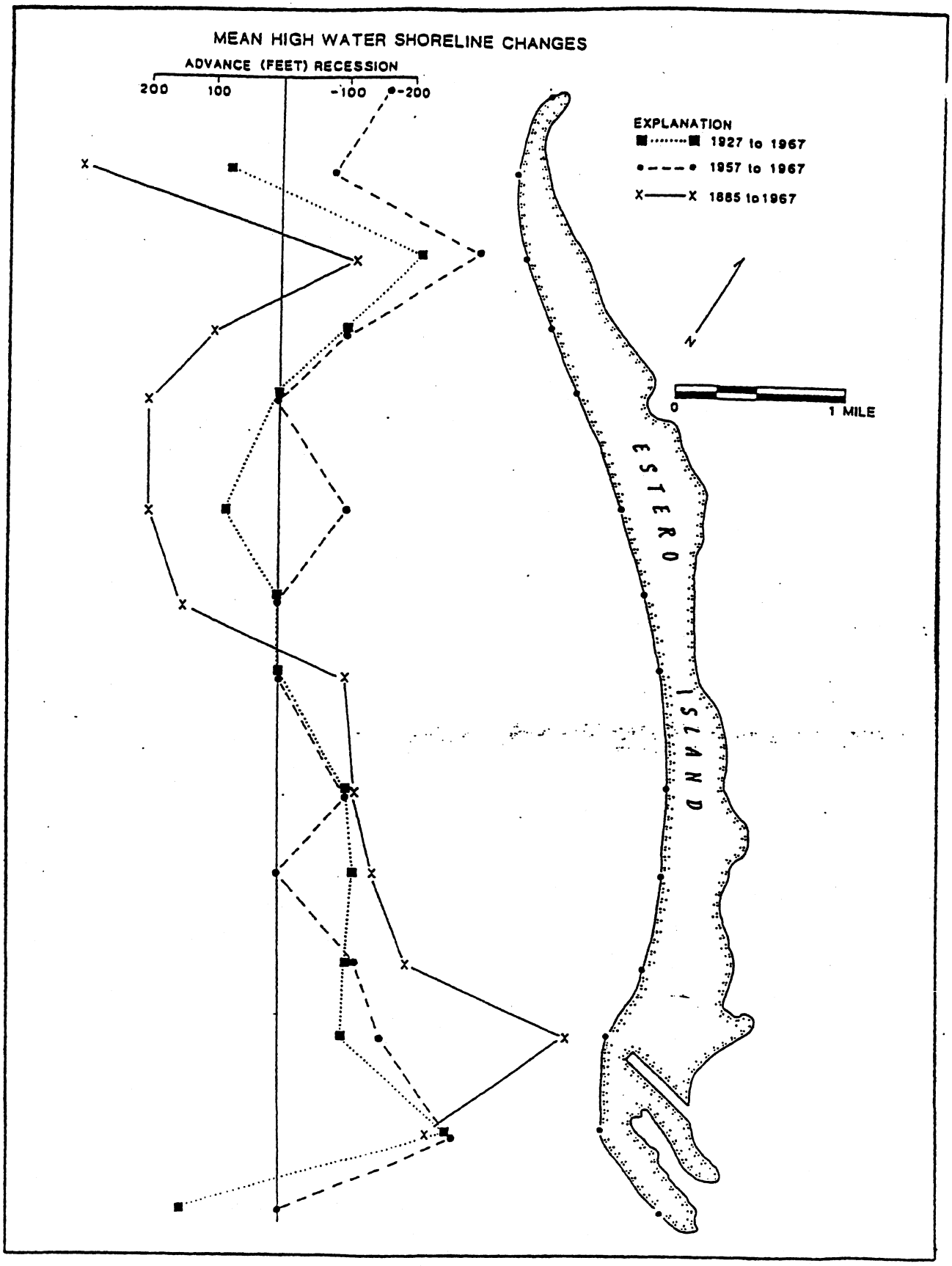


FIGURE A–5

ESTERO ISLAND
HISTORICAL SHORELINE CHANGE
(FROM GODSCHALK AND ASSOC., 1988)

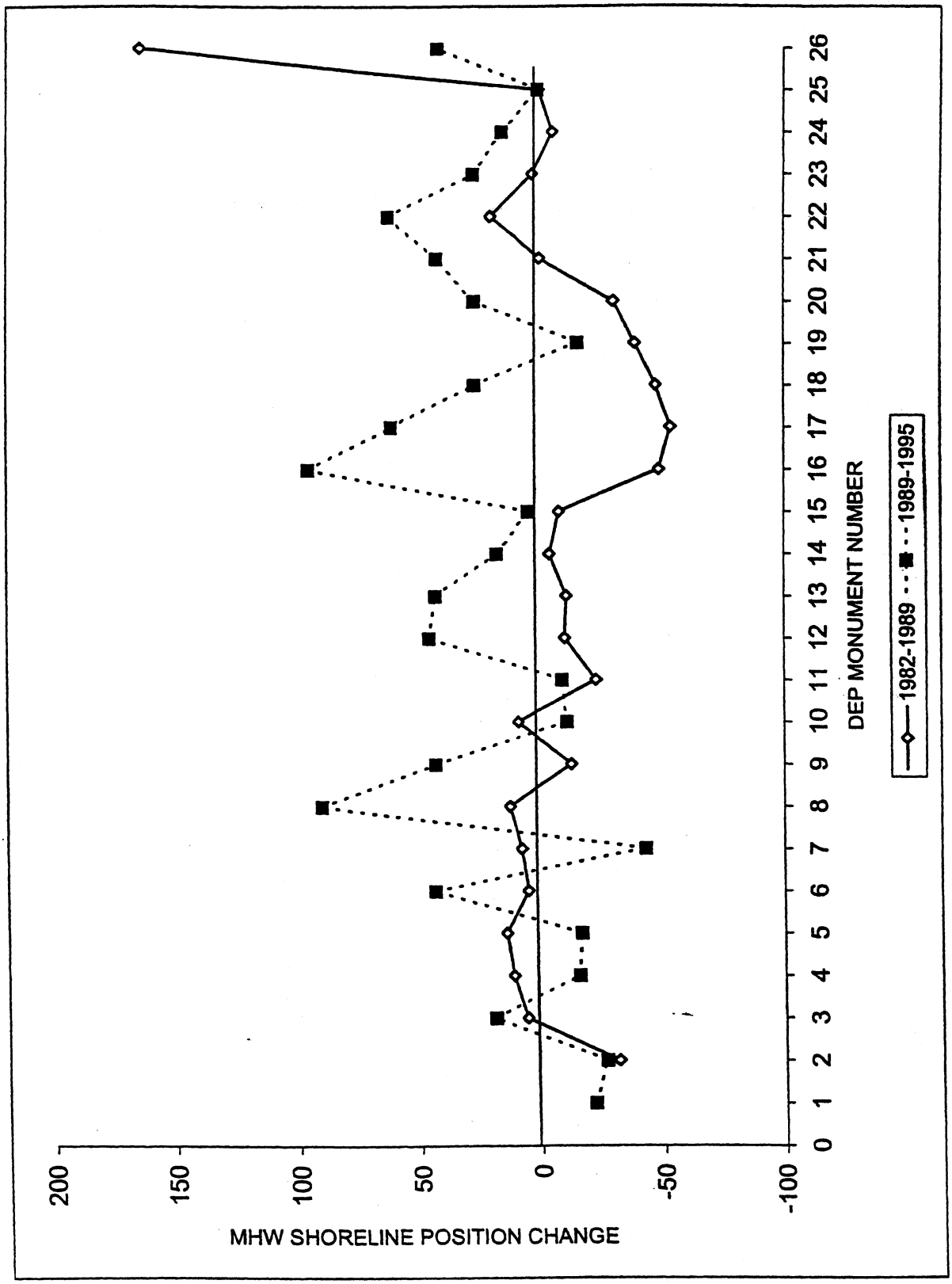


FIGURE A6

GASPARILLA ISLAND SHORELINE CHANGE

Table A-5

Mean High Water Shoreline Changes: Gasparilla Island
1982-1995

MHW Shoreline Change In Feet		
Monument	Shoreline Change 1982-1989	Shoreline Change 1989-1995
R-1	-74.9	-22.0
R-2	-31.8	-26.8
R-3	5.6	18.9
R-4	11.2	-16.0
R-5	14.2	-17.0
R-6	4.7	43.2
R-7	7.4	-43.0
R-8	12.4	90.0
R-9	-13.4	42.8
R-10	8.5	-11.6
R-11	-23.6	-9.7
R-12	-11.0	45.1
R-13	-11.7	42.5
R-14	-4.8	17.2
R-15	-8.8	4.1
R-16	-49.0	94.9
R-17	-53.7	60.7
R-18	-47.7	26.1
R-19	-39.4	-16.6
R-20	-30.9	26.1
R-21	-1.0	41.5
R-22	19.4	61.8
R-23	2.0	26.5
R-24	-6.5	14.7
R-25	-0.7	0.0
R-26	163.9	40.9
Gasparilla Island Average	**-6.1**	**20.5**
Standard Deviation	**42.3**	**35.6**
Project Area Average[1]	**-19.0**	**31.1**
Standard Deviation	**22.1**	**29.8**

NOTES:
(1): PROJECT AREA EXTEND ROUGHLY FROM R-11 TO R-24

data indicates a mean retreat of the shoreline of -19.1 for the project area (R-11 to R-24). This retreat is most pronounced in the area between monuments R-15 and R-20. This recession may be attributed at least in part to the movement of fill placed in this area in 1981. Shoreline north of the project area remained somewhat stable showing only slight recession or advance. Recession between monuments R-10 and R-15 is limited due to the presence of a seawall in this region. A mean shoreline advance of +31.1 feet occurred during the region from 1989 to 1995 within the project area. Much of this advance may be attributed to placement of fill in the region surrounding R-17 in 1993. Much of this fill is no longer present, and a recession of the shoreline has occurred since 1995. Recently, placement of fill has increased the shoreline position near the southern end of Gasparilla Island, though monitoring data was not available for this study. For the entire Lee County segment of Gasparilla Island, a net loss of –6.1 feet was observed for the period from 1982 to 1989, and a net gain of +20.5 feet was observed for the period from 1989 to 1995.

A-35. Estero Island shoreline change during the period from May 1982 to May 1995 is presented in Figure A-7 and Table A-6. Shoreline position is based on FDEP surveys conducted in May 1982 and May 1989, and the USACE survey conducted in April 1996. The period from 1982 to 1989 indicates a slight advance over the central portion of the island, with a mean advance of 24.2 feet within the project area. A region of slight recession is noted between R-191 and R-194. The overall advance during this period is due in part to the placement of fill in 1986. During the period from 1989 to 1995 the region exhibited a mean recession of -26.1 feet within the project area. The recession is greatest from R-176 to R-180 and appears consistent with a historical "hot spot" in this area. Recession between monuments R-180 and R-198 is limited due to the presence of a seawall in this region. Shoreline position from R-200 southward indicates a dramatic advancement in shoreline position. This advance is due to the migration of offshore bars shoreward in this area. Local reports suggest that these features formed during Hurricane Donna in 1960 and have since that time have created an extensive region of vegetated dunes and bars (Godschalk and Associates, 1988). Over the extent of Estero Island, a net shoreline advance of +25.0 feet was observed from 1982 to 1989, and a net advance of +12.5 feet was observed over the 1989 to 1995 period. This net advance is directly attributable to the emergent shoal feature south of the project area.

Gasparilla Island Volumetric Changes

A-36. Gasparilla Island volumetric changes from 1982 to 1995 for the project area are presented in Figure A-8 and Table A-7. For the period from 1982 to 1989 the project area showed a net loss of -66,700 cy or an annual rate of -9,500 cubic yards/year lost. This loss is most pronounced in the vicinity of R-15 and is most likely associated with the re-adjustment of 216,100 cubic yards of beach fill placed in this area in 1981 (Table A-8). A net volumetric gain of 230,000 occurred for the period from 1989 to 1995 within the project area. Most of this gain, however, can be attributed to the placement of over 438,000 cubic yards of fill in 1993. Considering fill placement, the region experienced a net loss of 208,200 cubic yards for an annual rate of 34,700 cubic yards/year. Over the Lee County segment of Gasparilla Island, a net loss of 138,200 cubic yards was observed for the 1982-1989 time period. From 1989 to 1995 the area experienced a net gain of 260,100 cubic yards.

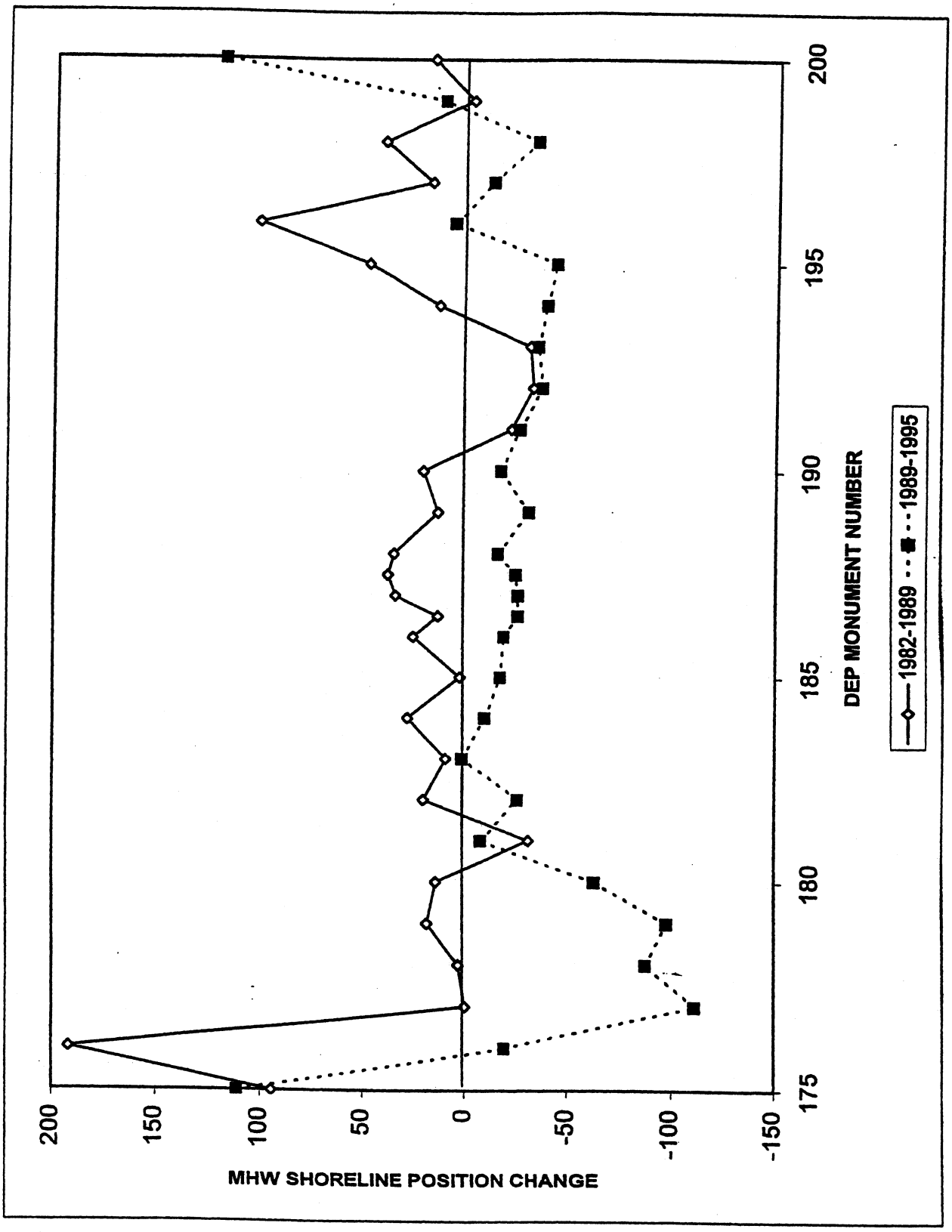


FIGURE A-7

ESTERO ISLAND SHORELINE CHANGE

Table A-6

Mean High Water Shoreline Changes: Estero Island
1982-1995

Estero Island Shoreline Change In Feet		
Monument	Shoreline Change[1] 1982-1989	Shoreline Change 1989-1995
R-175	94.5	110.9
R-176	191.5	-20.0
R-177	-0.3	-111.2
R-178	2.9	-87.6
R-179	18.0	-97.7
R-180	13.7	-62.7
R-181	-31.6	-8.1
R-182	19.6	-26.3
R-183	8.9	1.0
R-184	27.6	-9.9
R-185	2.2	-17.6
R-186	25.0	-19.3
R-186.5	12.8	-26.3
R-187	34.0	-26.3
R-187.5	37.8	-25.1
R-188	34.9	-16.3
R-189	12.9	-31.4
R-190	20.3	-17.5
R-191	-22.6	-26.8
R-192	-33.0	-37.6
R-193	-31.5	-35.4
R-194	12.8	-39.7
R-195	47.8	-44.0
R-196	101.6	5.5
R-197	16.9	-13.0
R-198	40.5	-34.3
R-199	-2.7	10.9
R-200	76.3	68.8
R-201	4.9	407.3
R-202	-47.2	447.1
R-203	142.8	20.9
R-204	23.8	-16.7
R-205	15.5	-0.6
R-206	31.1	14.4
R-207	6.6	18.5
R-208	-18.1	0.8
R-209	2.8	-19.8
R-210	-1.2	-0.3
Estero Island Average	**25.0**	**12.5**
Standard Deviation	**51.0**	**103.4**
Project Area Average[2]	**24.2**	**-26.1**
Standard Deviation	**46.0**	**39.8**

NOTES:
(1): 190,00 CUBIC YARDS PLACED IN 1986 IN THE VICINITY OF R-176
(2): PROJECT AREA EXTENDS ROUGHLY FROM R-175 TO R-199

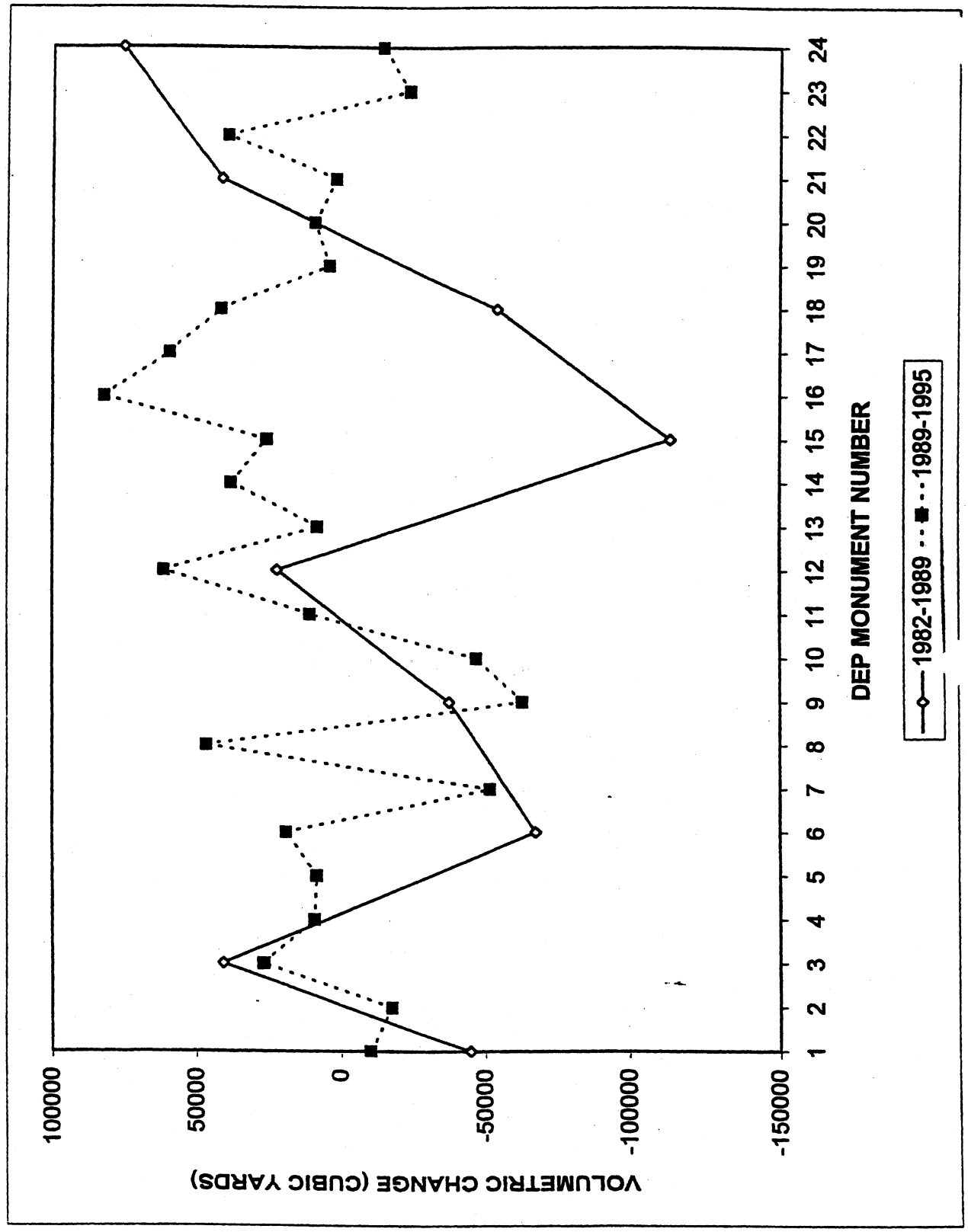


FIGURE A-8

GASPARILLA ISLAND VOLUMETRIC CHANGE

Table A-7

Volumetric Changes: Gasparilla Island
1982-1995

Volumetric Change In Cubic Yards					
1982-1989[1]			1989-1995		
Monument	Distance (Ft)[2]	Volume Change	Monument	Distance (Ft)[2]	Volume Change
R-1	-	-44,704	R-1	-	-10,228
R-3	2,006	40,633	R-2	1,022	-17,772
R-6	3,053	-67,495	R-3	984	26,825
R-9	3,180	-37,825	R-4	1,003	9,238
R-12	4,006	22,128	R-5	1,022	8,496
R-15	3,027	-113,554	R-6	1,028	19,029
R-18	3,215	-54,210	R-7	985	-51,681
R-21	2,907	41,056	R-8	1,006	46,385
R-24	2,968	75,783	R-9	1,189	-63,029
			R-10	1,291	-47,028
			R-11	1,520	10,733
			R-12	1,195	61,054
			R-13	1,002	8,087
			R-14	1,020	37,869
			R-15	1,005	25,549
			R-16	1,134	82,095
			R-17	1,011	59,079
			R-18	1,070	41,299
			R-19	938	3,934
			R-20	1,092	9,030
			R-21	877	1,553
			R-22	1,108	38,945
			R-23	928	-24,335
			R-24	932	-15,007
Gasparilla Island Net Volume Change		**-138,188**	**Gasparilla Island Net Volume Change**		**260,124**
Project Area Net Volume Change[3]		**-66,662**	**Project Area Net Volume Change[3]**		**229,828**
Gross Beach Fill		**0**	**Gross Beach Fill**		**438,020**
Gross Volume Change		**-66,662**	**Gross Volume Change**		**-208,192**
Gross Annual Rate		**-9,523**	**Gross Annual Rate**		**-34,698**

NOTES:

(1): COMPLETE PROFILES WERE SERVEYED AT EVERY THIRD MONUMENT IN 1982 FDEP SURVEY

(2): DISTANCE BETWEEN FDEP MONUMENTS USED IN VOLUME COMPARISON

(3): PROJECT AREA EXTEND ROUGHLY FROM R-11 TO R-24

Table A-8

Reported Beach Fill Volumes

	DATE	VOLUME (CUBIC YARDS)
GASPARILLA		
	Sept. 81	216,062
	May-93	438,030
	Apr-97	245,566
ESTERO		
	85/86	190,000
	May-96	?

Gasparilla Island fill was placed in the vicinity of R-17 or Southward.
Estero Island fill was placed in the vicinity of R-178.

Estero Island Volumetric Changes

A-37. Difficulties were encountered in the assessment of volumetric changes for Estero Island. The most recent USACE survey for Estero Island provided profile data only to wading depth. Data from a LIDAR survey done concurrent with this survey proved to be unreliable and could not be used to provide offshore elevation to a depth of closure. Further comparisons of the 1982 and 1989 surveys for Estero Island indicate profile closure discrepancies most likely due to calibration errors in the fathometer surveys. For these reasons, volumetric changes for the time period from 1982 to 1995 were determined using a proxy method based on shoreline change. The volumetric change is calculated by multiplying the shoreline change by the effective shoreline length and the distance from the existing berm to the depth of closure:

$$\Delta v = L\, \Delta y\, (b + h_c)$$

where:

Δv = volumetric change
L = effective length of shoreline
Δy = horizontal shoreline change
b berm height
h_c = effective closure depth

A-38. The effective shoreline length is assumed to extend from the monument location halfway to each adjacent monument. The effective shoreline length for each monument is in general near 1000 feet, and a depth of closure for Estero Island of -8 feet was used.

A-39. The resulting volumetric estimates for the project area are presented in Figure A-9 and Table A-9. For the period from 1982 to 1989 the project area on Estero Island gained 245,400 cubic yards. A portion of this gain is associated with 190,000 cubic yards. of fill placed in 1986, indicating a net gain of 55,400 cubic yards. This relates to an annual accretion rate of 7,900 cubic yards/year. From 1989 to 1995 the region experienced a net loss of 340,000 cubic yards or 56,700 cubic yards/year. For the time period from 1982 to 1989 the entire Estero Island shoreline exhibited a gain of 287,700 cubic yards. From 1989 to 1995 Estero Island showed a net loss of –172,300 cubic yards.

Inlet Effects

A-40. Boca Grande Pass lies immediately to the south of Gasparilla Island and has a considerable influence on the project area. Tidal currents associated with the inlet dominate the littoral transport of sediment at the southern tip of Gasparilla Island. This has resulted in the deposition of nearshore sediments within the channel as well as within an extensive offshore system of shoals. The volume of material retained in the ebb shoal has been estimated to be 160 million cubic yards (Godschalk and Associates, 1988).

A-41. This inlet remains a federal project with a mandated minimum depth of 32 feet and channel minimum width of 300 feet. Periodic maintenance dredging has been required since 1912. Subsequent dredging operations have resulted in the removal of approximately 8.8 million cubic yards of material over the period from 1912 to 1984 (Godschalk and Associates, 1988). Until recently, dredged material has been deposited offshore, permanently removing this material from the nearshore littoral system. Since 1981 beach quality fill from inlet dredging has been placed on the beach in the vicinity of R-17.

A-42. Recent observations indicate that a significant portion of maintenance fill placed on the adjacent beaches in 1997 has re-entered Boca Grande Pass and has been deposited in nearby marinas and navigation channels.

A-43. Estero Island is situated between Matanzas Pass to the north and Big Carlos Pass to the south. Matanzas Pass consists of a wide, relatively shallow entrance between Estero and Sanibel Islands. Due to the overall size of the entrance (over three miles), tidal currents associated with this inlet are limited. The net northerly longshore sediment transport along Estero Island suggests that this pass intercepts sand lost from the nearshore regions of the island. Consequently periodic dredging of the adjacent navigation channel has been required. When appropriate dredged material has been placed on the adjacent beaches of Estero Island.

A-44. A significant tidal current and ebb tidal delta occur to the south of Estero Island due to Big Carlos Pass. The series of nearshore bars currently protecting the southern portion of Estero Island may be associated with the migration of sand from the Big Carlos ebb shoal system during Hurricane Gloria in 1960 (Godschalk and Associates, 1988). A noticeable widening and deepening of the pass occurred in 1965 immediately following the construction of the causeway between Ft. Myers and Bonita Beach (Olsen and Associates, 1987). This resulted in an increase in the total sediment volume retained in the inlet flood and ebb shoal system. It is estimated that

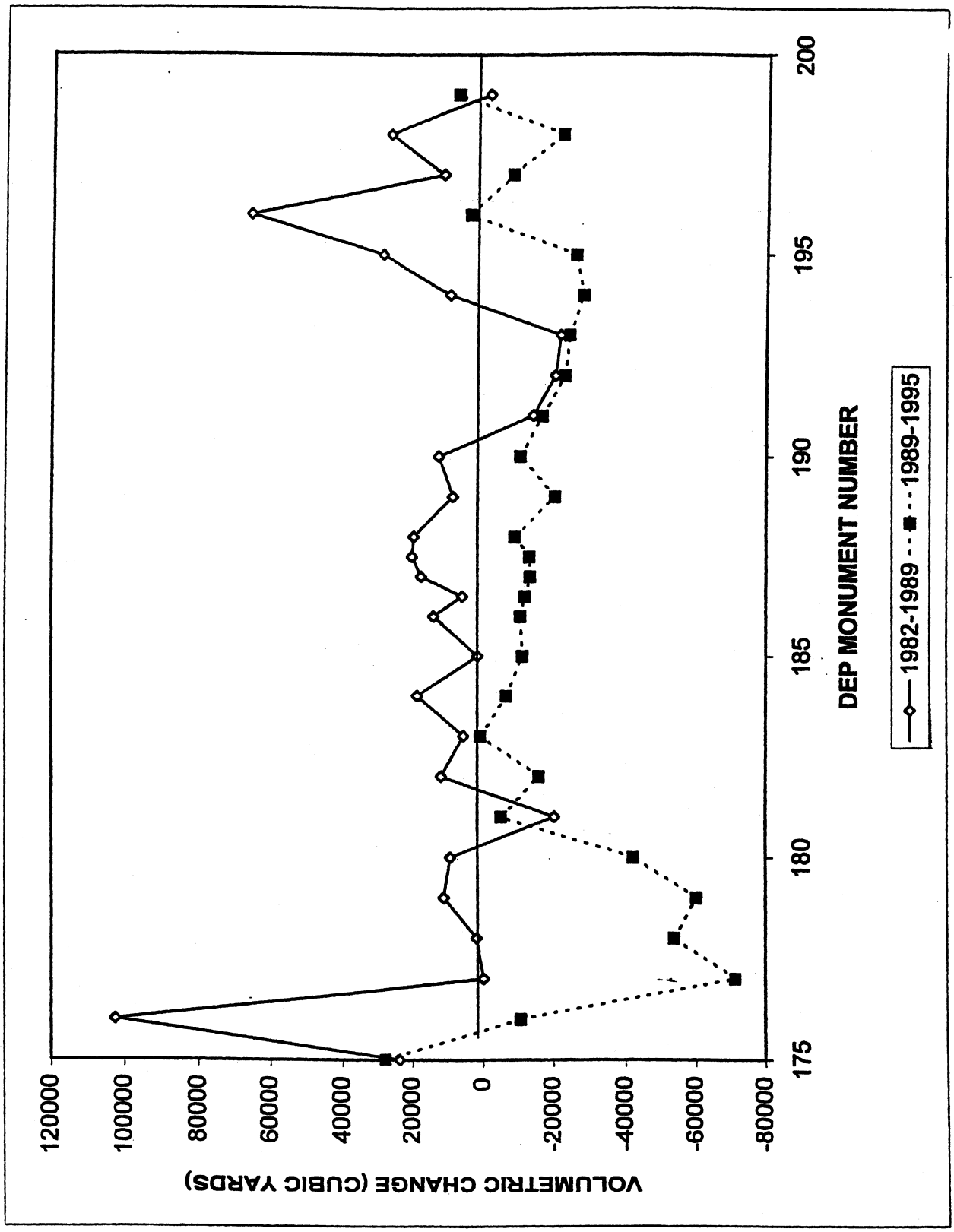


FIGURE A-9

ESTERO ISLAND VOLUMETRIC CHANGE

Table A-9

Volumetric Changes: Estero Island
1982-1995

Volumetric Change In Cubic Yards			
Monument	Distance[1] (Feet)	1982-1989 Volume Change	1989-1995 Volume Change
R-175	-	16,851	19,775
R-176	785	72,999	-7,624
R-177	894	-137	-50,685
R-178	1,111	1,268	-38,294
R-179	810	7,885	-42,798
R-180	1,116	6,563	-30,033
R-181	990	-14,461	-3,707
R-182	1,023	8,407	-11,282
R-183	864	3,915	440
R-184	1,071	13,183	-4,728
R-185	1,029	1,001	-8,006
R-186	971	9,826	-7,586
R-186.5	757	4,134	-8,494
R-187	664	12,357	-9,559
R-187.5	935	14,169	-9,408
R-188	713	13,843	-6,466
R-189	1,031	5,986	-14,569
R-190	1,009	8,791	-7,579
R-191	895	-10,095	-11,972
R-192	1,069	-14,546	-16,574
R-193	869	-15,561	-17,488
R-194	1,303	6,539	-20,281
R-195	944	20,352	-18,734
R-196	924	46,771	2,532
R-197	1,073	7,780	-5,984
R-198	965	18,773	-15,899
R-199	1,110	-1,227	4,953
R-200	888	13,606	12,268
R-201	1,113	874	72,627
R-202	921	-8,417	79,724
R-203	1,338	25,463	3,727
R-204	1,057	4,244	-2,978
R-205	972	2,764	-107
R-206	1,203	5,546	2,567
R-207	1,093	1,177	3,299
R-208	1,043	-3,227	142
R-209	1,020	499	-3,531
R-210	1,132	-214	-53
Estero Island Net Volume Change		**287,679**	**-172,363**
Project Area Net Volume Change[2]		**245,364**	**-340,048**
Gross Beach Fill		**190,000**	**0**
Gross Volume Change		**55,364**	**-340,048**
Gross Annual Rate		**7,909**	**-56,674**

NOTES:
(1): DISTANCE BETWEEN FDEP MONUMENTS USED IN VOLUME COMPARISON
(2): PROJECT AREA EXTENDS ROUGHLY FROM R-175 TO R-199

the flood and ebb shoals contain approximately 4.2 and 8.0 million cubic yards of material, respectively (Hine et al., 1987).

Existing Shoreline Protective Structures

A-45. A list of current shoreline protective structures within the area of interest is presented in Table A-10. The most prominent structure on Gasparilla Island is an approximately 6000 foot long, 6 foot high continuous seawall (Figure A-10). This structure appears to provide a considerable protective value. The seawall is fronted by numerous groins of various types (i.e. dogbone, wooden piling, sheet pile, rock). Little beach remains in this area, and the overall ability of this groined field to retain significant volumes of sand is questionable. An approximately 700 ft. long seawall is present at R-25 (Figure A-11). This structure was originally intended to provide protection to the adjacent road, though the road has since been moved. The remaining structure consists of an armored headland with no existing beach. This structure further acts as a barrier to the longshore transport of sediment from the north to south. A terminal groin was constructed by local interests in 1982 at the southern end of the island to provide protection to the historic lighthouse.

A-46. A low, nearly continuos seawall approximately 14,000 feet in length, 2-3 feet high presently exists on Estero Island roughly between monuments R-180 and R-198 (Figure A-12). The beach width in front of this structure varies, though in some areas the width is quite narrow. Low rock and woodpile groins have been placed in a few areas, though the protective value of these structures appears negligible. A seawall has been placed at the very southern end of the island facing Big Carlos Pass. In some areas these seawalls have failed and collapsed into the inlet (Godschalk and Associates, 1988). No coastal structures are currently present at the northern tip of the island adjacent to Matanzas Pass.

Table A-10

Existing Erosion Control Structures

Location	DEP Monument	Type	Approx. Length (Feet)
Gasparilla Island	R-13.6	Rock groin	-
	R-14.5 to R-15.3	Pre-cast groins	800
	R-10.3 to R-15.4	Seawall	6,000
	R-18	Seawall / groins	500
	R-24.5 to R-25.5	Revetment / seawall	770
	R-26	Terminal Groin	-200
Estero Island	R180 to R-194	Seawall/Bulkhead	14,000
	R-194	Groin (remnants)	-
	R-195 to R-198	Bulkhead	3,020
	R-197	Nine Rock groins	500
	R-198 toR-199	Groins (Remnants)	1,000
	R-208 to R-210	Bulkhead / groins	1,480

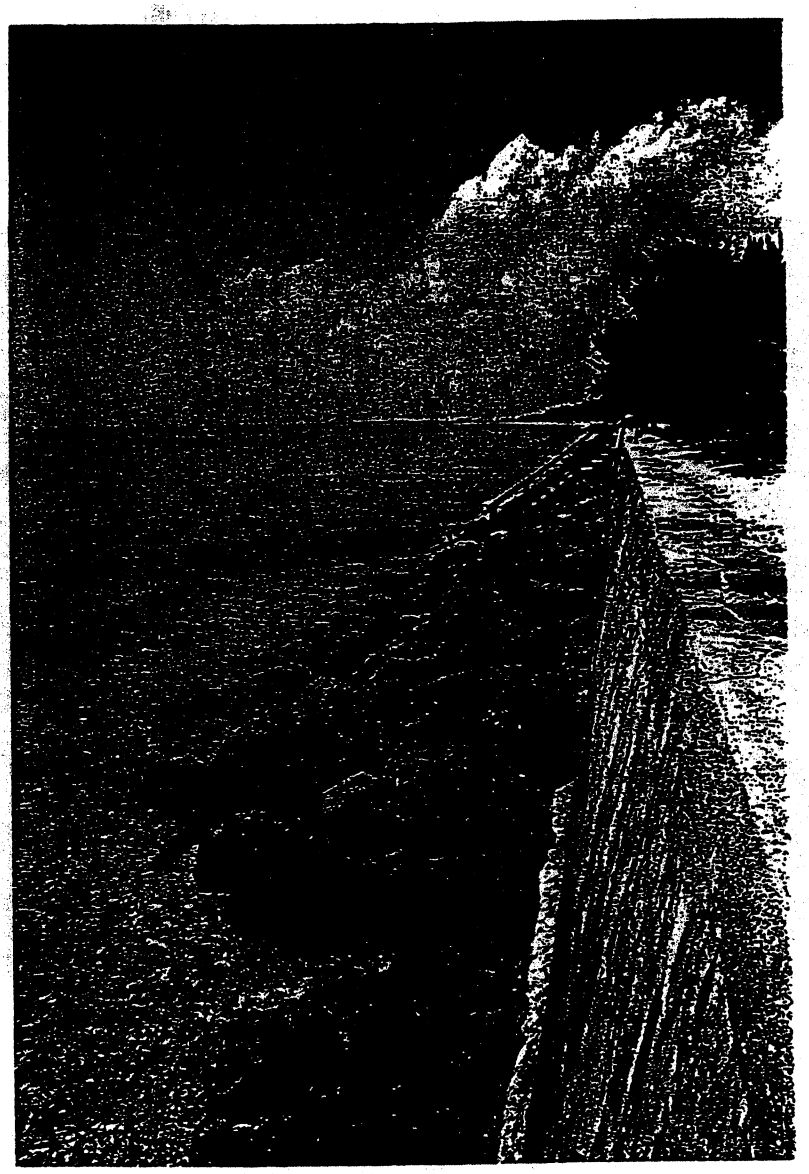


FIGURE A-10

GASPARILLA ISLAND
SEAWALL STRUCTURE LOCATED
BETWEEN R-10 AND R-16

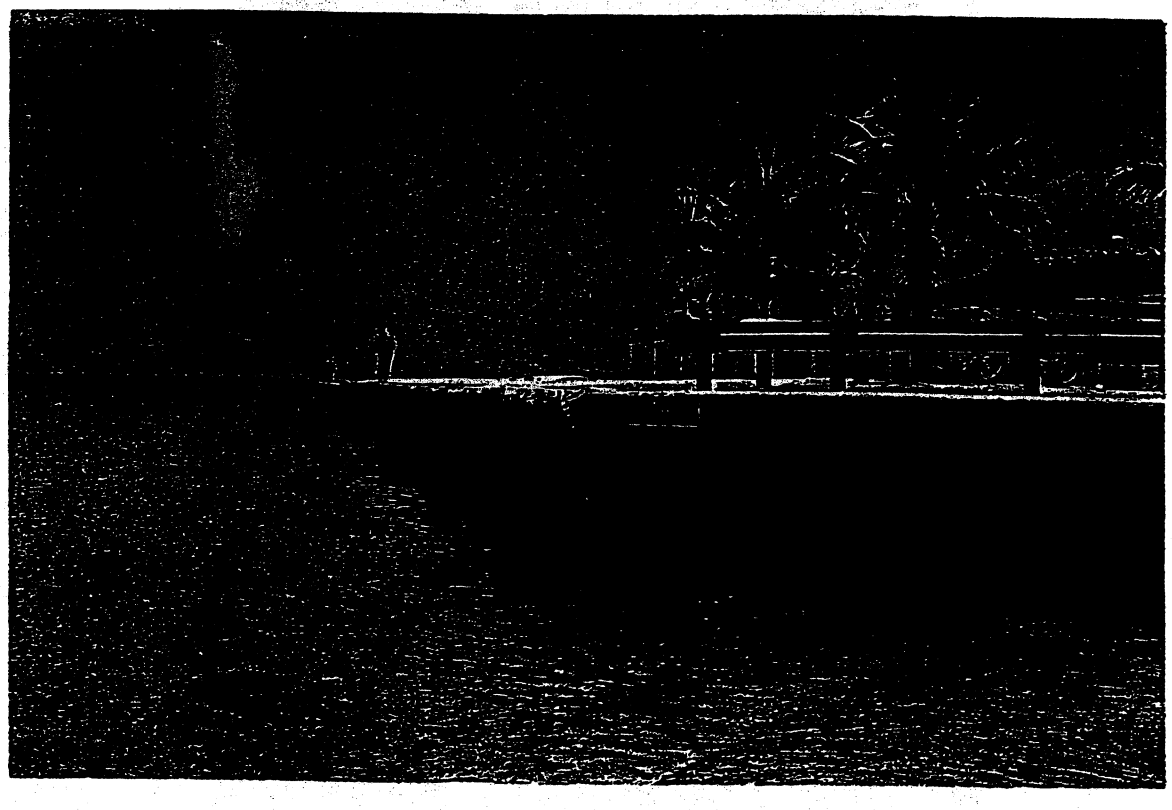


FIGURE A-11

SEAWALL STRUCTURE NEAR
R-25 AT SOUTHERN END OF
GASPARILLA ISLAND

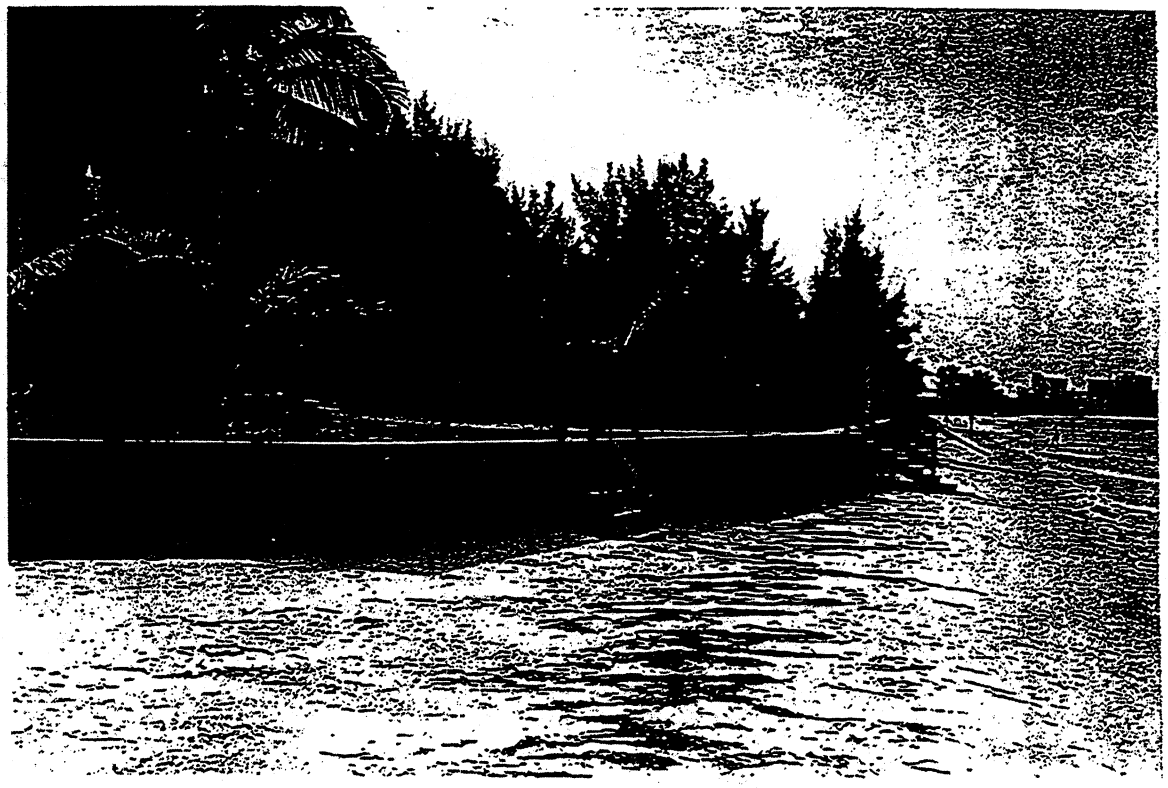


FIGURE A-12

ESTERO ISLAND
SEAWALL STRUCTURE LOCATED
BETWEEN R-180 AND R-194

Littoral Transport

A-47. Longshore sediment transport rates for the region were calculated by Walton (1973) and are presented in Figure A-13. For Gasparilla Island, the net longshore transport rate was estimated to be 124,000 cubic yards/year from north to south. This estimate correlates well with the estimated 155,500 cubic yards/year annual volumetric increase of the Boca Grande ebb shoal determined based on recent dredging requirements (USACE, 1990). Within the GENESIS simulations conducted for this study, a maximum longshore transport rate of 105,000 cubic yards/year was observed for the design runs.

A-48. The longshore sediment transport estimates for Estero Island indicate a nodal point or transport direction reversal. This reversal in net transport direction is associated with the sheltering effect of Sanibel Island over the northern portion of Estero Island. Considerable erosion may be expected in the area near this nodal point. The region of interest extends from this area northward. The longshore transport rate in this region increases from near zero to a maximum. Walton (1973) estimated the maximum longshore transport rate as 69,000 cubic yards per year. Recent estimates, however, suggest a lower value on the order of 29,000 cubic yards per year (Poff and Stephen, 1998). Within the GENESIS simulations conducted for this study, a maximum transport rate of 59,000 cubic yards/year was observed within the design runs. Nodal behavior in the vicinity of the region of historic transport reversal was also observed within the GENESIS simulations.

CROSS-SHORE SEDIMENT TRANSPORT

A-49. Cross shore sediment transport characteristics for Lee County beaches were estimated using the Storm Induced BEAch CHange model, SBEACH (Larson and Kraus, 1989). SBEACH simulates 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, and berms. SBEACH is a one-dimensional model that considers only cross-shore sediment transport; that is, the model assumes that simulated profile changes are produced only by cross-shore processes. Longshore wave, current, and sediment transport processes are not included. 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 describes (1) the storm being simulated, and (2) the beach of interest. Basic requirements include time histories of wave height, wave period, water elevation, beach profile surveys, and median sediment grain size.

A-50. SBEACH calculates the cross-shore variation in wave height and wave- and wind-induced 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.

A-51. The extent of beach erosion is often quantified in terms of beach recession. Throughout this discussion, recession is defined as the horizontal distance from the mean high water mark on

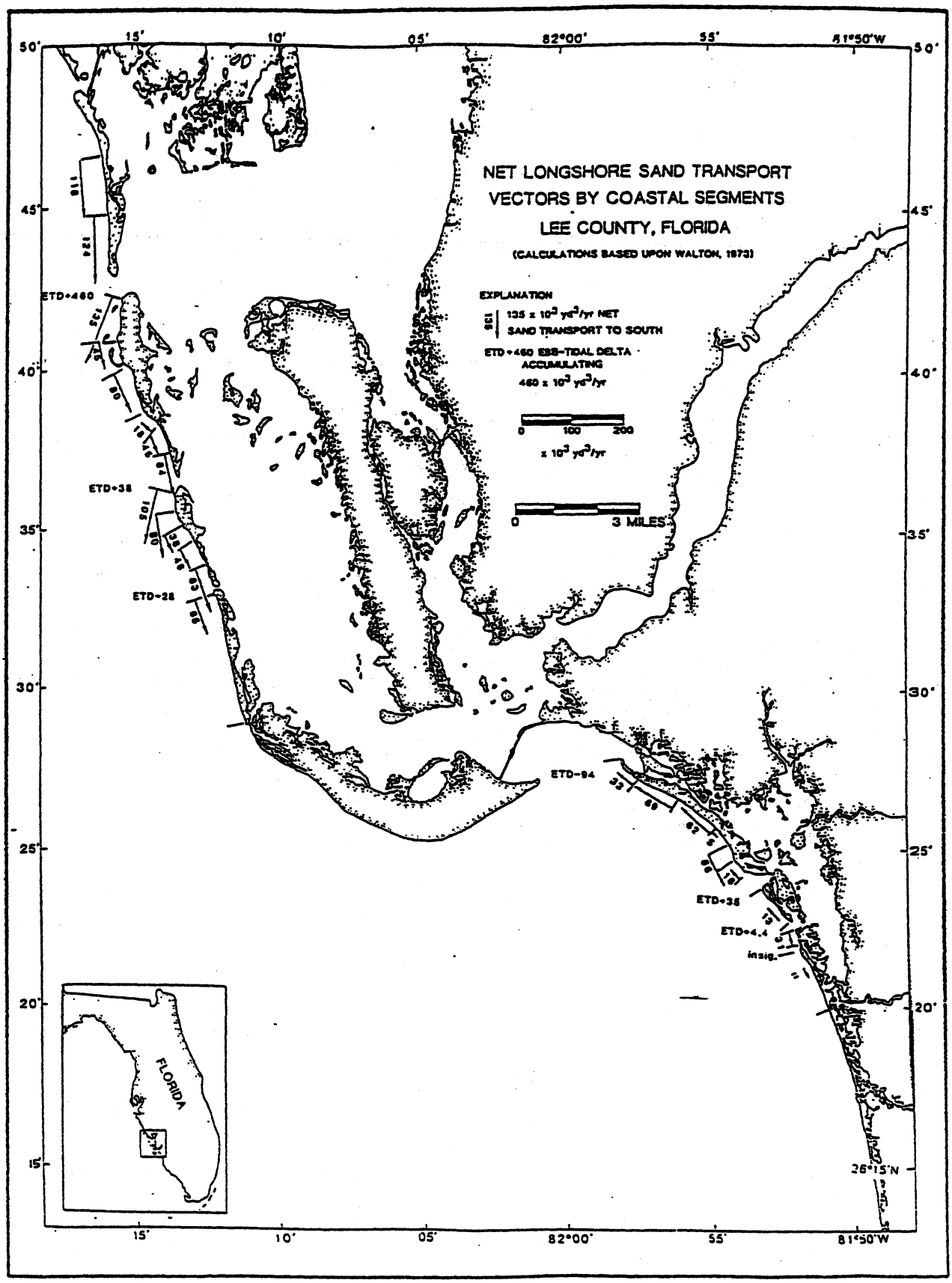


FIGURE A—13

NET LONGSHORE SAND TRANSPORT VECTOR
FOR VARIOUS COASTAL SECTORS OF LEE COUNTY
(FROM GODSCHALK AND ASSOC., 1988)

the pre-storm profile to the most landward point where the vertical difference in pre- and post-storm profiles equals 0.5 feet. This definition is presented graphically in Figure A-14.

A-52. These values are referenced to the MHW datum based on the NOAA tidal benchmarks for both Estero and Gasparilla Islands. The vertical distance between NGVD and MHW for Estero Island was determined to be 1.4 feet, and for Gasparilla Island was determined to be 0.87 feet. These values were additionally compared to estimates derived from the FDEP survey database for the region with favorable results.

A-53. Basic assumptions underlying SBEACH simulations are that (1) breaking waves and variations in water level are the major causes of sand transport and profile change, (2) cross shore sand transport takes place primarily in the surf zone, (3) conservation of mass dictates that the amount of material eroded must equal the amount deposited, (4) median sediment grain diameter on the profile is reasonably uniform across shore, (5) influence of structures blocking longshore transport is insignificant, and the shoreline is straight (i.e., longshore effects are negligible during the term of simulation), and (6) linear wave theory is applicable everywhere along the profile.

A-54. SBEACH has significant capabilities that make it useful for quantitative studies of beach profile response to storms. It accepts as input a pre-storm beach profile (either idealized or surveyed), time series of water level as produced by storm surge and tide, time series of wave height and 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.

A-55. Calibration of the Lee County SBEACH model was performed through repeated simulations of the subtropical storm of June 1982. This was selected for calibration based on (1) the significant erosional impact it had on the coast of Lee County and (2) the availability of the measured wave, water level, and survey data needed to accurately assess the quality of the SBEACH predictions. Input data for the calibration procedure were obtained from a variety of sources. Pre-storm and post-storm beach profiles, at FDEP monument R-6, were obtained from May 1982 and July 1982 FDEP surveys, respectively. Total water surface elevation data (storm surge and tide) were compiled from the Dredging Research Project (DRP) storm surge database. Hindcast wave heights and periods were obtained from the Wave Information Study (WIS) for Station G1017 located at latitude 26.5 degrees north and longitude 82.5 degrees west. A mean beach sediment grain size of 0.32 mm was used, based on results of the most recent beach sampling efforts (USACE, Section 933 Study 1990). The calibration procedure established the following values as the selected calibration parameters, a) transport rate coefficient (K) of 0.000002.5 m^4/N, b) slope dependent coefficient (EPS) of 0.004 m^2/s, and c) transport rate decay factor (LAMM) of 0.50 m^{-1}. A total of 600, 5-minute time steps were used to simulate the 50 hour storm history. The calculated SBEACH storm-induced beach recession was 115 feet, which compared well with the measured recession of 112 feet.

A-56. Verification of the Lee County SBEACH model was performed by simulation of the June 1982 subtropical storm at a different location within the project area. Measured pre- and post-

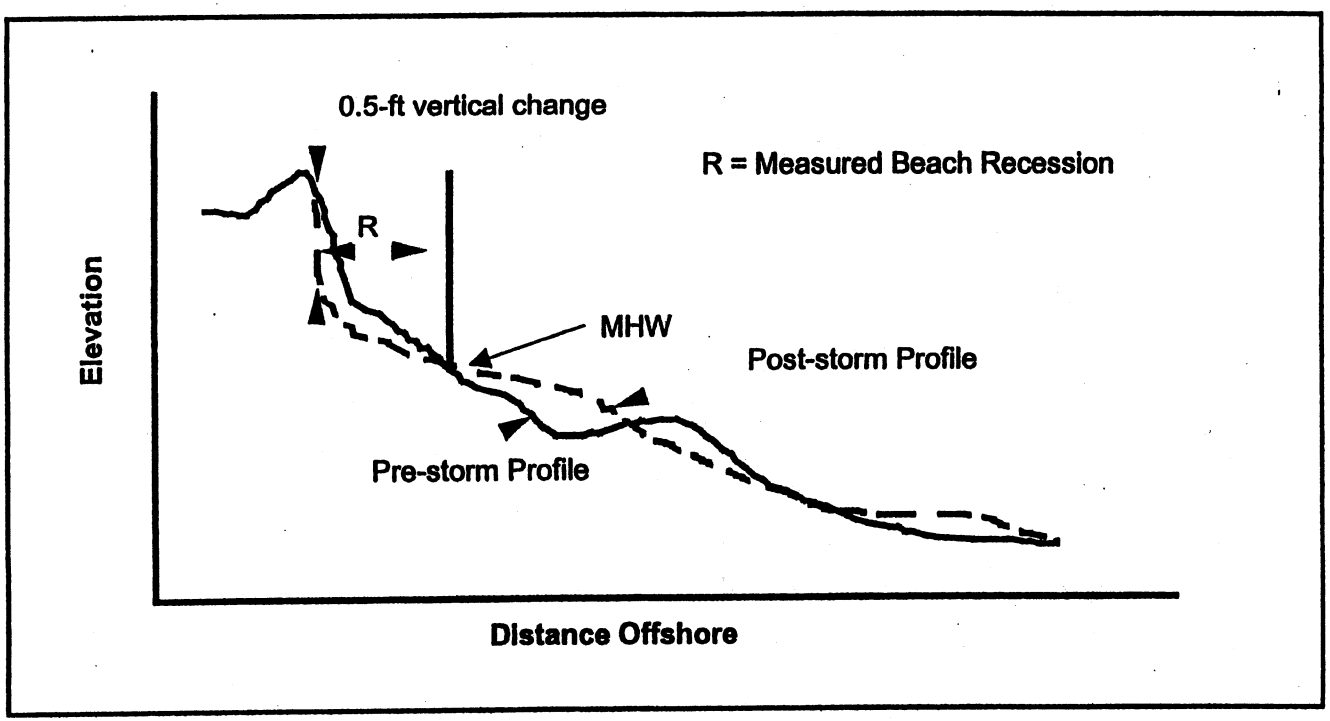


Figure A-14. Beach Recession Definition Sketch.

storm beach profiles at FDEP monument R-10, were used for the verification run. The calculated recession distance of 102 feet compared reasonably well with the 93 foot measured beach recession; therefore, the calibrated and verified SBEACH model was considered acceptable for further analysis of storm-induced beach recession in Lee County.

A-57. The cross shore sediment transport analysis procedure involved the use of the SBEACH model to perform multiple simulations of historical tropical and extratropical storms which have influenced the project shoreline. The study area consists of two distinct regions, namely Gasparilla and Estero Islands. For Gasparilla Island the most recent survey (August, 1995) based on shore surveys and offshore Lidar data was used. For Estero Island, Lidar data was unavailable due to inadequate water clarity during the conduction of the Lidar survey. The profiles used for Estero Island were therefore constructed from the most recent shoreline survey (August 1995) and the most recent offshore FDEP survey (May 1989). For both regions, two characteristic reaches were identified for use in the SBEACH analysis. These reaches were determined based on comparisons to mean profiles for the regions as well as their positions within the region. The choice of characteristic reaches was further limited due to the presence of numerous shoreline structures present in both regions. R-9 and R-23 were used for Gasparilla Island, while R-178 and R-190 were used for Estero Island.

A-58. For gulf coast sites, such as Lee County, the shoreline is subjected to both tropical cyclones (tropical depressions, tropical storms, and hurricanes) and extratropical storms. While tropical cyclones are often characterized by very high wind, wave, and surge conditions, the longer duration of extratropical storms can result in beach erosion of equal or greater magnitude than the erosion caused by storms of tropical origin. Once the historical storms of interest are identified, corresponding storm surge hydrographs, and wave condition time series must be extracted from appropriate data sources. For this application, those data sources were the DRP storm surge database and the WIS hindcast wave database.

A-59. Tropical Cyclone Selection. The tropical surge database which contains a record of 104 years of tropical storm activity indicated that 21 tropical cyclones have significantly influenced the area represented by station 213, which is the nearest DRP station to the region under study. For this application, a significant influence implies the storm resulted in a surge of at least 0.5-meter at the site in question. The 21 storms identified for Lee County are listed in Table A-11. Individual storm tracks and maximum surge elevations at all nearshore stations are available in the tropical cyclone database summary report (Scheffner et al., 1994). An estimate of the frequency of occurrence of tropical cyclones which impact the project shoreline can be computed as: 21 events/ 104 seasons = 0.201 events per year. This corresponds to a recurrence frequency of roughly one tropical cyclone every five years.

Table A-11

Tropical Cyclones with Influence on Lee County

Storm Number	Date	NHC Database Number (Name)
1	08/04/1901	127
2	10/09/1910	194
3	09/11/1926	276
4	09/22/1929	296
5	08/31/1930	299
6	07/25/1933	324
7	08/31/1933	331
8	08/29/1935	353
9	07/27/1936	362
10	10/12/1944	440
11	10/05/1946	456
12	09/04/1947	461
13	09/20/1947	463
14	09/01/1950	493 (Easy)
15	08/28/1953	521
16	10/07/1953	530 (Hazel)
17	06/18/1959	584
18	06/04/1966	643 (Alma)
19	06/01/1968	662 (Abby)
20	10/13/1968	669 (Gladys)
21	06/18/1982	807

A-60. Extratropical Storm Selection. The DRP extratropical storm database contains 16 winter seasons of storm surge and current hydrographs. Extratropical storms were identified by visual inspection of each season's storm surge hydrographs at DRP Station ~~2~~13. These hydrograph inspections, combined with a general estimation of the frequency of extratropical storms along the gulf coast of Florida, resulted in a 0.3-meter threshold magnitude of the storm surge. In other words, extratropical storms were identified as those events characterized by maximum surge magnitudes which equaled or exceeded 0.3 meters. Analysis of all 16 extratropical storm seasons resulted in a compilation of the storms listed in Table A-12. This table indicates that 9 storms influenced Lee County beaches during the extratropical seasons from 1977 through 1993. It also identifies the approximate date of occurrence and magnitude of the peak storm surge elevation, relative to mean sea level (msl). An estimate of the frequency of occurrence of extratropical storms which impact the project site can be computed as 9 events/16 seasons = .56 events per year.

A-61. Storm Surge and Wave Hydrograph Development. The tropical and extratropical simulations which generated the storm surge characteristics contained in the DRP data base do not include consideration of tides at the time of the storm event. Storm surge modeling was performed with respect to mean sea level; however, total surge elevation, and corresponding beach recession estimates, can be significantly influenced by the magnitude and phasing of the tidal component. Tidal influence was accounted for by assuming that each storm event has an equal probability of occurring at any time during the tidal cycle. For this analysis, that assumption was simplified by allowing the onset of the storm conditions to coincide with four individual tidal phases. Those phases were designated as 0 degrees (high tide), 90 degrees (msl during peak flood), 180 degrees (low tide), and 270 degrees (msl during peak ebb). Tidal constituents of the project site were obtained from the DRP database for computation of tide elevations. The result of combining storm surge and tidal components of the total surge elevation is a four-fold increase in the number of individual storms used in the SBEACH analysis. For example, each individual storm in the original 21-storm tropical database was represented by four storms which differ solely with regard to tidal phasing; therefore, the tropical cyclone database was expanded from 21 to 84 storms, and the extratropical storm database was expanded from 9 to 36 storms.

A-62. The time histories of the storms in question were limited in duration to the periods in which the storms were influencing the project beaches. The appropriate hydrograph durations for extratropical and tropical storms were determined to be 50 hours and 42 hours, respectively. Both extratropical and tropical storm hydrographs were generated with a 1-hour timestep to accomplish compatibility with the hindcasted wave data.

A-63. Wave conditions corresponding to each of the extratropical storms were obtained from the WIS hindcast database, Station G1017. This deepwater wave data was subsequently transformed to nearshore conditions for the depth corresponding to the offshore depth of the profiles used in the SBEACH simulations (i.e. 4.5 meters). This transformation was accomplished using the WAVETRAN application within the Shoreline Modeling System (Gravens, 1992).

Table A-12.
Extratropical Storms with Influence on Lee County

Storm Number	Storm Season	Date	Maximum Surge Height (meters)
-	1977-1978	No Storms	-
1	1978-1979	01/21/79	0.3
2	1979-1980	09/13/79	0.7
3	1980-1981	02/09/81	0.3
-	1981-1982	No Storms	-
4	1982-1983	02/02/83	0.3
5		03/18/83	0.3
6	1983-1984	03/28/84	0.3
-	1984-1985	No Storms	-
7	1985-1986	11/21/85	0.5
-	1986-1987	No Storms	-
-	1987-1988	No Storms	-
8	1988-1989	09/16/88	0.3
-	1989-1990	No Storms	-
-	1990-1991	No Storms	-
-	1991-1992	No Storms	-
9	1992-1993	03/12/93	0.5

A-64. Wave conditions characteristic of tropical cyclones were computed in accordance with procedures specified in the Shore Protection Manual (USACE, 1984). Storm position and intensity values were specified based on information from the National Hurricane Center Tropical Storm Database. Again, the resulting offshore wave data required transformation to the nearshore using the WAVETRAN application.

A-65. SBEACH Model Results. The effects of each of the extratropical and tropical storms for each tide phase were determined through application of SBEACH to each of the four characteristic reaches. From these simulations, the beach recession for each storm was calculated for each reach.

A-66. Significant beach recession was observed for the majority of storm simulations. The characteristic reaches for Estero Island showed a greater maximum recession compared to the Gasparilla Island reaches. For major storm events, the level of recession for all the reaches was quite severe, and the simulation indicated a complete inundation of the profile. The tropical storm runs generally produced greater recession than the extratropical storms. Recession results are summarized in Table A-13.

A-67. Overall, the SBEACH analysis produced appropriate data for the performance of project cost-benefit analysis. The Empirical Simulation Technique (EST) (Borgman et al., 1992), was selected as the joint-probability analysis tool used to establish the relative costs and benefits of the proposed shore protection measures. The relative frequency and level of crosshore recession due to storm damage was quantified based on the SBEACH results for input into the EST analysis.

Table A-13

Recession Results for SBEACH Analysis

Reach (Storm)	Mean Recession (feet)	Maximum Recession (feet)
Reach 1-Extratropical	64	112
Reach 1-Tropical	96	207
Reach 2-Extratropical	73	134
Reach 2-Tropical	105	190
Reach 3-Extratropical	60	143
Reach 3-Tropical	155	373(2)
Reach 4-Extratropical	23	42
Reach 4-Tropical	157	562(2)

Notes: (1) All recession distances are referenced to Mean High Water.
(2) Cases in which complete inundation of the profile occurred.

A-68. Joint-Probability Analysis of Storm-Induced Beach Recession. Proposed shore protection measures must be subjected to a benefit-cost analysis in order to assess whether Federal participation in the project is appropriate. Primary benefits are typically quantified in terms of the reduction of storm-induced damages to existing property and/or structures. In order to quantify those benefits, one must estimate a) the damage potential which exists without the proposed protection measures (i.e., for existing conditions), and b) the damage potential which exists with shore protection measures in place. Benefits are expressed as the reduction in storm-induced damages resulting from the presence of the shore protection measures. In order to account for risks and uncertainties inherent to the analysis procedure, methods were selected to express storm damages in a probabilistic manner. In other words, the results were required in the form of recession versus frequency of occurrence relationships. The Empirical Simulation Technique (EST) (Borgman et al., 1992), was selected as the joint-probability analysis tool used to establish those relationships. The overall beach recession analysis procedure can be described by the following major tasks:

1. Identify storm events which have impacted the study area.
2. Construct or obtain the water surface elevation and wave field hydrographs characteristic of each of the identified storms while in the vicinity of the study site.
3. Apply the numerical model, SBEACH, to estimate the beach recession associated with each of the storm events.
4. Construct EST input data files using descriptive storm parameters and calculated recession values.
5. Use the EST to generate multiple repetitions of multi-year scenarios of storm events and their corresponding beach erosion responses.
6. Analyze the EST simulations to compute recession versus frequency-of-occurrence relationships with associated confidence limits.
7. Apply the resulting recession-frequency curves as input to an appropriate economics-based model for computation of damages, costs, and benefits.

Based on this procedure, recession frequency curves for Gasparilla and Estero Islands were generated, and were presented in Figure A-14A.

LONGSHORE SEDIMENT TRANSPORT

A-69. 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 (CERC, 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.

A-70. Waves. The WIS hindcast, at Station G1017, 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. This data set was used for both Gasparilla and Estero Islands, though the approach applied to the data in both regions differed significantly due to local conditions. The deepwater (WIS Phase II) wave conditions were transformed from a depth of 18 meters to a 10 meter depth (WIS Phase III) using the WAVETRAN transformation model. For Estero Island, the sheltering effects of Sanibel Island were included within the WAVETRAN transformation of the offshore conditions. In this case a 50 degree sheltering (relative to the shore) was used. For Gasparilla Island, no sheltering was applied. Due to the non-uniform

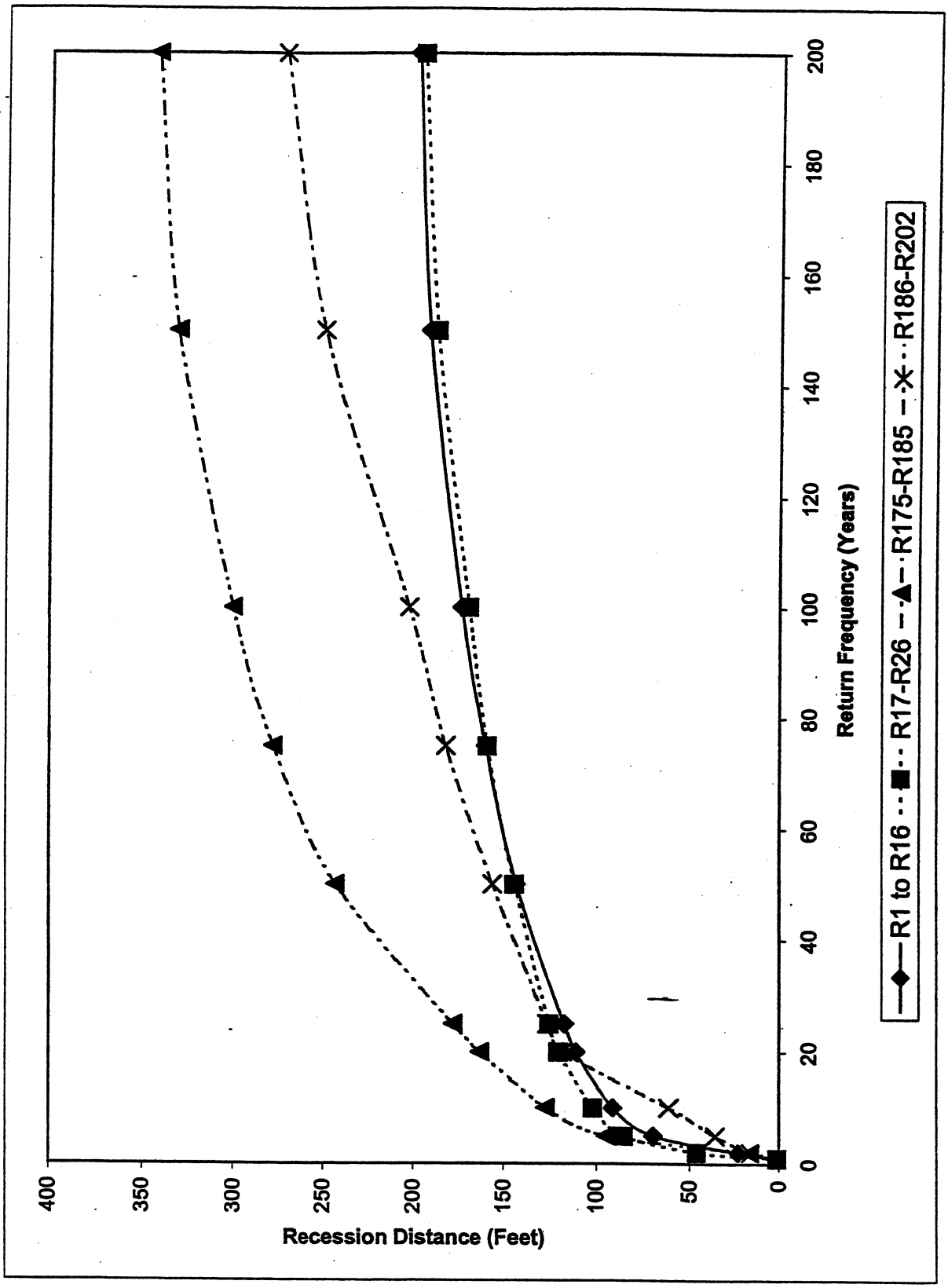


FIGURE A-14a

SHORELINE RECESSION - FREQUENCY CURVES FOR PROJECT AREA

bathymetry adjacent to Estero Island, the external wave refraction model RCPWAVE was used to shoal waves from an intermediate water depth to the nearshore. Due to the fairly uniform bathymetry offshore of Gasparilla Island, the internal wave transformation model contained within the GENESIS software was used. GENESIS accomplishes this transformation by assuming the simplified condition of straight and parallel offshore contours.

A-71. Shoreline Modeling Grid. GENESIS simulations require that a one-dimensional shoreline modeling grid be established. This grid consists of a baseline which roughly follows the local shoreline orientation. The local shoreline is expressed in terms of a distance from this baseline over a regularly spaced grid. For Gasparilla Island a shoreline orientation of 170 degrees (from north) was used. The shoreline grid consisted of 126 cells at a 200 foot spacing, covering a total shoreline distance of 25,200 feet. For Estero Island, a shoreline orientation of 130 degrees was used, and 168 cells were used at a 200 foot spacing, covering a total distance of 33,600 feet. The Gasparilla Island baseline covers a region between FDEP monuments R-1 to R-26, which covers an area from the North Lee County border to Boca Grande Pass. The Estero Island baseline runs from R-175 to R-210, and covers the length of the island from Matanzas Pass to Big Carlos Pass.

A-72. Historical Shoreline Data. Shoreline position (relative to NVGD) were extracted from the 1982 and 1989 FDEP surveys, and the 1995 USACE survey. Offshore data for the RCPWAVE modeling necessary for Estero Island was generated using available survey data from the NOAA bathymetry database. The shoreline data was used to develop shoreline distances relative to the GENESIS baseline. This was accomplished using the programs SHORLROT, CUINTP, and WTSHO, provided in the GENESIS shoreline modeling system (SMS). The Estero Island offshore data was used to develop depth values over a regularly spaced grid relative to the GENESIS baseline and orientation for the RCPWAVE wave transformation model.

A-73. Manmade and Natural Coastal Armor. A variety of coastal structures may be found on both Gasparilla and Estero Islands. On Gasparilla Island the primary structure of interest is a seawall structure which covers a distance of roughly 7,000 feet (Figure A-10). Along much of this region the shoreline has eroded to the point where a sub-aerial beach no longer exists. A considerable number of groins of various types are present in conjunction with the seawall structure, though the impact of these structures appears to be minimal due to the severe lack of sand in this area. South of this feature a smaller combined seawall and groin combination may be found, and further south another series of small groins is present. A 700 foot seawall surrounds a headland extension of the shoreline near the southern extent of the region near Boca Grande Pass. A low terminal groin feature is present at the pass seaward of the lighthouse. Natural rock outcroppings may be found along the length of Gasparilla Island, though the low and sporadic nature of this rock appears to have a negligible effect on longshore sediment transport.

A-74. On Estero Island a nearly continuos, low seawall extends over a distance of 14,000 feet (Figure A-12). In some areas the shoreline has eroded to this structure. South of this structure a small set of groins may be found. The southern region of Estero Island is dominated by an emergent sandbar feature associated with Big Carlos Pass. In this region considerable shoreline changes have been observed, and the sandbar appears to be migrating shoreward. This region is

included within the GENESIS model, though the results are suspect due to the inability of the GENESIS to adequately model the transport processes present.

A-75. The lengths and locations of these shoreline structures were input into the GENESIS model based on data from available surveys and aerial photography. The overall lengths and permeability of the groins was adjusted during the calibration procedure in order to obtain the closest correlation between known and modeled shoreline changes adjacent to the structure.

A-76. Calibration. Calibration of the GENESIS model was accomplished through simulation of measured shoreline changes which occurred between 1982 and 1989. Wave data was derived from the WIS hindcast for the time period between surveys.

A-77. For Gasparilla Island the best correlation between measured and modeled shorelines was achieved with the longshore transport coefficients, K_1 and K_2, assigned values of 0.1 and 0.05, respectively (Figure A-15). Effective grain diameter, D_{50}, with shell content was estimated as 0.32 mm. Average berm height was specified as +5 feet and depth of closure was defined as –13.5 feet NGVD. The prevailing direction of sediment transport was from north to south. Numerous modifications of the armor features and calibration settings were investigated. The GENESIS model, however, consistently modified the shoreline position to reduce the natural undulations present in the area. This behavior was retarded somewhat due to the presence of the seawalls and groins. No combination of input parameters was found that would eliminate the proclivity of the model to distort the shoreline. The best-fit parameters were therefore determined based on the mean values of sediment transport and shoreline change over the entire GENESIS domain. An average calibration/verification error of 35 feet was obtained for the calibration runs, with a maximum longshore transport rate of 105,000 cubic yards/year.

A-78. For Estero Island the best correlation between measured and modeled shorelines was achieved with the longshore transport coefficients, K_1 and K_2, assigned values of 0.4 and 0.2, respectively (Figure A-16). Effective grain diameter, D_{50}, was estimated as 0.16 mm. Average berm height was specified as +5 feet, and depth of closure was defined as –8 feet, NGVD. Again, numerous modifications of the armor features and calibration settings were investigated. A 1986 beach fill in the northernmost region of the domain was estimated based on the published total volume of fill placed (190,000 yd^3). Unlike Gasparilla Island, the prevailing direction of longshore sediment transport was from south to north. This reversal in direction between study regions can be attributed to the sheltering effect of Sanibel Island on the Estero Island wave climate. Over most of the domain a reasonable performance of the model was observed. The major exception to this occurs in the region where the emergent sandbar is present. While the results in this region are poor, it should be noted that several fundamental assumptions of the GENESIS model are violated in this area. The area is also outside the primary region of concern for this study. The best fit parameters were determined based on the mean values of sediment transport and shoreline change over the northern portion of the domain excluding the region associated with the emergent sand bar. A calibration error of 48 feet was obtained for the calibration GENESIS runs, with a maximum transport rate of 59,000 cubic yards/year occurring within the simulations. Nodal behavior in the vicinity of the region of historic transport reversal was also observed.

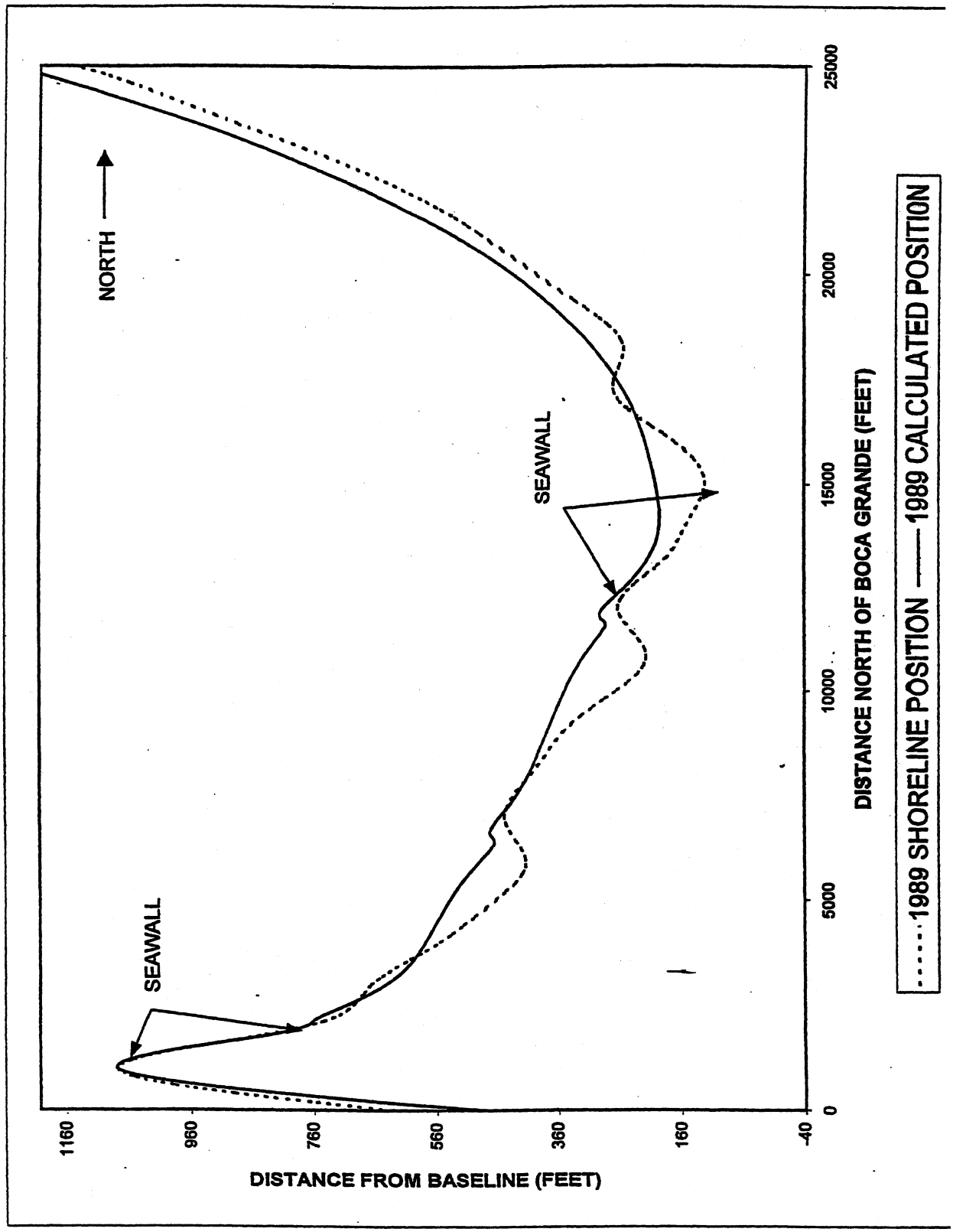


FIGURE A-1

GASPARILLA ISLAND GENESIS CALIBRATION

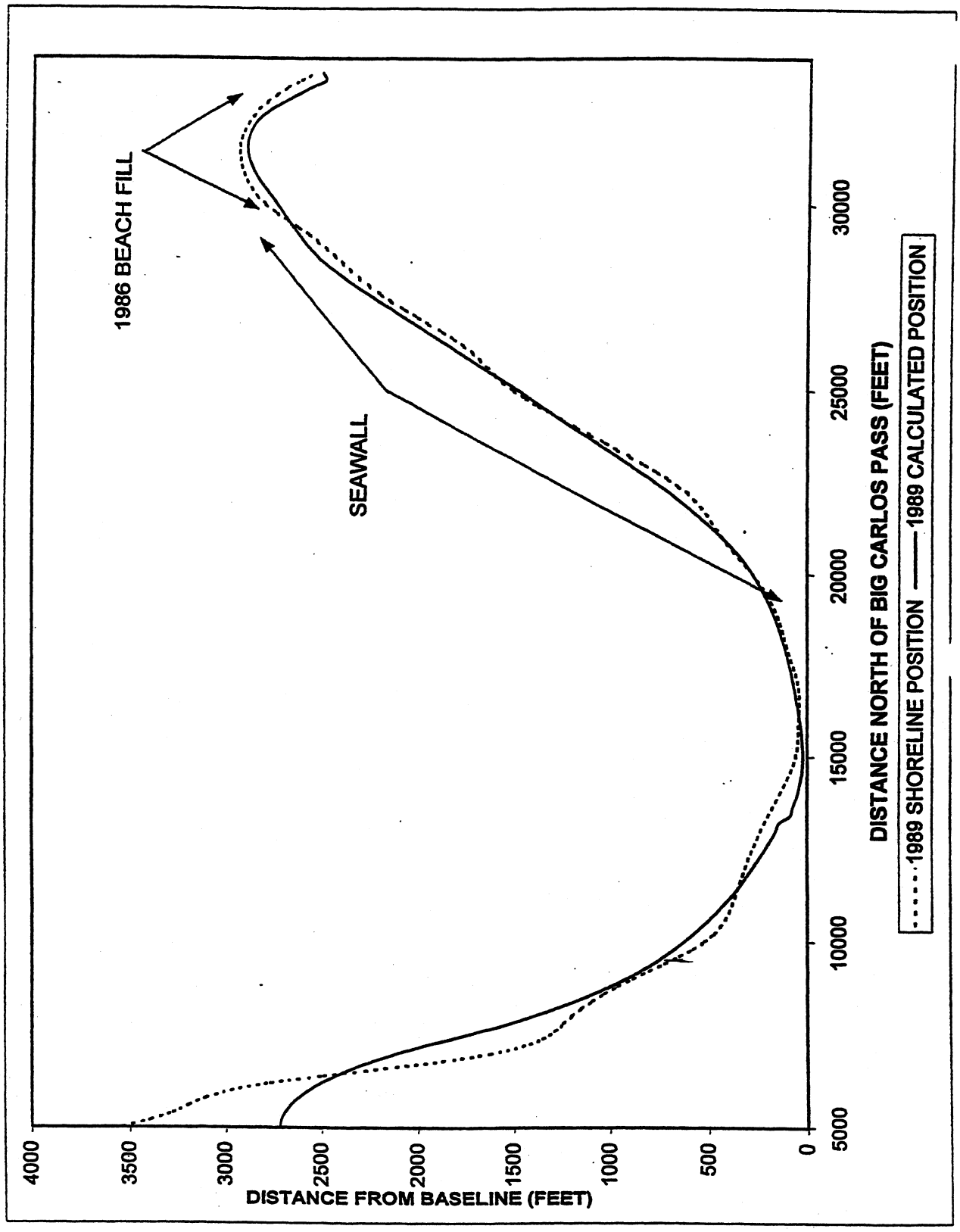


FIGURE A-16

ESTERO ISLAND GENESIS CALIBRATION

A-79. Verification. Verification of the GENESIS model was accomplished through simulation of measured shoreline changes, which occurred between 1989 and 1995. Wave data was derived from the WIS hindcast for the time period between surveys. Input parameters were modified in order to produce the best fit to the observed shoreline change. For Gasparilla Island the tendency of the model to smooth shoreline positions was again observed, and the input parameters prescribed in the calibration procedure produced the best comparison in terms of the mean values of sediment transport and shoreline change over the entire GENESIS domain (Figure A-17). A 1993 beach fill was included within the model based on dredging records of reported fill volume (210,000 yd^3), and published descriptions of the fill location (USACE, 1993). A calibration/verification of 45 feet was calculated for the Gasparilla Island verification run, with a maximum longshore transport rate of 96,000 cubic yards/year.

A-80. For Estero Island, the major discrepancy between the model and observed shoreline change occurred in the region of the emergent sand bar (Figure A-18). A reasonable model performance was observed north of this region. Various combinations of input parameters were tried, though again the initial calibration parameters provided the best results. A calibration/verification of 53 feet was calculated for the Estero Island verification run, with a maximum longshore transport rate of 66,000 cubic yards/year.

A-81. Prediction of Future Shoreline Position. 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, including longshore transport magnitude and direction. To identify representative years, the wave data for each year of record were evaluated using the programs SEDTRAN and WHEREWAV. SEDTRAN provides an estimate of the regional potential longshore gross and net transport based on the input wave data. WHEREWAV tabulates the frequency and average wave height of waves for each of nine incident wave angle bands. The method presented in Gravens and Scott (1993) was used to evaluate the program output, the results of which are presented in Table A-14. Based on this analysis the years 1993, 91, 88, 86, 80, 78, 76 were determined to be most representative of the near term regional wave climate. Wave data for future conditions was constructed based on this result for use in the GENESIS simulations.

A-82. The 1995 shoreline has been adopted as the pre-construction shoreline position. For both Gasparilla and Estero Islands the shoreline has eroded back to the seawall over significant portions of the project area, and no further recession may take place. Fill placement associated with navigation maintenance has occurred on a fairly regular basis and may be assumed to negate any future pre-project retreat over the remaining project area.

A-83. Gasparilla Island GENESIS Model Results. GENESIS model runs were conducted based on the economically optimized MHW extension of 20 feet and the optimized renourishment interval of seven years. Shoreline position was based on the 1995 USACE survey. GENESIS model coefficients were identical to those determined within the calibration and verification procedure. Model results are presented in Figures A-19 and A-20.

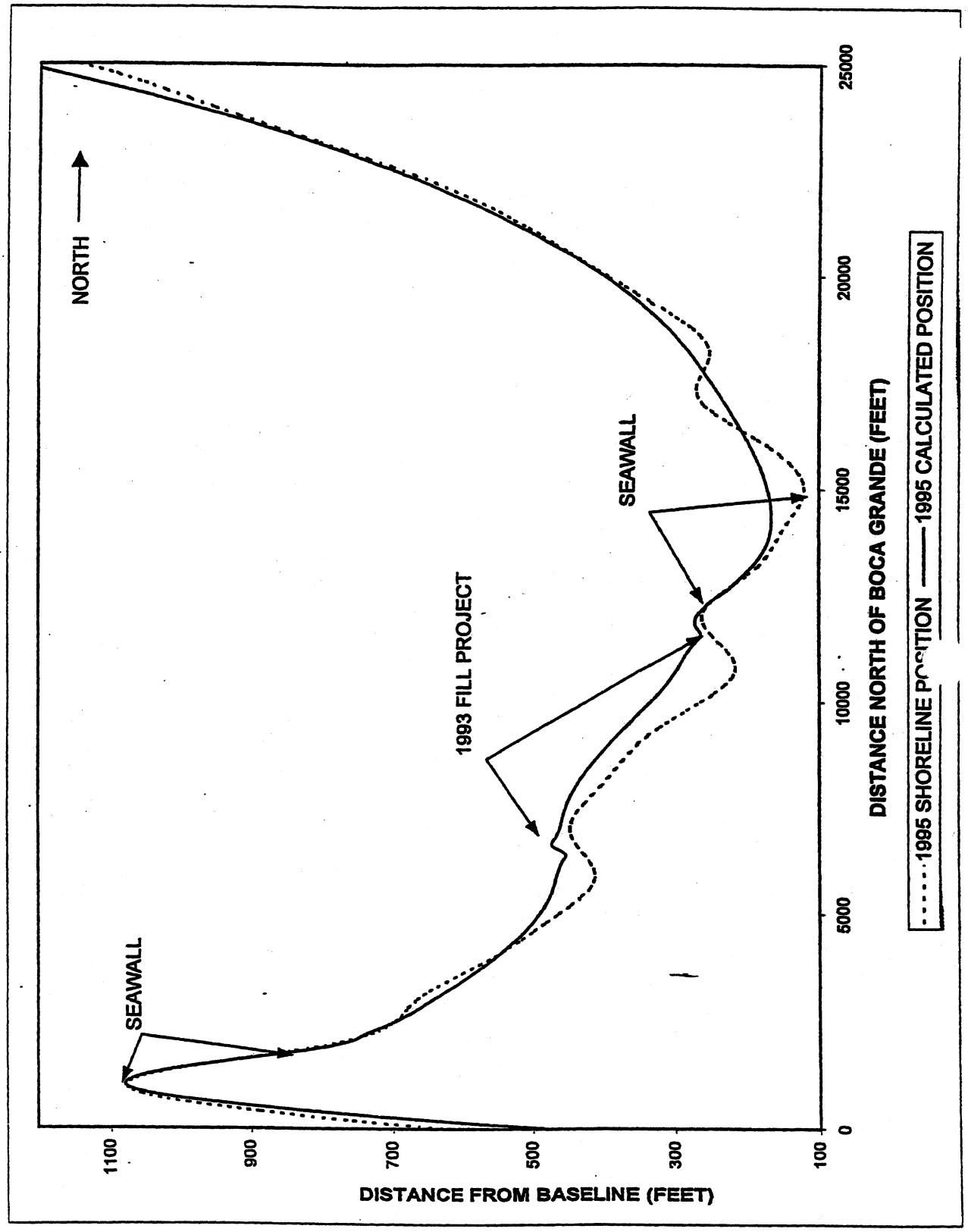


FIGURE A-17

GASPARILLA ISLAND GENESIS VERIFICATION

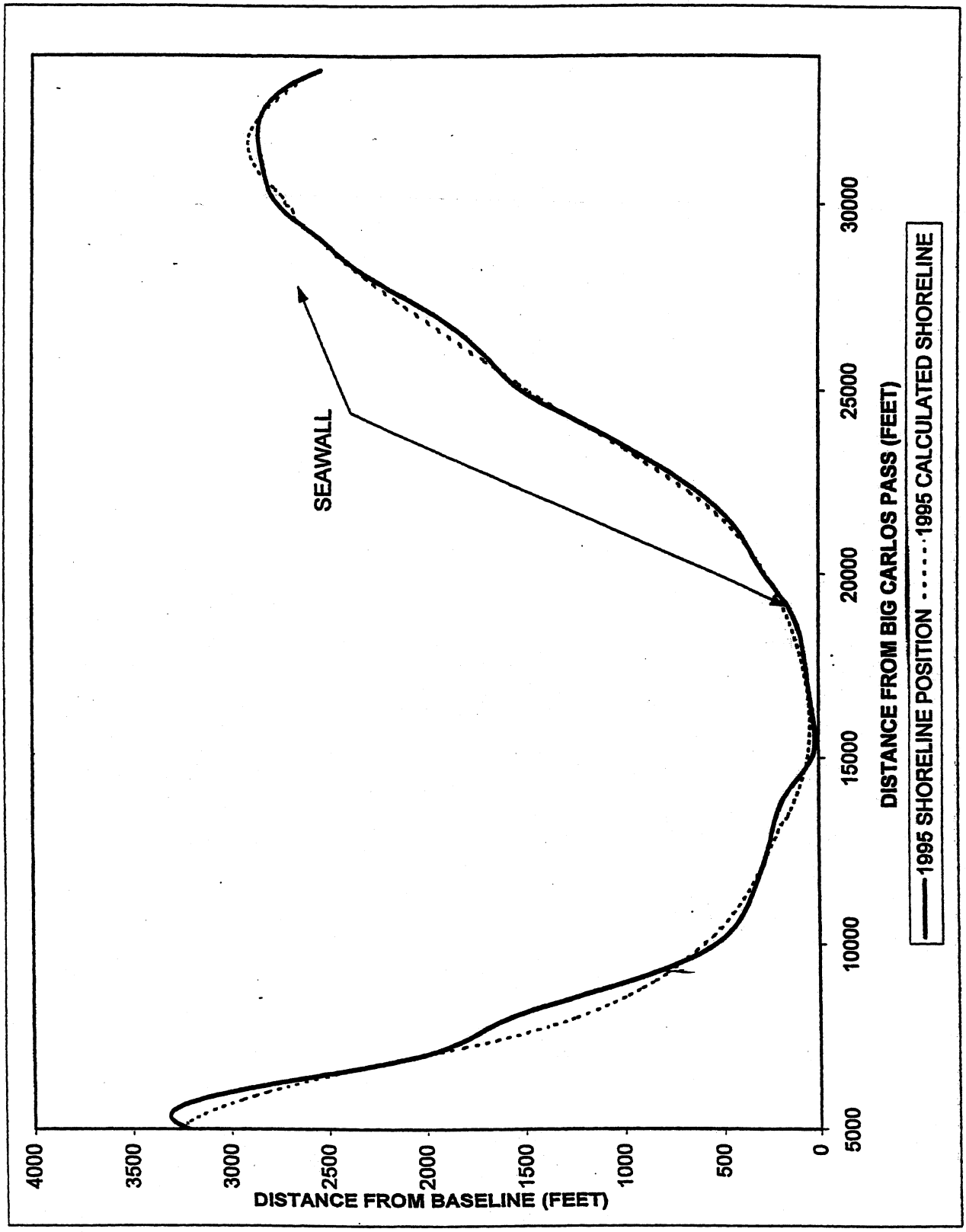


FIGURE A-18

ESTERO ISLAND GENESIS VERIFICATIION

TABLE A-14
SELECTION OF REPRESENTATIVE OFFSHORE WAVE TIME SERIES
LEE COUNTY SHORELINE CHANGE MODEL RESULTS

YEAR	WAVE HEIGHT (ft.) IN ANGLE BAND																		POTENTIAL TRANSPORT RATE (cy / year)				REPRESENTATION POINTS* (1)	
	1		2		3		4		5		6		7		8		9							
	NUM	HT	NUM	HT	NUM	HT	NUM	HT	NUM	HT	NUM	HT	NUM	HT	NUM	HT	NUM	HT	TO NORTH	TO SOUTH	NET	GROSS	POINTS	RANK
1976	3	0.63	27	0.49	35	0.63	12	0.62	36	0.98	85	0.52	43	0.66	71	0.58	0	0.00	(71,000)	32,000	(39,000)	100,000	15	35
1977	0	0.00	45	0.50	17	0.61	16	0.71	60	0.79	100	0.53	49	0.71	46	0.57	0	0.00	(76,000)	21,000	(55,000)	98,000	14	13
1978	1	0.50	44	0.56	30	0.61	21	0.69	61	1.07	78	0.64	44	0.61	54	0.57	0	0.00	(89,000)	48,000	(41,000)	137,000	16	23
1979	1	0.80	59	0.54	33	0.93	27	1.02	74	1.14	69	0.50	37	0.60	48	0.57	0	0.00	(91,000)	100,000	9,000	191,000	15	3
1980	2	0.50	36	0.50	42	0.60	34	0.56	56	0.86	135	0.58	47	0.54	36	0.56	0	0.00	(85,000)	29,000	(56,000)	114,000	16	17
1981	0	0.00	36	0.49	37	0.64	14	0.84	56	1.01	109	0.53	64	0.61	44	0.55	0	0.00	(82,000)	32,000	(50,000)	114,000	15	27
1982	1	0.60	56	0.52	37	0.74	12	0.69	24	0.81	49	0.47	28	0.59	25	0.56	0	0.00	(31,000)	45,000	14,000	76,000	11	26
1983	4	0.57	91	0.52	47	0.74	46	1.24	136	1.00	119	0.54	41	0.60	32	0.60	0	0.00	(11,000)	180,000	169,000	191,000	10	16
1984	0	0.00	33	0.56	34	0.73	26	0.76	84	1.09	77	0.56	30	0.73	46	0.57	0	0.00	(87,000)	53,000	(34,000)	140,000	15	12
1985	2	0.75	56	0.58	68	0.80	38	1.64	84	1.06	109	0.55	41	0.61	36	0.54	0	0.00	(85,000)	320,000	235,000	405,000	10	22
1986	3	0.50	45	0.53	47	0.66	36	0.75	63	0.79	92	0.52	37	0.69	31	0.56	0	0.00	(64,000)	46,000	(18,000)	110,000	17	11
1987	1	0.50	39	0.55	37	0.67	25	1.11	96	0.92	155	0.54	49	0.69	46	0.54	0	0.00	(110,000)	72,000	(38,000)	182,000	15	28
1988	1	0.50	71	0.57	52	0.76	32	0.92	73	1.09	82	0.59	36	0.58	58	0.59	0	0.00	(81,000)	140,000	59,000	221,000	16	31
1989	3	0.50	40	0.52	17	0.55	16	0.64	40	0.77	74	0.51	64	0.62	41	0.61	0	0.00	(65,000)	17,000	(48,000)	82,000	14	1
1990	1	0.50	28	0.47	19	0.63	18	0.69	27	0.84	110	0.51	28	0.63	31	0.59	0	0.00	(53,000)	24,000	(29,000)	77,000	13	2
1991	5	0.50	59	0.56	62	0.62	18	0.86	30	0.95	110	0.52	40	0.63	42	0.57	0	0.00	(67,000)	62,000	(5,000)	129,000	17	24
1992	1	0.50	37	0.57	46	0.70	24	1.30	67	0.86	162	0.57	53	0.51	36	0.51	0	0.00	(87,000)	92,000	5,000	179,000	15	21
1993	3	0.50	40	0.56	50	0.67	29	0.82	82	0.99	132	0.52	54	0.63	40	0.60	0	0.00	(92,000)	68,000	(24,000)	160,000	18	5
1994	4	0.50	65	0.49	28	0.76	17	0.87	56	1.07	86	0.62	62	0.62	45	0.56	0	0.00	(130,000)	57,000	(73,000)	187,000	14	20
1995	3	0.50	89	0.54	97	0.71	52	0.76	74	0.97	89	0.63	75	0.65	51	0.56	0	0.00	(120,000)	110,000	(10,000)	230,000	13	30
25 YEAR AVERAGE AND STANDARD DEVIATION																								
AVG.	2	0.47	50	0.53	42	0.70	26	0.88	64	0.95	101	0.55	47	0.63	43	0.57	0	0.00	(78,850)	77,400	(1,450)	156,150		
S.D.	1	0.21	18	0.03	18	0.09	11	0.26	26	0.11	28	0.04	14	0.05	10	0.02	0	0.00	26,562	69,101	74,662	73,464		
REPRESENTATIVE TOLERANCE																								
A.+S.D.	3	0.68	68	0.56	60	0.76	37	1.14	90	1.07	129	0.59	62	0.68	53	0.59	0	0.00	(52,288)	146,501	73,212	229,614		
A.-S.D.	1	0.25	32	0.50	23	0.61	15	0.63	38	0.84	73	0.50	33	0.57	33	0.55	0	0.00	(105,412)	8,299	(76,112)	82,686		

(1): USED IN SELECTION OF REPRESENTATIVE YEARS FOR WAVE DATA

- ONE POINT ASSIGNED FOR EACH CATEGORY WITHIN ONE STANDARD DEVIATION OF MEAN VALUE.

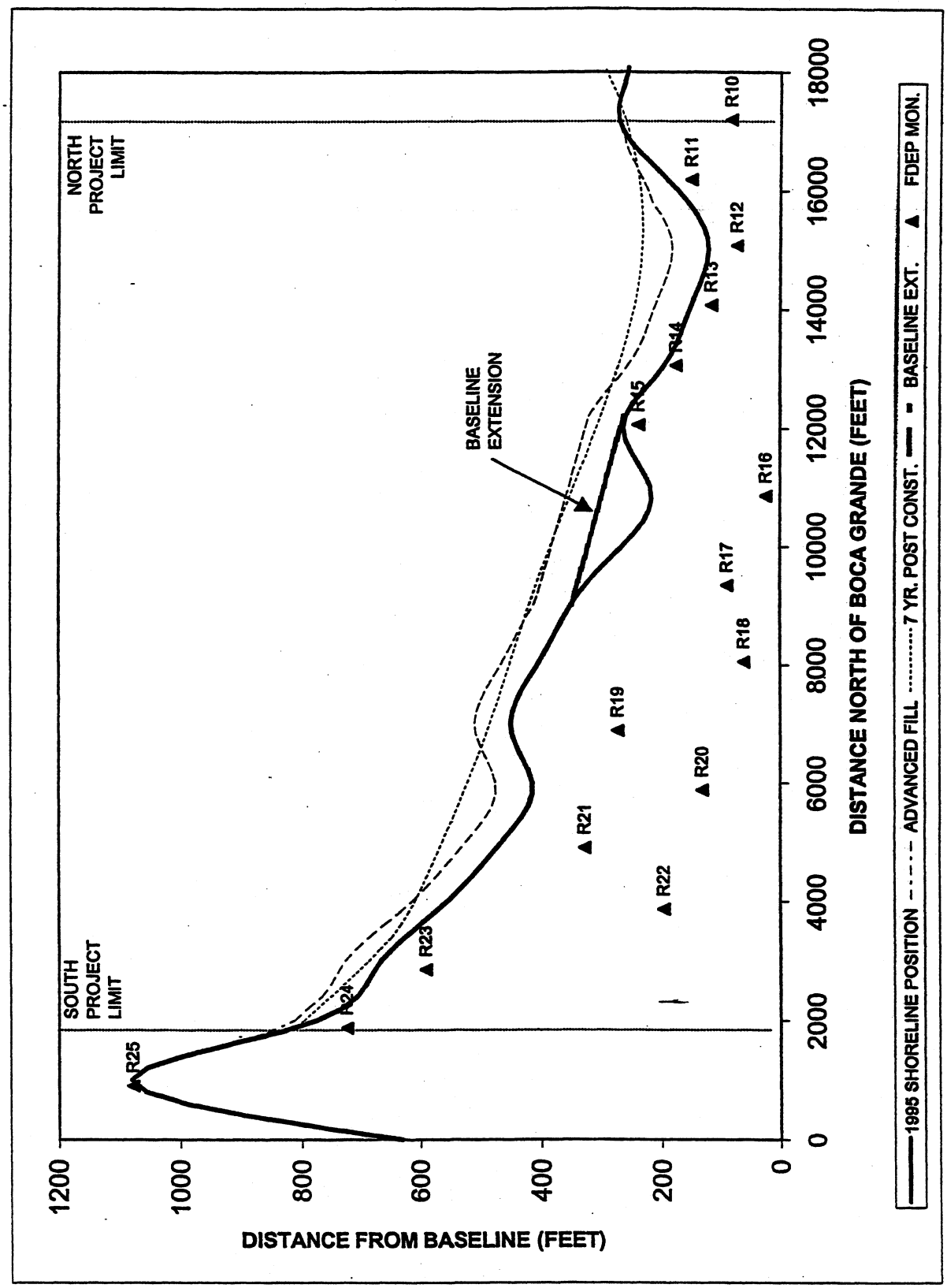


FIGURE A-19

GASPARILLA GENESIS PREDICTED PROJECT SHORELINE LOCATION

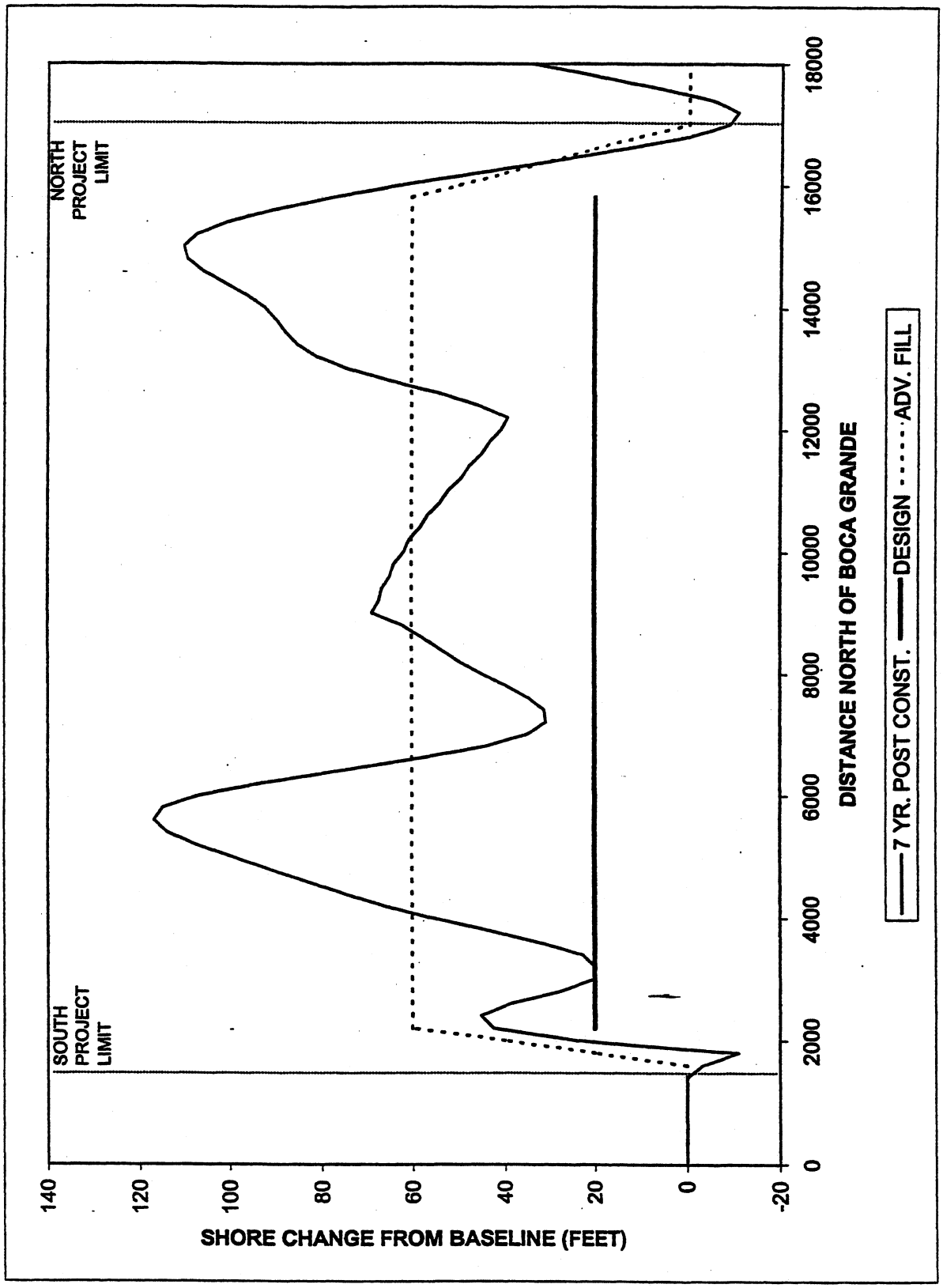


FIGURE A-20

GASPARILLA GENESIS PREDICTED SHORELINE CHANGE

A-84. Initial model runs indicated the need for the extension of the fill baseline in the vicinity of FDEP monument R-16. This extension provides for a more uniform shoreline orientation and reduces the high erosion rate observed in this region within the GENESIS simulations. This region has historically exhibited a high erosion rate, which is in part due to the curvature in the shoreline and the presence of an extensive seawall to the north.

A-85. Advanced nourishment was initially determined based on the background erosion rate of 2.3 cubic yards per linear foot. The magnitude and distribution of advanced fill was then modified based on GENESIS runs in an iterative procedure. A uniform placement of advanced fill was found to be adequate in maintaining the design berm width over the seven year renourishment cycle. An extension of the shoreline of 40 feet beyond the 20-foot design extension was required.

A-86. Diffusion losses from the project were minimized by tapering the north and south ends of the project. The overall length and placement of the taper section was again developed based on iterative GENESIS simulations. For the northern extreme of the project, a 1,400 foot taper was added to the north of FDEP monument R-11. This taper follows a naturally occurring curve in the shoreline, improving the performance of the taper section. At the southern extreme, a 600 foot taper was used beginning at FDEP monument R-24. The project is tapered towards the armored headland feature, which acts as a barrier to sediment transport from the project area.

A-87. GENESIS simulations were performed to evaluate the potential effects of an additional terminal structure at the southern end of the project on shoreline position and advanced fill requirements. Simulation performance, however, suggests that the armored headland feature present at FDEP monument R-25 acts as a barrier to sediment transport from the project and no additional improvement may be gained from any additional terminal structures.

A-88. Estero Island GENESIS Model Results. GENESIS model runs were conducted based on the economically optimized MHW shoreline extension of 40 feet and the optimized renourishment interval of three years. Shoreline position was based on the 1995 USACE survey. GENESIS model coefficients were identical to those determined within the calibration and verification procedure. Model results are presented in Figures A-21 and A-22.

A-89. Advanced nourishment was initially determined based on the background erosion rate of 2.3 cubic yards/year per linear foot. The magnitude and distribution of advanced fill was then modified based on GENESIS runs in an iterative procedure. A uniform extension of the shoreline of 24 feet beyond the design dimensions was found to be adequate over most of the project length. In the region from R-195 to R-198 and additional extension of 40 feet proved necessary in order to maintain the integrity of the design over the renourishment interval. This region coincides with a historic mean longshore sediment transport nodal point, reinforcing the need for additional fill in this area.

A-90. Tapering the placement of fill minimized diffusion losses from the southern end of the project. The overall length and placement of the taper was again developed based on iterative GENESIS simulations. A 2,000 foot taper beginning at FDEP monument R-198 extends to the south of the project area. At the north end of the project, a 2,000 foot taper of the advanced fill

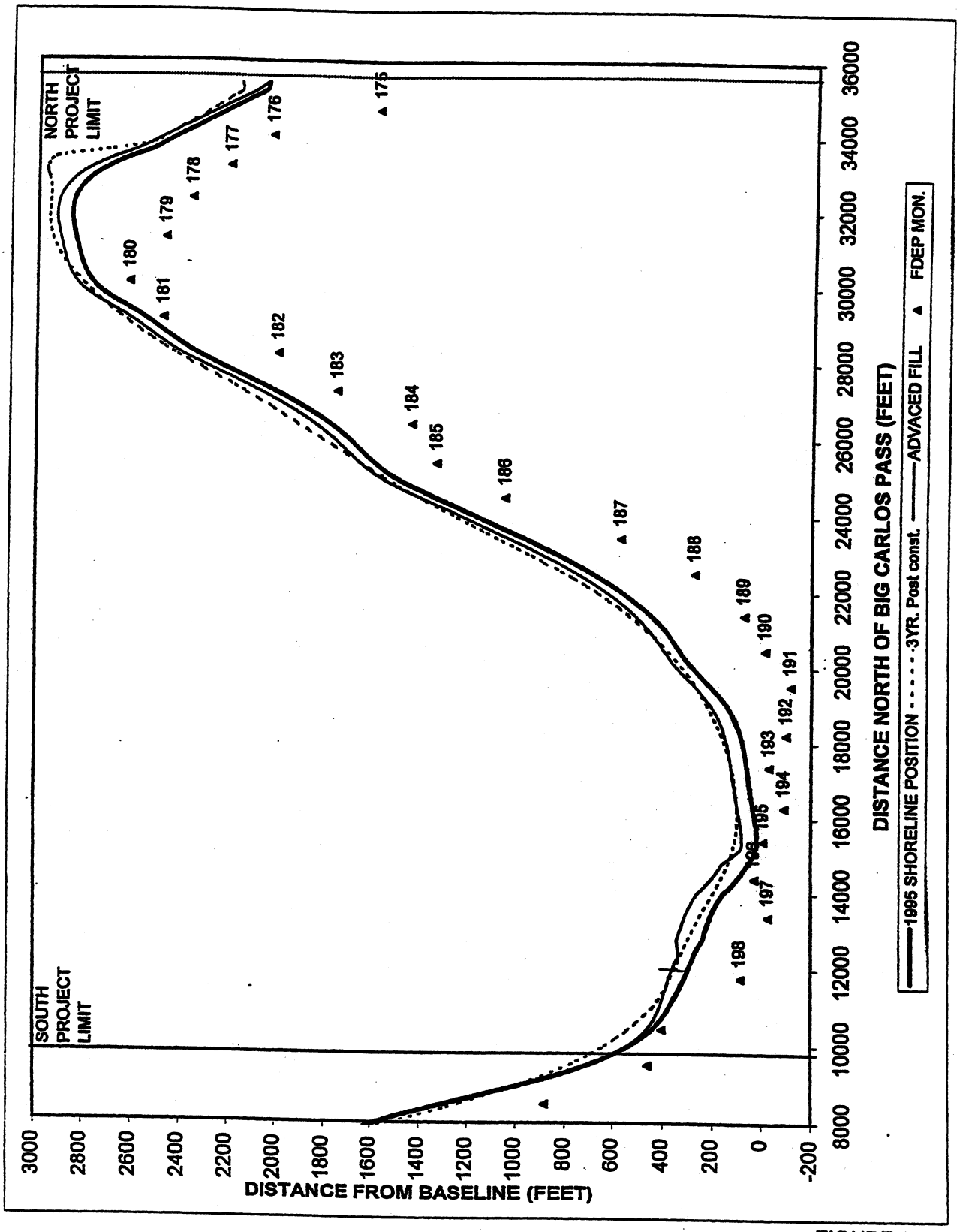


FIGURE A-21

ESTERO GENESIS PREDICTED PROJECT SHORELINE LOCATION

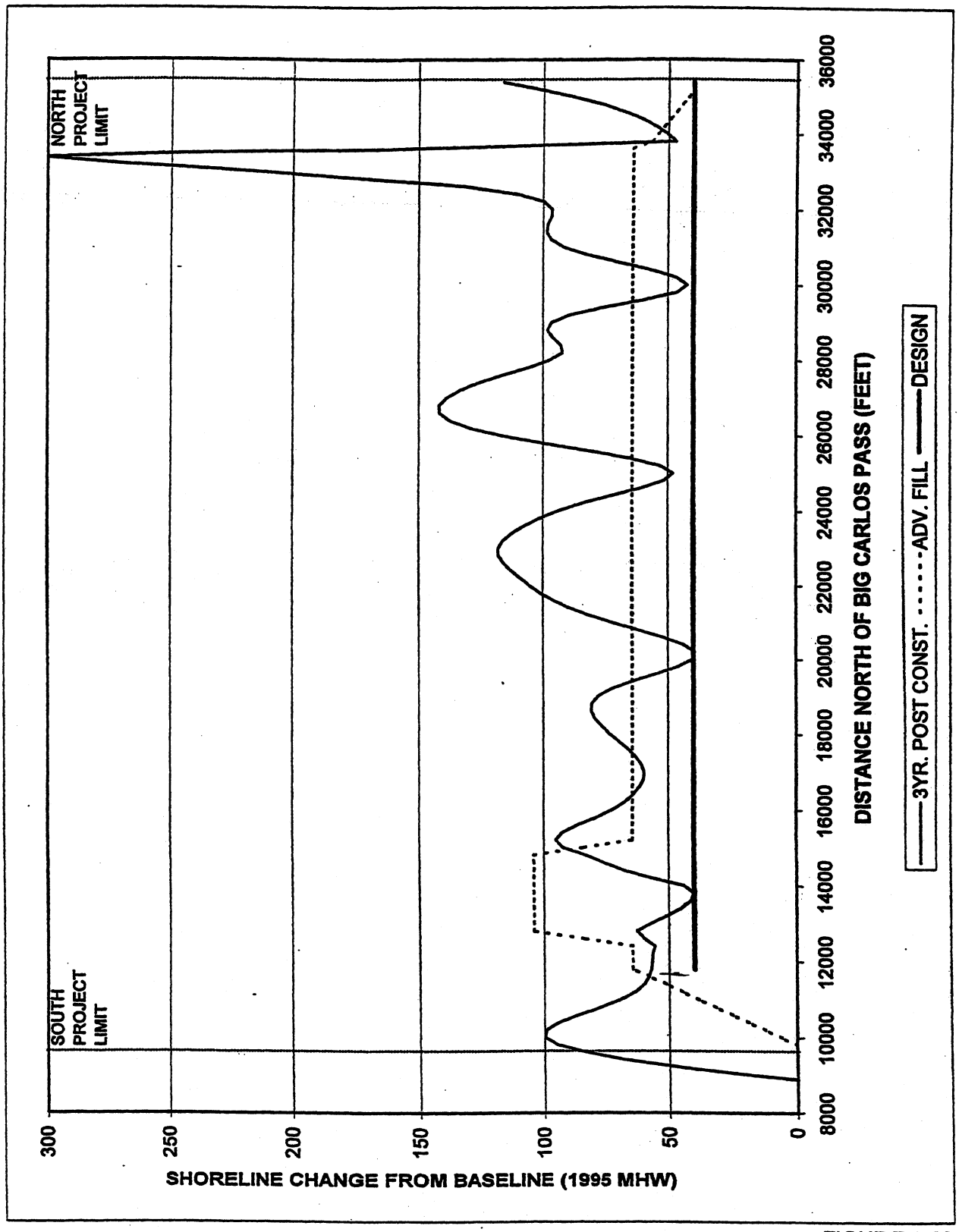


FIGURE A-22

ESTERO GENESIS PREDICTED PROJECT SHORELINE CHANGE

was added at the north end of the project beginning at 400 foot north of R-176. The design dimensions, however, were maintained to the boundary of the project due to the placement of a terminal structure at this boundary.

A-91. Additional GENESIS simulations were performed to evaluate the potential effects of a terminal structure at the northern end of the project on shoreline position and advanced fill requirements. Successive runs indicated that significant reductions in the magnitude of required advanced fill could be attained through the placement of a terminal structure at the northern boundary of the project. The reduction in advanced fill verses structure length is presented in Table A-15. Furthermore, the placement of a structure in this region would impede the movement of sand from the project area northward into Matanzas Pass and the nearby navigation channel.

Table A-15

Reduction In Advanced Fill Required Versus Jetty Length For Estero Island Northern Boundary

JETTY LENGTH[1] (FEET)	ADVANCED FILL PERCENT REDUCTION	ADVANCED FILL VOLUME REDUTION (CU. YDS.)
50	2.3	9,289
100	4.6	18,578
150	8.3	33,521
>150	8.3	33,521

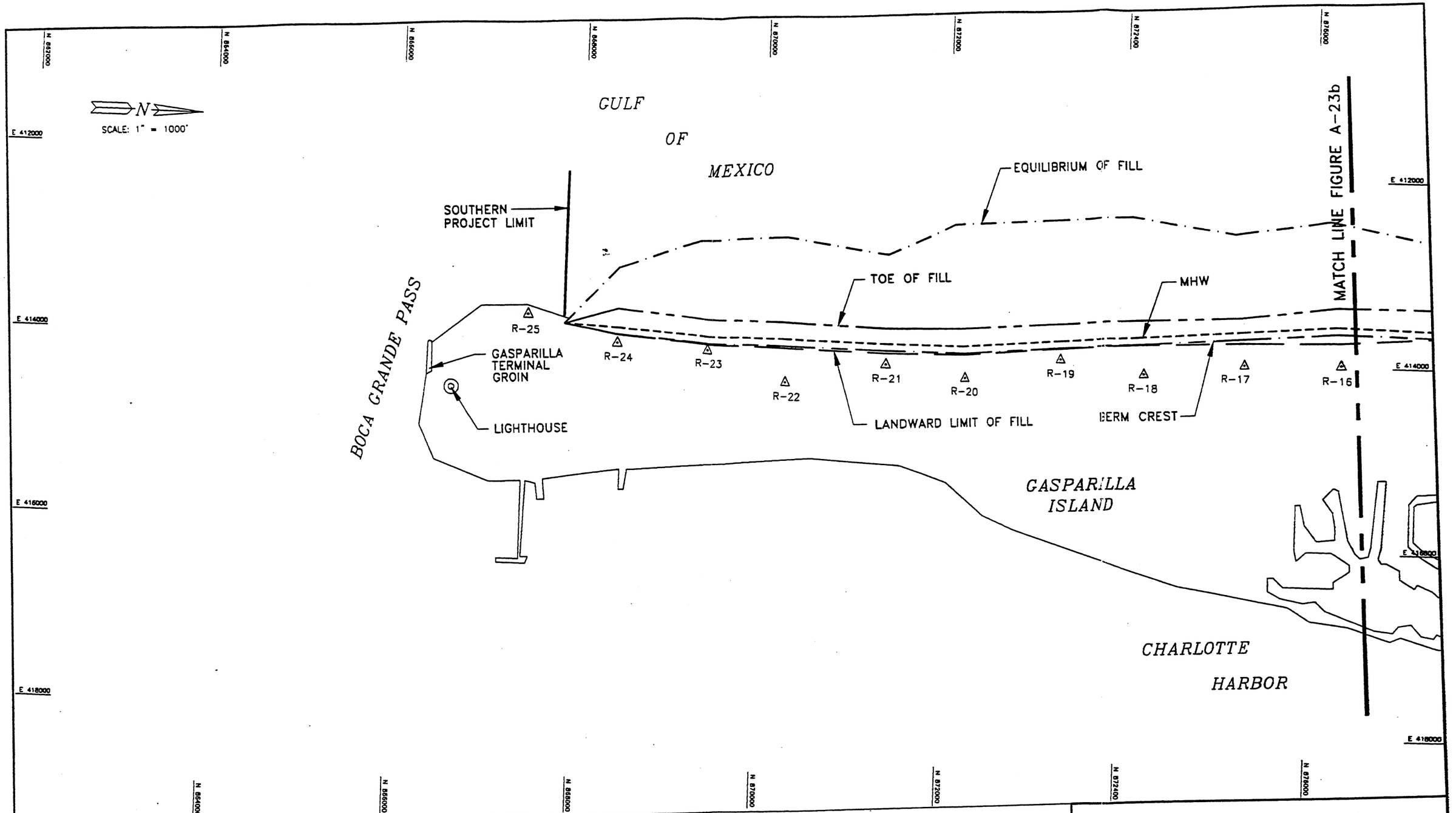
Notes:
(1): Jetty length measured from MHW position seaward.

GASPARILLA ISLAND PROTECTIVE BEACH DESIGN

A-92. Based on the analysis and modeling efforts documented herein, a plan for nourishment of Gasparilla Island has been formulated. A detailed description of the resulting plan is presented here. Distances to various dimensions of the project relative to FDEP monuments are presented in Table A-16 and Figure A-23a and A-23b.

Project Length

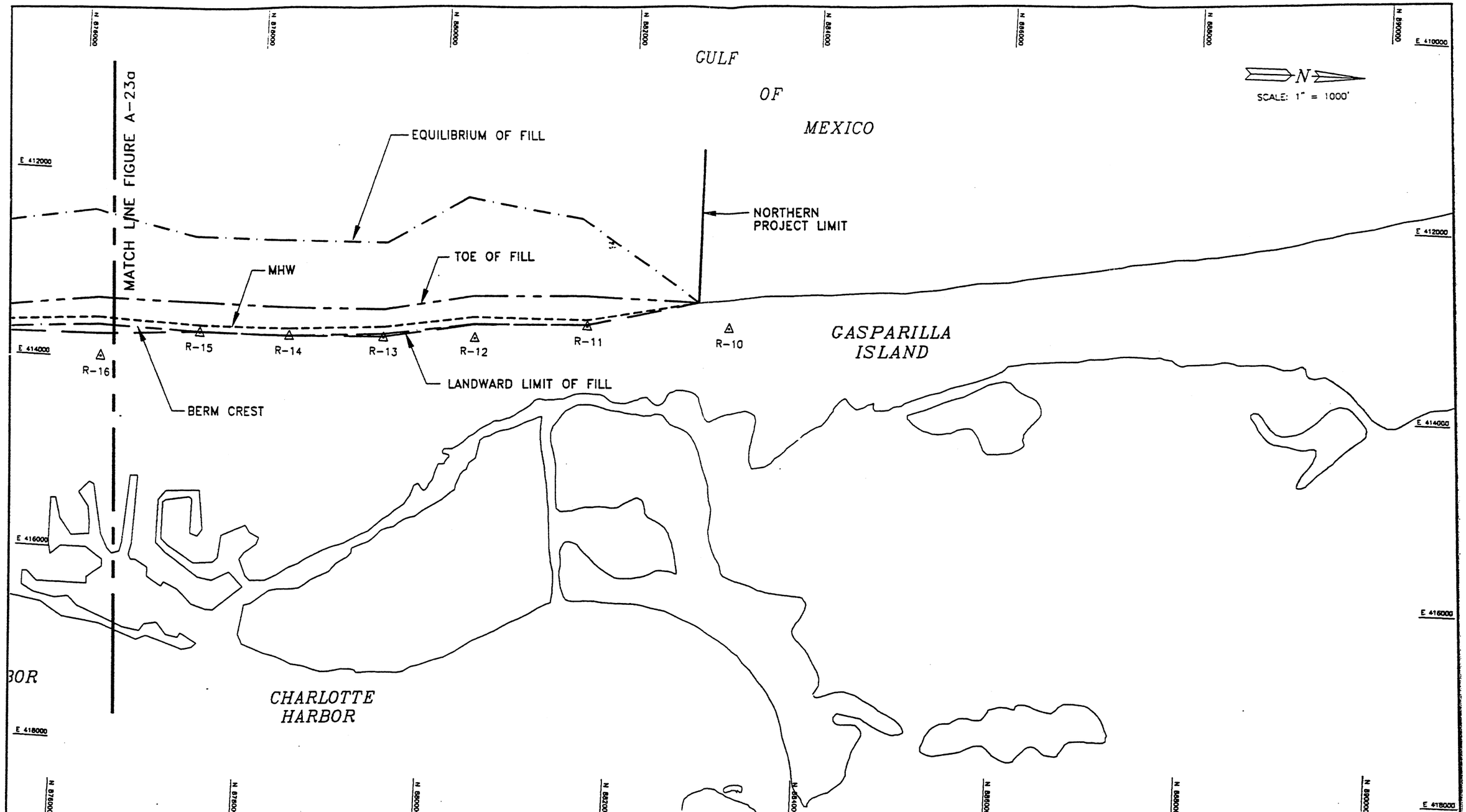
A-93. Approximately 2.8 miles of the Gasparilla Island shoreline are considered for nourishment. The south limit of the proposed beachfill is located at FDEP monument R-24. A 600-foot taper section connects the proposed beachfill with the existing southern shoreline. The northern limit of the renourishment area is defined as FDEP monument R-11. A 1,200 foot long taper section connects the proposed beach fill with the existing shoreline.



GASPARILLA ISLAND
PROTECTIVE BEACH DESIGN

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

FIGURE A-23a



GASPARILLA ISLAND
PROTECTIVE BEACH DESIGN

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2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

FIGURE A-23b

TABLE A-16
GASPARILLA ISLAND DESIGN POSITIONS RELATIVE TO FDEP MONUMENTS

FDEP MONUMENT	DISTANCE FROM FDEP MONUMENT IN FEET				
	LANDWARD EXTENT OF DESIGN	DESIGN BERM CREST	DESIGN MHW POSITION(1)	CONSTRUCTION TOE OF FILL(2)	EQUILIBRIUM TOE OF FILL(3)
R-11	16	16	66	318	1,132
R-12	145	149	223	445	1,483
R-13	12	38	113	299	996
R-14	2	2	78	297	999
R-15	8	8	74	314	1,008
R-16	234	337	409	618	1,552
R-17	232	277	352	504	1,406
R-18	314	320	395	579	1,697
R-19	114	120	195	379	1,497
R-20	253	268	343	534	1,653
R-21	118	145	220	387	1,179
R-22	367	388	463	643	1,559
R-23	61	71	146	331	1,176
R-24	89	92	164	366	806

NOTES:
(1) BASED ON A MHW POSITION OF 0.87 FEET RELATIVE TO NGVD.
(2) BASED ON 1:10 CONSTRUCTION SLOPE.
(3) BASED ON PROFILE TRANSLATION.

Project Baseline

A-94. The project is defined in terms of a MHW extension. Over most of the project, the 1995 MHW shoreline position has been adopted as the project baseline. The Gasparilla Island project is defined as a 20 foot extension of the baseline. Within the region from R-15 to R-17 an extension of the project baseline was incorporated into the design based on GENESIS model results. The baseline extension consists of an advance from the 1995 MHW position of 5 feet at R-15, 84 feet at R-16 and 14 feet at R-17. This extension of the baseline in this region is necessary to straighten a deficit in the shoreline position due to the presence of the seawall structure immediately to the north. The region has historically been starved of sediment by the updrift structure. The baseline extension compensates for this condition.

Berm Elevations

A-95. Based on the existing natural berm elevation, a +5 foot (relative to MLW) design berm has been chosen. This value represents an increase from the authorized project height of +4 feet (relative MLW). The increased berm elevation approximates the naturally existing berm (where present), and was selected as a more appropriate elevation for design considerations.

Berm Widths

A-96. Based on economic considerations, a MHW extension of 20 feet was found to provide the optimum ratio between project costs and benefits. Additional fill is required to maintain this berm width over the optimized renourishment interval.

Beach Slopes

A-97. For Gasparilla Island, the native beach slope is estimated as 1 (vertical) on 15 (horizontal) above MLW and 1 on 25 below MLW. This estimate is based on the average slope of the 1995 USACE survey. Profiles in the vicinity of shoreline protective structures were not considered in this estimate since the presence of these structures may produce an artificially steep cross-shore slope estimate. A construction slope of 1 on 10 was also adopted.

Design Fill Volume

A-98. The design template was determined based on a 20 foot MHW extension and a 1:15 and 1:25 slope above and below MLW, respectively. 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. This was accomplished through a translation of the existing profile seaward to a distance such that the translated profile is entirely seaward of the design template. While the design template represents the threshold dimensions of the project, volumes estimated based solely on the design template generally under represent the required volume necessary to maintain the design template. Volumes for both the design template and additional translated volume are presented in Table A-17.

TABLE A-17
GASPARILLA ISLAND TOTAL FILL VOLUME REQUIREMENTS

FDEP MONUMENT	DISTANCE (FT.) (1)	DISTANCE ALONG BASELINE (FT.)	DESIGN VOLUME (CU. YDS.)(2)	ADDITIONAL TRANSLATED VOLUME (CU. YDS.)(3)	TOTAL DESIGN VOLUME (CU. YDS.)	ADVANCE FILL VOLUME (CU. YDS.)(4)	TOTAL FILL VOLUME (CU. YDS.)(5)	VOLUME BEHIND BASELINE (CU. YDS.)(6)
NORTH TAPER	1,200	1,200	*	5,778	5,778	17,333	28,889	*
R-11	1,358	2,558	2,834	6,015	8,849	36,716	54,414	84
R-12	1,099	3,657	4,162	4,868	9,030	29,714	47,774	1,811
R-13	1,011	4,668	14,598	1,612	16,210	27,334	59,754	3,271
R-14	1,012	5,680	8,486	4,267	12,753	27,361	52,867	954
R-15	1,070	6,750	17,401	6,533	23,934	28,930	76,798	638
R-16	1,073	7,823	33,882	19,662	53,544	29,011	136,099	2,492
R-17	1,041	8,864	15,596	6,936	22,532	28,146	73,210	2,790
R-18	1,004	9,868	5,797	2,722	8,519	27,145	44,183	2,097
R-19	1,015	10,883	5,861	2,751	8,612	27,443	44,667	2,120
R-20	985	11,868	6,006	3,781	9,787	26,631	46,205	3,045
R-21	992	12,860	12,266	6,172	18,438	26,821	63,697	3,455
R-22	1,018	13,878	11,834	4,634	16,468	27,524	60,460	2,793
R-23	930	14,808	17,026	6,689	23,715	25,144	72,574	1,812
R-24	1,010	15,818	8,553	578	9,131	27,307	45,569	677
SOUTH TAPER	600	16,418	*	2,889	2,889	8,667	14,445	*
TOTAL	**16,418**	*	**164,302**	**80,109**	**244,411**	**421,227**	**665,638**	**28,039**

NOTES:

(1): PROJECT EXTENDS FROM 1,200 FEET NORTH OF FDEP MONUMENT R-11 SOUTH TO 600 FEET BEYOND R-24

(2): BASED ON A 20 FOOT BERM EXTENSION AND 5 FOOT (RELATIVE MLW) BERM ELEVATION WITH 1:15 ONSHORE AND 1:25 OFFSHORE SLOPE

(3): TRANSLATED PROFILE SEAWARD OF LINEAR PROFILE: VOLUME DIFFERENCE

(4): ADVANCED FILL BASED ON SEVEN YEAR NOURISHMENT INTERVAL

(5): BASED ON AN OVERFILL FACTOR OF 1.0

(6): BASELINE CONSISTS OF THE 1995 MHW POSITION EXEPT IN THE VICINITY OF FDEP MONUMENTS R-15 TO R-17

Fill Volume Behind Baseline

A-99. For the Gasparilla Island segment, fill volumes behind the baseline are presented in Table A-17. A total volume of 28,000 cubic yards of fill will be required over the entire segment length. This equates to an average fill requirement of 1.9 cubic yards/linear foot.

Advanced Nourishment

A-100. The required volume of advanced nourishment was based on expected long term volumetric losses over the renourishment cycle. The optimum renourshment cycle was determined on an economic basis, which represents the lowest average annual equivalent cost of maintaining the project. For the Gasparilla Island design, the optimum renourshment cycle was determined to be seven years.

A-101. Initial advanced nourishment volume was based on historical volume change analysis and numerical modeling of with-project conditions. The background erosion rate was calculated based on a rate of 2.3 cubic yards per year per linear foot of shoreline. This represents an annual loss of 34,000 cubic yards per year over the entire 2.8 mile project length. This rate corresponds to the historic rate observed for the project area from 1989 to 1995. Additional losses are incurred due to diffusion of sand from the project area. To quantify this effect, successive GENESIS model simulations were undertaken to determine the required magnitude and distribution of advanced fill. Based on this analysis, the magnitude of advanced fill required to maintain the project dimensions over the seven year renourishment cycle was calculated as 421,200 cubic yards, including advanced volume associated with taper sections. A uniform placement of advanced fill was adopted based on GENESIS model output. Allowing for the long term loss of 34,000 cubic yards/year results in a total additional loss of 26,000 cubic yards/year due to diffusive effects (13,000 from each end).

Future Periodic Nourishment

A-102. Estimation of project performance has been undertaken based on historical shoreline behavior and numerical simulation. Initial estimates of future periodic nourishment are based on this information. The future periodic nourishment volume is assumed to be equal to the volume determined for the initial seven year renourishment cycle. For Gasparilla Island this volume was estimated as 421,200 cubic yards. Modifications of the level of periodic nourishment may be undertaken based on monitoring of future project performance.

Overfill Volume

A-103. Geotechnical investigation of the borrow areas for Gasparilla Island detailed in Appendix B indicate that the borrow area grain size is greater than that observed on the native beach. Therefore no additional modification of fill volume is required, resulting in an overfill ratio of 1.0.

A-104. Two borrow areas were defined for the Gasparilla Island renourishment project area based on vibracores obtained in 1996. Borrow Area 1 lies approximately 3,000 feet offshore of

the south end of Gasparilla Island. The borrow area contains 6,100,000 cubic yards of clean medium grain sand (0.29 mm) which is moderately sorted (0.96). Compatibility analysis of this borrow area with the Gasparilla Island Project area found the borrow area to be unsuitable.

A-105. Borrow Area 2 lies on the shoal to the north of Boca Grande Pass navigation channel. The borrow area contains 7,780,000 million cubic yards of beach quality fill material. The mean grain size is 1.25 phi (0.42 mm) with a sorting value of 1.74, or poorly sorted. Compatibility analysis found the borrow areas to be suitable for beach fill for the Gasparilla Island beach project. Additional studies recommended for the borrow area include a cultural resource study and magnetometer survey.

ESTERO ISLAND PROTECTIVE BEACH DESIGN

A-106. Based on the analysis and modeling efforts documented herein, a plan for nourishment of Estero Island has been formulated. A detailed description of the resulting plan is presented here. Distances to various dimensions of the project relative to FDEP monuments are presented in Table A-18 and Figures A-24a and A-24b.

Project Length

A-107. Approximately 4.7 miles of the Estero Island shoreline are considered for nourishment. The north limit of the proposed beach fill is located at FDEP monument R-175. The southern limit of the renourishment area is defined as R-198. A 1,800 foot long taper section connects the proposed beach fill with the existing shoreline to the south.

Project Baseline

A-108. The project is defined in terms of a MHW extension. The 1995 MHW shoreline position has been adopted as the project baseline. The Estero Island project is defined as a 40 foot extension of the baseline.

Berm Elevations

A-109. Based on the existing natural berm elevation, a +5 foot (relative to MLW) design berm has been chosen. This value represents an increase from the authorized project value of +5 feet (relative MLW). The increased berm elevation approximates the naturally existing berm (where present), and was deemed a more reasonable choice for design considerations.

Berm Widths

A-110. Based on economic considerations, a MHW extension of 40 feet was found to provide the optimum ratio between project costs and benefits. Additional fill is required to maintain this berm width over the optimized renourishment interval.

the south end of Gasparilla Island. The borrow area contains 6,100,000 cubic yards of clean medium sand and is well suited for beach nourishment. Compatibility analysis of the borrow area with the Gasparilla Island Project area found the borrow area to be compatible.

A-105. Borrow Area 1 has an inlet to the south of Boca Grande Pass navigation channel. The borrow area contains 7,780,000 million cubic yards of beach quality fill material. The mean grain size is 1.35 phi (0.41 mm) with a sorting value of 1.75, or poorly sorted. Compatibility analysis found the borrow area to be suitable for beach fill on the Gasparilla Island beach project. Additional studies recommended for the borrow area include a cultural resource study and nearshore survey.

BEACHES ISLAND PROTECTIVE REALIGN DESIGN

A-106. Based on the analysis and modeling efforts documented herein, a plan for nourishment of Beach Island has been formulated. A detailed description of the recycling plan is presented here. Discussion of various dimensions of the project relative to FDEP monitoring are presented in Table A-14 and Figures A-23a and A-23b.

Project Length

A-107. Approximately 4.7 miles of the Beach Island shorelines are considered for nourishment. The north limit of the proposed beach fill is located at TR73 monument R-123. The southern limit of the recommended area is defined as R-138. A 1,300 foot long jetty section connects the proposed beach fill with the existing shoreline to the south.

Project Alignment

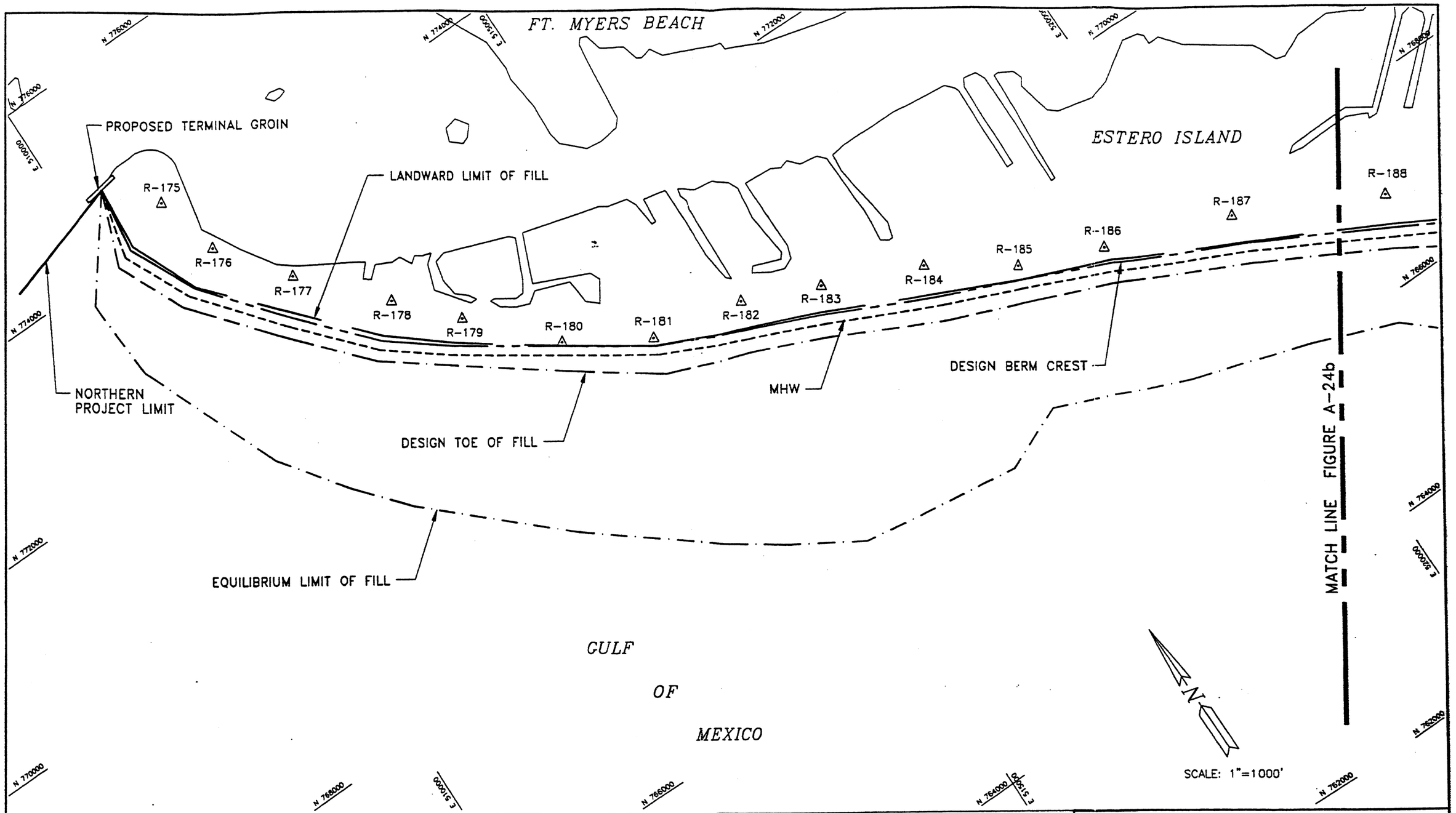
A-108. The project is defined in terms of a MHW alignment. The 1993 MHW shoreline position has been adopted as the project baseline. The Beach Island project is defined as a 40 foot extension of the baseline.

Beach Fill Volume

A-109. Based on the existing natural berm elevation, a 40 foot projection to MHW (design berm has been chosen). This recycling operation is increased from the authorized project value of 45 feet (relative MHW). The increased berm elevation approximates the naturally existing berm (where present), and is deemed a more reasonable choice for design considerations.

Berm Width

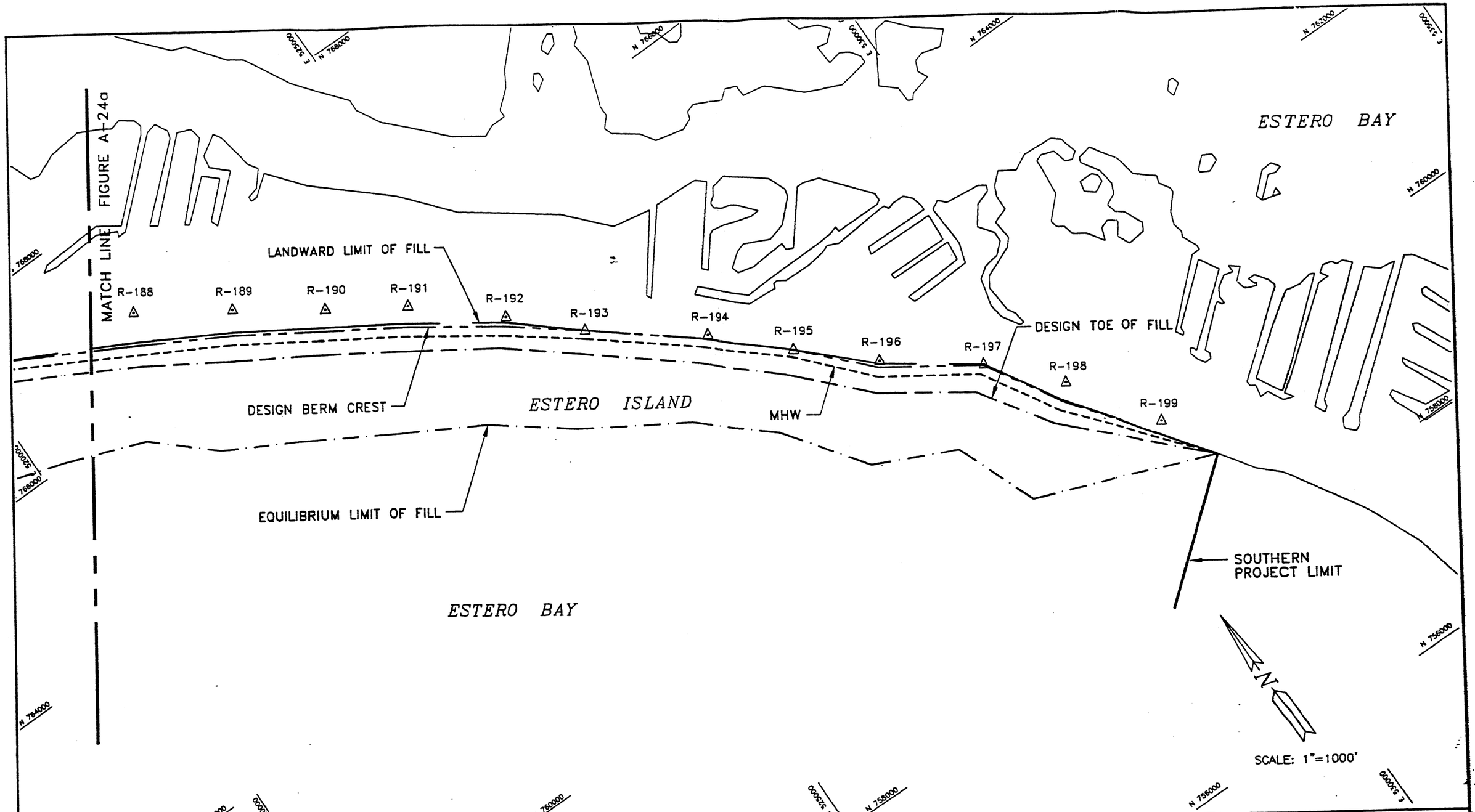
A-110. Based on economic considerations, a MHW accretion of 40 feet was found to provide the optimum ratio between project costs and benefits. Additional fill is required to maintain this berm width over the project life as nourishment occurs.



ESTERO ISLAND
PROTECTIVE BEACH DESIGN

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

FIGURE A-24a



ESTERO ISLAND
PROTECTIVE BEACH DESIGN

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

FIGURE A-24b

TABLE A-18
ESTERO ISLAND DESIGN POSITIONS RELATIVE FDEP MONUMENTS

FDEP MONUMENT	DISTANCE FROM FDEP MONUMENT IN FEET				
	LANDWARD EXTENT OF DESIGN	DESIGN BERM CREST	DESIGN MHW POSITION(1)	CONSTRUCTION TOE OF FILL(2)	EQUILIBRIUM TOE OF FILL(3)
R-175	562	606	706	835	1,328
R-176	449	463	563	698	1,516
R-177	380	435	535	657	1,960
R-178	380	435	535	656	2,039
R-179	269	302	402	514	2,069
R-180	37	42	142	305	2,015
R-181	89	86	186	403	2,312
R-182	291	309	409	554	2,624
R-183	278	306	406	551	2,742
R-184	327	362	462	636	2,360
R-185	152	152	248	400	1,558
R-186	156	194	294	426	1,686
R-187	320	332	432	575	1,585
R-188	229	267	367	490	1,370
R-189	245	278	378	553	1,497
R-190	197	238	338	493	1,419
R-191	188	224	324	484	1,358
R-192	60	103	203	339	1,164
R-193	2	2	90	253	1,050
R-194	49	49	137	311	944
R-195	2	2	79	272	888
R-196	30	70	170	342	1,103
R-197	1	10	110	310	945
R-198	193	205	305	456	1,294

NOTES:
(1) BASED ON A MHW POSITION OF 1.42 FEET RELATIVE TO NGVD.
(2) BASED ON 1:25 CONSTRUCTION SLOPE.
(3) BASED ON PROFILE TRANSLATION.

Beach Slopes

A-111. For Estero Island, the native beach slope is estimated as 1 (vertical) on 25 (horizontal) above MLW and 1 on 35 below MLW. This estimate is based on the average slope of the 1995 USACE survey. A construction slope of 1 on 10 was also adopted.

Design Fill Volume

A-112. The design template was determined based on a 40 foot MHW extension and a 1:25 and 1:35 slope above and below MLW, respectively. 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. This was accomplished through a translation of the existing profile seaward to a distance such that the translated profile is entirely seaward of the design template. While the design template represents the threshold dimensions of the project, volumes estimated based solely on the design template generally under represent the required volume necessary to maintain the design template. Volumes for both the design template and additional translated volume are presented in Table A-19.

Fill Volume Behind Baseline

A-113. For the Estero Island segment, fill volumes behind the baseline are presented in Table A-19. A total volume of 85,200 cubic yards of fill will be required over the entire segment length. This equates to an average fill requirement of 3.4 cubic yards/liner foot.

Advanced Nourishment

A-114. The required volume of advanced nourishment is based on expected long term volumetric losses over a renourishment cycle. The optimum renourshment cycle was determined on an economic basis, which represents the lowest average annual equivalent cost of maintaining the project. For the Estero Island design, the optimum renourshment cycle was determined to be three years.

A-115. Initial advanced nourishment volume was based on historical volume change analysis and numerical modeling of with project conditions. The background erosion rate was calculated based on a rate of 2.3 cubic yards per year per linear foot of shoreline. This represents an annual loss of 57,000 cubic yards per year over the entire 4.7 mile project length. This rate corresponds to the loss rate observed in the project area from 1989 to 1995. Additional losses are incurred due to diffusion of sand from the project area. To quantify this effect, successive GENESIS model simulations were undertaken to determine the required magnitude and distribution of advanced fill. Based on this analysis, the magnitude of advanced fill required to maintain the project dimensions over the three year renourishment cycle was calculated as 244,400 cubic yards, including advanced volume associated with taper sections. A uniform placement of advanced fill was adopted based on GENESIS model output, except for the region from R-195 to R-198 where an additional extension of 40 feet was added based on GENESIS model

TABLE A-19
ESTERO ISLAND TOTAL FILL VOLUME REQUIREMENTS

FDEP MONUMENT	DISTANCE (FT.)(1)	DISTANCE ALONG BASELINE (FT.)	DESIGN VOLUME (CU. YDS.)(2)	ADDITIONAL TRANSLATED VOLUME (CU. YDS.)(3)	TOTAL DESIGN VOLUME (CU. YDS.)	ADVANCE FILL VOLUME (CU. YDS.)(4)	TOTAL FILL VOLUME (CU. YDS.)(5)	VOLUME BEHIND BASELINE (CU. YDS.)(6)
R-175	785	785	4,292	6,171	10,463	3,419	13,882	1,901
R-176	894	1,679	7,306	8,424	15,730	7,315	23,045	3,464
R-177	1,111	2,790	12,074	8,599	20,673	6,369	27,043	4,459
R-178	810	3,600	11,567	14,637	26,204	8,369	34,573	4,272
R-179	1,116	4,716	6,680	7,070	13,750	7,578	21,328	2,892
R-180	990	5,706	8,392	14,976	23,368	9,174	32,541	2,938
R-181	1,023	6,729	10,119	21,070	31,189	8,770	39,959	1,288
R-182	864	7,593	11,088	8,565	19,653	8,219	27,873	3,375
R-183	1,071	8,664	9,340	11,973	21,313	8,428	29,741	4,240
R-184	1,029	9,693	17,097	16,632	33,729	9,147	42,875	2,527
R-185	971	10,664	4,434	8,973	13,407	8,710	22,118	1,792
R-186	757	11,421	7,442	9,600	17,042	7,527	24,569	3,957
R-186A	664	12,085	7,890	6,958	14,848	6,190	21,038	1,613
R-187	935	13,020	6,683	4,737	11,420	6,968	18,388	2,723
R-187A	713	13,733	12,151	12,943	25,094	7,184	32,277	4,166
R-188	1,031	14,764	6,933	10,390	17,323	7,600	24,923	4,206
R-189	1,009	15,773	16,600	15,240	31,840	8,887	40,727	3,352
R-190	895	16,668	8,605	18,597	27,202	8,292	35,494	5,350
R-191	1,069	17,737	10,496	19,646	30,142	8,554	38,696	4,504
R-192	869	18,606	10,801	14,678	25,479	8,444	33,923	5,084
R-193	1,303	19,909	3,123	12,957	16,080	9,462	25,542	1,169
R-194	944	20,853	3,452	9,202	12,654	9,789	22,443	2,159
R-195	924	21,777	3,414	13,999	17,413	8,142	25,554	355
R-196	1,073	22,850	12,135	13,372	25,507	23,212	48,719	5,575
R-197	965	23,815	11,631	4,795	16,426	23,682	40,108	3,749
R-198	1,110	24,925	8,216	10,195	18,411	9,040	27,451	4,123
SOUTH TAPER	1,800	26,725	*	9,412	10,048	5,921	15,969	*
TOTAL	**26,725**	*	**231,961**	**313,810**	**545,771**	**244,393**	**790,800**	**85,233**

NOTES:

(1): PROJECT EXTENDS FROM FDEP MONUMENT R-175 SOUTH TO 427 FEET BEYOND R-199 INCLUDING TAPER SECTIONS.

(2): BASED ON A 40 FOOT MHW EXTENSION AND 5 FOOT (RELATIVE MLW) BERM ELEVATION WITH 1:25 ONSHORE AND 1:35 OFFSHORE SLOPE

(3): TRANSLATED PROFILE SEAWARD OF LINEAR PROFILE: VOLUME DIFFERENCE. BASED ON -8 FT. DEPTH OF CLOSURE.

(4): ADVANCED FILL BASED ON THREE YEAR NOURISHMENT INTERVAL

(5): BASED ON AN OVERFILL FACTOR OF 1.0

(6): BASELINE CONSISTS OF THE 1995 MHW POSITION

simulations. Allowing for the long term loss of 57,000 cubic yards/year results in an additional loss of 24,500 cubic yards/year due to diffusive effects (12,200 from each end).

Future Periodic Nourishment

A-116. Estimation of project performance has been undertaken based on historical shoreline behavior and numerical simulation. Initial estimates of future periodic nourishment are based on this information. The future periodic nourishment volume is assumed to be equal to the volume determined for the initial three year renourishment cycle. For Estero Island this volume was estimated as 244,400 cubic yards over one nourishment cycle, or 81,500 cubic yards per year. Modifications of the level of periodic nourishment may be undertaken based on future monitoring of project performance.

Overfill Volume

A-117. Geotechnical investigation of the borrow areas for Gasparilla Island detailed in Appendix B. Indicate that the borrow area grain size is greater than that observed on the native beach. Therefore no additional modification of fill volume is required, resulting in an overfill ratio of 1.0.

A-118. The borrow area selected for Estero Island potentially contains over 3,500,000 cubic yards of coarse sand (1.04 mm) with approximately 7% silt. Based on compatibility analysis, the borrow area is suitable as beach fill for Estero Island. This borrow area as defined contains the Captiva/Sanibel borrow area dredged in 1997. It is estimated that 500,000 cubic yards were removed at that time. It is recommended that thirty (30) additional cores be taken across the total extent of the proposed Estero Island borrow area B-1 to define the total sediment quantity and quality (Figure A-4). It is also recommended that side scan sonar be performed across the borrow area to define limits of hardbottom communities located adjacent to the Captiva/Sanibel borrow areas. A cultural resources study and magnetometer survey would also be required prior to dredging within this borrow area.

Estero Island Terminal Groin Structural Design

A-119. GENESIS model simulations indicate a significant reduction in the magnitude of required advanced fill with the addition of a new terminal structure at the north end of Estero Island in the vicinity of R-175. The effective length of the structure was optimized on an economic basis using the results from the GENESIS model for structures of various lengths. Details of the structural design are included in the following sections, and in Figures A-25 and A-26.

A-120. Structure Length. The optimum effective structure length was determined to be 150 feet. This distance represents the distance from the existing MHW station seaward, but does not include the length of structure required landward of the MHW station. An additional 90 feet of structure is required to link the structure to the existing berm crest, resulting in a total structure length of 240 feet. The seaward end of the structure extends to the crest of the bar at a water depth of approximately –2.5 feet (relative MTL). GENESIS model simulations suggest a region

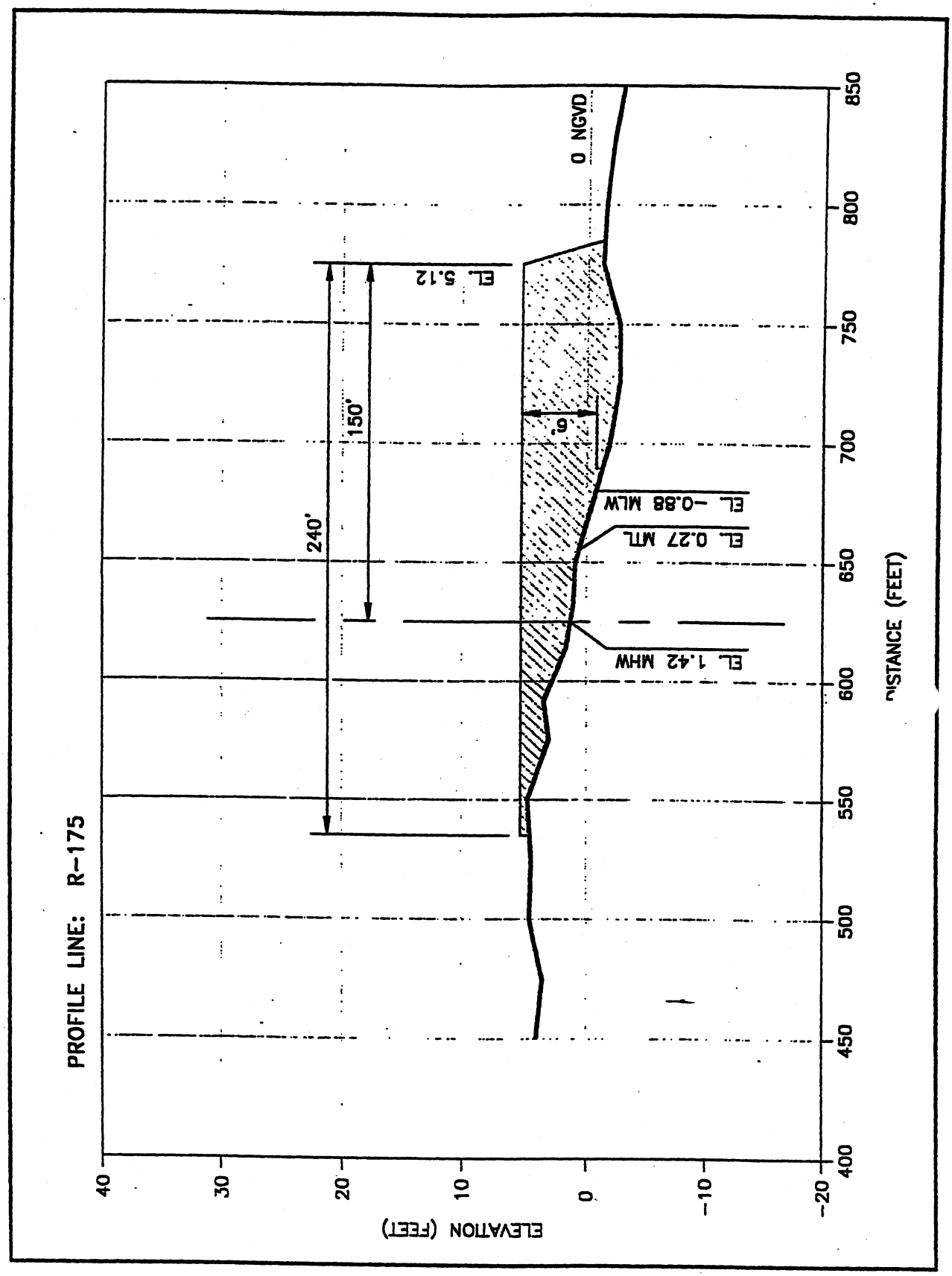


FIGURE A-

ESTERO ISLAND
TERMINAL GROIN

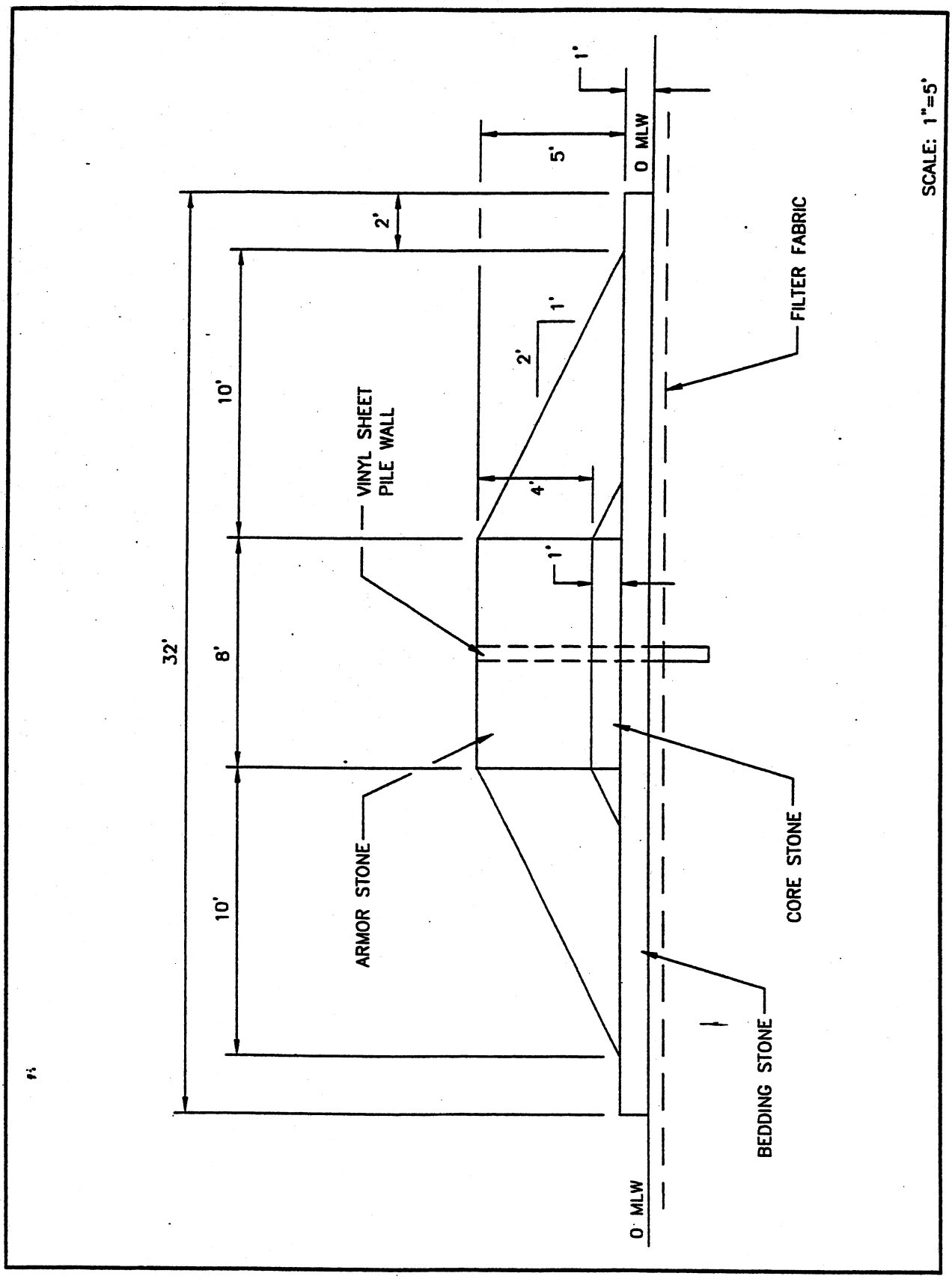


FIGURE A-26

ESTERO BEACH
TERMINAL GROIN
CROSS SECTION

of influence on the order of 2,000 feet to the south of the structure, with a maximum fillet volume of 72,200 cubic yards.

A-121. Structure Height. A continuous structure height of 6 feet (relative MLW) was selected. This elevation exceeds the natural berm elevation in this location by approximately 1 foot, and is capable of sustaining a wave of 4 feet with no overtopping, and a wave of 6 feet with minimal overtopping. Depth induced wave breaking, however, should limit the size of waves incident on the structure under most conditions. The regional mean wave condition has been estimated as 1.6 feet/ 3.9 seconds (Brooks and Brandon, 1995). The wave climate in this area is further reduced due to the sheltering effects of nearby Sanibel Island.

A-122. Structure Location. The structure should be placed in the vicinity of R-175 near the northern end of Estero Island. The specific location and orientation is further delineated in Figure A-27. The structure is oriented at a bearing of 240 degrees, roughly paralleling the adjacent navigation channel. A reduction in the movement of sand from the beach into the channel is expected.

A-123. Construction Material. Two layers of two-foot mean diameter (1,220 lb) armor stone has been used in the structure design. Initial calculations are based on the use of a rough granite stone (165 lbs/ft^3), though locally available limestone may be used at significant cost savings with no significant changes to the design cross-section. This estimate is based on structural stability analysis using the ACES software package (Hudsen formula). A design wave height of 4 feet was used, and the values of the coefficients K_d and $K\Delta$ were set at 1.1 and 1.02, respectively. Due to the limited water depth at the structure head, calculations were based on an elevated water level (surge) of +2.5 feet (relative to MTL).

A-124. The weight of the individual core and bedding stone should be about 1/10 and 1/100 of the armor stone weight, respectively. Sand tightening of the structure will be accomplished through the placement of a vinyl sheet pile at the center of the structure. The sheet pile is included in order to render the structure impermeable, and is not intended to add to the structural integrity of the structure. The use of a vinyl material eliminates corrosion issues, which would be encountered through the use of a steel or aluminum sheet pile alternative.

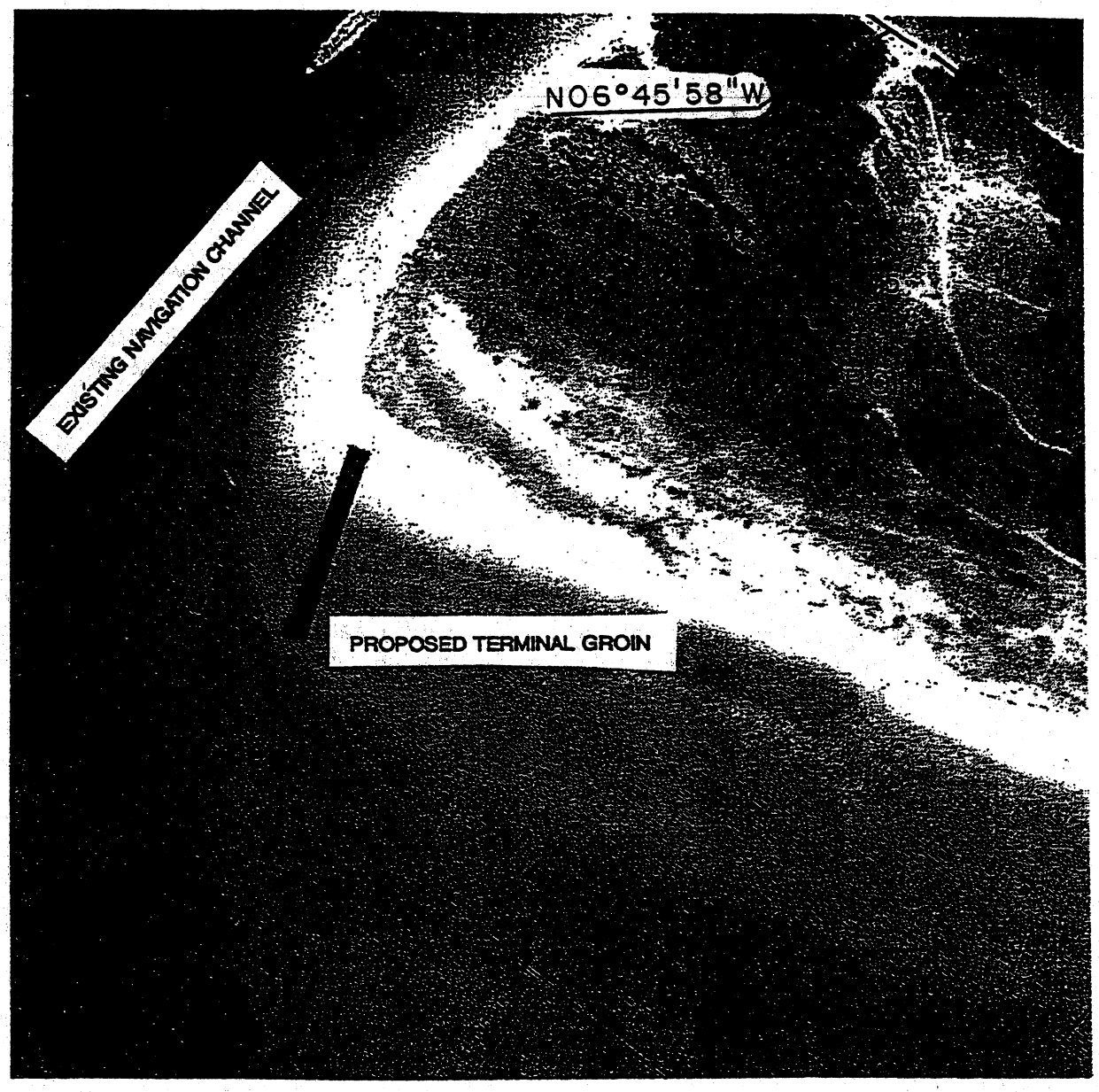
A-125. Based on the design cross-section and total length of 240 feet, the estimated stone volume is as follows: 13,713 cubic feet armor stone, 3,325 cubic feet bedding stone, 7968 cubic feet foundation stone. In addition, 10,080 square feet of filter fabric, and 2,400 square feet of vinyl sheet pile will be required.

Cost Estimates

A-126. From conception to completion of the project, the project cost estimate is a paramount management document. It is a guide to further refinement of uncertain features and leads to high confidence in the Federal Government's ability to award and execute contract construction within prescribed cost and time limits. Uncertainty exists in all estimates. The goal is to identify the uncertainty associated with a cost element, to forecast the risk of cost or time growth associated with the uncertainty and to assign a contingency to the cost element that will express the cost

which, within a high degree of confidence, will not be exceeded when further detailed information is available. During pre-construction engineering and design, the focus is on detailed investigations and design and a significant increase in the detail of the cost estimate and decrease in the contingencies.

A-127. The cost estimates for the recommended beach nourishments and shallow water reef mitigation are based on October and December 1999 price levels, respectively. The estimated quantities for the beach fill and groin design are based on bathymetric conditions surveyed in August 1995. The cost estimates include contingencies of about 15 and 25 percent for the nourishments and mitigation, respectively 18 percent for remaining planning, engineering and design, and construction management. MCACES cost estimates, which exclude interest during construction, are included within a subappendix to the engineering appendix.



SCALE: 1"=200'

FIGURE A-27

APPROXIMATE LOCATION AND ORIENTATION
OF PROPOSED ESTERO ISLAND
TERMINAL GROIN

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MCASES COST ESTIMATE

Lee County BEC-Mitigation
Shallow Water Reef
Nearshore Area
Lee County, Florida

Designed By: Jacksonville District Office
Estimated By: M Fascher

Prepared By: M Fascher

Preparation Date: 02/06/01
Effective Date of Pricing: 01/10/00

Sales Tax: 6.00%

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Currency in DOLLARS

For the shallow water disposal area a separate spud barge and crane along
This is a preliminary estimate for placing rock in a nearshore area for mitigation. It was assumed that rock would be purchased from Florida.

Contingency of 25% was used due to nature of work.

Percentages of 8% and 10% were used for E&D and S&A at the request of the technical manager.

Notes for update to effective pricing date of 1, October 2000. The cost were updated using the factors from EM 1110-2-1304 (Civil Works Construction Cost Index System). The reprice factor was determined for code 17 (Beach Replenishment) from index numbers for first quarter FY 00(Oct.1999) and for first quarter FY01 (Oct.2000).

SUMMARY REPORTS SUMMARY PAGE

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

No Detailed Estimate...

No Backup Reports...

* * * END TABLE OF CONTENTS * * *

** PROJECT OWNER SUMMARY - Contract **

	QUANTITY	UOM	CONTRACT	CONTING	TOTAL COST	UNIT CC
02 Shallow Water Reef			236,410	69,125	305,536	

** PROJECT OWNER SUMMARY - UserDefi **

	QUANTITY	UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
02 Shallow Water Reef						
02- A Construction Cost						
02- A/06 Fish and Wildlife Facilities						
02- A/06.03 Wildlife Facilities & Sanctuary						
02- A/06.03.73 Habitat and Feeding Facilities						
02- A/06.03.73/02 Rock Placement in Nearshore Area	2910.00	CY	200,456	60,137	260,593	89.55
TOTAL Habitat and Feeding Facilities	0.60	ACR	200,456	60,137	260,593	434321.96
TOTAL Wildlife Facilities & Sanctuary			200,456	60,137	260,593	
TOTAL Fish and Wildlife Facilities			200,456	60,137	260,593	
TOTAL Construction Cost			200,456	60,137	260,593	
02- B Non-Construction Cost						
02- B/30 Planning, Engineering and Design			15,968	3,992	19,960	
02- B/31 Construction Management (S&I)			19,986	4,996	24,982	
TOTAL Non-Construction Cost			35,954	8,988	44,942	
TOTAL Shallow Water Reef			236,410	69,125	305,536	

No errors detected...

* * * END OF ERROR REPORT * * *

Lee Co BEC Update
General Re-Evaluation Report

Designed By: Jacksonville District
Estimated By: M Fascher

Prepared By: M Fascher

Preparation Date: 02/06/01
Effective Date of Pricing: 10/01/00

Sales Tax: 6.00%

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Lee County BEC

The plan is for renourishment of two islands, Gasparilla and Estero with construction of a new groin on Estero Island.

Dredging estimates were based on the CEDEP program. Mob & demob costs were also determined in the CEDEP program.

Standard contingencies of 15% were used.

E&D and S&A percentages of 8 and 10% were used as directed by the technical manager.

Notes for update to effective pricing date of 1, October 2000. The cost were updated using the factors from EM 1110-2-1304 (Civil Works Construction Cost Index System). The reprice factor was determined for code 17 (Beach Replenishment) from index numbers for first quarter FY 00(Oct.1999) and for first quarter FY01 (Oct.2000) 527.91 and 543.87.

** PROJECT OWNER SUMMARY - Contract **

		QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
1	Initial Fill-Gasparilla Island		3,833,873	575,081	4,408,954	
2	Gasparilla Island-Ren at 7 Years		2,760,487	414,073	3,174,560	
3	Gasparilla Island-Ren at 14 Year		2,760,487	414,073	3,174,560	
4	Gasparilla Island-Ren at 21 Year		2,760,487	414,073	3,174,560	
5	Gasparilla Island-Ren at 28 Year		2,760,487	414,073	3,174,560	
6	Gasparilla Island-Ren at 35 Year		2,760,487	414,073	3,174,560	
7	Gasparilla Island-Ren at 42 Year		2,760,487	414,073	3,174,560	
8	Gasparilla Island-Ren at 49 Year		2,760,487	414,073	3,174,560	
9	Initial Fill-Estero Island		11,695,329	1,754,299	13,449,628	
10	Estero Island Terminal Groin		252,759	37,914	290,672	
11	Estero Island-Ren at 3 Years		4,205,404	630,811	4,836,215	
12	Estero Island-Ren at 6 Years		4,205,404	630,811	4,836,215	
13	Estero Island-Ren at 9 Years		4,205,404	630,811	4,836,215	
14	Estero Island-Ren at 12 Years		4,205,404	630,811	4,836,215	
15	Estero Island-Ren at 15 Years		4,205,404	630,811	4,836,215	
16	Estero Island-Ren at 18 Years		4,205,404	630,811	4,836,215	
17	Estero Island-Ren at 21 Years		4,205,404	630,811	4,836,215	
18	Estero Island-Ren at 24 Years		4,205,404	630,811	4,836,215	
19	Estero Island-Ren at 27 Years		4,205,404	630,811	4,836,215	
20	Estero Island-Ren at 30 Years		4,205,404	630,811	4,836,215	
21	Estero Island-Ren at 33 Years		4,205,404	630,811	4,836,215	
22	Estero Island-Ren at 36 Years		4,205,404	630,811	4,836,215	
23	Estero Island-Ren at 39 Years		4,205,404	630,811	4,836,215	
24	Estero Island-Ren at 42 Years		4,205,404	630,811	4,836,215	
25	Estero Island-Ren at 45 Years		4,205,404	630,811	4,836,215	
26	Estero Island-Ren at 48 Years		4,205,404	630,811	4,836,215	

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT	CC
1 Initial Fill-Gasparilla Island						
1- A Construction Cost						
1- A/17 Beach Replenishment						
1- A/17.00 Beach Replenishment						
1- A/17.00.01 Mobilization, Demob & Prep Work						
1- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027		
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027		
1- A/17.00.16 Pipeline Dredging						
1- A/17.00.16/ 1 Excavation from Borrow Area	786200.00 CY	2,429,830	364,474	2,794,304	3.55	
TOTAL Pipeline Dredging		2,429,830	364,474	2,794,304		
1- A/17.00.99 Associated General Items						
1- A/17.00.99/ 1 Turbidity Monitoring		17,452	2,618	20,069		
1- A/17.00.99/ 2 Manatee Observer		37,396	5,609	43,006		
1- A/17.00.99/ 3 Sea Turtle Observer/Relocations		62,327	9,349	71,676		
1- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885		
TOTAL Associated General Items		124,901	18,735	143,637		
TOTAL Beach Replenishment		3,131,276	469,691	3,600,968		
TOTAL Beach Replenishment		3,131,276	469,691	3,600,968		
TOTAL Construction Cost		3,131,276	469,691	3,600,968		
1- B Non-Construction Cost						
1- B/01 Lands and Damages		139,077	20,862	159,939		
1- B/30 Planning, Engineering and Design		250,339	37,551	287,889		
1- B/31 Construction Management		313,181	46,977	360,158		
TOTAL Non-Construction Cost		702,596	105,389	807,986		
TOTAL Initial Fill-Gasparilla Island		3,833,873	575,081	4,408,954		
2 Gasparilla Island-Ren at 7 Years						

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
2- A Construction Cost					
2- A/17 Beach Replenishment					
2- A/17.00 Beach Replenishment					
2- A/17.00.01 Mobilization, Demob & Prep Work					
2- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	
2- A/17.00.16 Pipeline Dredging					
2- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
2- A/17.00.99 Associated General Items					
2- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
2- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
2- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
2- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
2- B Non-Construction Cost					
2- B/01 Lands and Damages		0	0	0	
2- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
2- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 7 Years		2,760,487	414,073	3,174,560	
3 Gasparilla Island-Ren at 14 Year					
3- A Construction Cost					

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT C.
3- A/17 Beach Replenishment					
3- A/17.00 Beach Replenishment					
3- A/17.00.01 Mobilization, Demob & Prep Work					
3- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	
3- A/17.00.16 Pipeline Dredging					
3- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
3- A/17.00.99 Associated General Items					
3- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
3- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
3- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
3- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
3- B Non-Construction Cost					
3- B/01 Lands and Damages		0	0	0	
3- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
3- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 14 Year		2,760,487	414,073	3,174,560	
4 Gasparilla Island-Ren at 21 Year					
4- A Construction Cost					
4- A/17 Beach Replenishment					

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
4- A/17.00 Beach Replenishment					
4- A/17.00.01 Mobilization, Demob & Prep Work					
4- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	
4- A/17.00.16 Pipeline Dredging					
4- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
4- A/17.00.99 Associated General Items					
4- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
4- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
4- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
4- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
4- B Non-Construction Cost					
4- B/01 Lands and Damages		0	0	0	
4- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
4- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 21 Year		2,760,487	414,073	3,174,560	
5 Gasparilla Island-Ren at 28 Year					
5- A Construction Cost					
5- A/17 Beach Replenishment					
5- A/17.00 Beach Replenishment					

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT CC
5- A/17.00.01 Mobilization, Demob & Prep Work					
5- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	
5- A/17.00.16 Pipeline Dredging					
5- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
5- A/17.00.99 Associated General Items					
5- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
5- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
5- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
5- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
5- B Non-Construction Cost					
5- B/01 Lands and Damages		0	0	0	
5- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
5- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 28 Year		2,760,487	414,073	3,174,560	
6 Gasparilla Island-Ren at 35 Year					
6- A Construction Cost					
6- A/17 Beach Replenishment					
6- A/17.00 Beach Replenishment					
6- A/17.00.01 Mobilization, Demob & Prep Work					

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
6- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	
6- A/17.00.16 Pipeline Dredging					
6- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
6- A/17.00.99 Associated General Items					
6- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
6- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
6- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
6- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
6- B Non-Construction Cost					
6- B/01 Lands and Damages		0	0	0	
6- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
6- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 35 Year		2,760,487	414,073	3,174,560	
7 Gasparilla Island-Ren at 42 Year					
7- A Construction Cost					
7- A/17 Beach Replenishment					
7- A/17.00 Beach Replenishment					
7- A/17.00.01 Mobilization, Demob & Prep Work					
7- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT CC
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	
7- A/17.00.16 Pipeline Dredging					
7- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
7- A/17.00.99 Associated General Items					
7- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
7- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
7- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
7- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
7- B Non-Construction Cost					
7- B/01 Lands and Damages		0	0	0	
7- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
7- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 42 Year		2,760,487	414,073	3,174,560	
8 Gasparilla Island-Ren at 49 Year					
8- A Construction Cost					
8- A/17 Beach Replenishment					
8- A/17.00 Beach Replenishment					
8- A/17.00.01 Mobilization, Demob & Prep Work					
8- A/17.00.01/ 1 Dredging, Mobil & Demobil.		576,545	86,482	663,027	
TOTAL Mobilization, Demob & Prep Work		576,545	86,482	663,027	

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
8- A/17.00.16 Pipeline Dredging					
8- A/17.00.16/ 1 Excavation from Borrow Area	541800.00 CY	1,674,487	251,173	1,925,660	3.55
TOTAL Pipeline Dredging		1,674,487	251,173	1,925,660	
8- A/17.00.99 Associated General Items					
8- A/17.00.99/ 1 Turbidity Monitoring		11,971	1,796	13,767	
8- A/17.00.99/ 2 Manatee Observer		25,652	3,848	29,500	
8- A/17.00.99/ 3 Sea Turtle Observer/Relocations		42,753	6,413	49,166	
8- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		88,103	13,215	101,318	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Beach Replenishment		2,339,135	350,870	2,690,005	
TOTAL Construction Cost		2,339,135	350,870	2,690,005	
8- B Non-Construction Cost					
8- B/01 Lands and Damages		0	0	0	
8- B/30 Planning, Engineering and Design		187,496	28,124	215,621	
8- B/31 Construction Management		233,855	35,078	268,934	
TOTAL Non-Construction Cost		421,352	63,203	484,555	
TOTAL Gasparilla Island-Ren at 49 Year		2,760,487	414,073	3,174,560	
9 Initial Fill-Estero Island					
9- A Construction Cost					
9- A/17 Beach Replenishment					
9- A/17.00 Beach Replenishment					
9- A/17.00.01 Mobilization, Demob & Prep Work					
9- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
9- A/17.00.17 Hopper Dredging					

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COS
9- A/17.00.17/ 1 Excavation from Borrow Area	790800.00 CY	8,513,429	1,277,014	9,790,443	12.38
TOTAL Hopper Dredging		8,513,429	1,277,014	9,790,443	
9- A/17.00.99 Associated General Items					
9- A/17.00.99/ 1 Turbidity Monitoring		40,095	6,014	46,110	
9- A/17.00.99/ 2 Manatee Observer		85,919	12,888	98,806	
9- A/17.00.99/ 3 Sea Turtle Observer/Relocations		143,198	21,480	164,677	
9- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		276,938	41,541	318,479	
TOTAL Beach Replenishment		9,636,989	1,445,548	11,082,538	
TOTAL Beach Replenishment		9,636,989	1,445,548	11,082,538	
TOTAL Construction Cost		9,636,989	1,445,548	11,082,538	
9- B Non-Construction Cost					
9- B/01 Lands and Damages		324,513	48,677	373,190	
9- B/30 Planning, Engineering and Design		770,590	115,588	886,178	
9- B/31 Construction Management		963,237	144,486	1,107,723	
TOTAL Non-Construction Cost		2,058,340	308,751	2,367,091	
TOTAL Initial Fill-Estero Island		11,695,329	1,754,299	13,449,628	
10 Estero Island Terminal Groin					
10- A Construction Cost					
10- A/10 Breakwaters and Seawalls					
10- A/10.00 Breakwaters & Seawalls					
10- A/10.00.01 Mob, Demob & Preparatory Work					
10- A/10.00.01/01 Mob, Demob & Preparatory Work		47,278	7,092	54,369	
TOTAL Mob, Demob & Preparatory Work		47,278	7,092	54,369	
10- A/10.00.46 Breakwaters					
10- A/10.00.46/J1 Armor Stone (1220 lbs)	937.00 TNS	81,374	12,206	93,581	99.8
10- A/10.00.46/J2 Core Stone (125#)	214.00 TNS	17,811	2,672	20,483	95.71

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
10- A/10.00.46/J3 Bedding Stone	470.00 TNS	34,228	5,134	39,362	83.75
10- A/10.00.46/J4 Filter Fabric	1120.00 SY	6,150	923	7,073	6.31
10- A/10.00.46/J5 Vinyl Sheet Piling	2400.00 SF	26,976	4,046	31,022	12.93
TOTAL Breakwaters		166,539	24,981	191,520	
TOTAL Breakwaters & Seawalls		213,817	32,073	245,890	
TOTAL Breakwaters and Seawalls		213,817	32,073	245,890	
TOTAL Construction Cost		213,817	32,073	245,890	
10- B Non-Construction Cost					
10- B/30 Planning, Engineering and Design		17,307	2,596	19,903	
10- B/31 Construction Management		21,634	3,245	24,879	
TOTAL Non-Construction Cost		38,942	5,841	44,783	
TOTAL Estero Island Terminal Groin		252,759	37,914	290,672	
11 Estero Island-Ren at 3 Years					
11- A Construction Cost					
11- A/17 Beach Replenishment					
11- A/17.00 Beach Replenishment					
11- A/17.00.01 Mobilization, Demob & Prep Work					
11- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
11- A/17.00.17 Hopper Dredging					
11- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
11- A/17.00.99 Associated General Items					
11- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
11- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
11- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT C
11- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
11- B Non-Construction Cost					
11- B/01 Lands and Damages		0	0	0	
11- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
11- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 3 Years		4,205,404	630,811	4,836,215	
12 Estero Island-Ren at 6 Years					
12- A Construction Cost					
12- A/17 Beach Replenishment					
12- A/17.00 Beach Replenishment					
12- A/17.00.01 Mobilization, Demob & Prep Work					
12- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
12- A/17.00.17 Hopper Dredging					
12- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
12- A/17.00.99 Associated General Items					
12- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
12- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
12- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
12- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
12- B Non-Construction Cost					
12- B/01 Lands and Damages		0	0	0	
12- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
12- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 6 Years		4,205,404	630,811	4,836,215	
13 Estero Island-Ren at 9 Years					
13- A Construction Cost					
13- A/17 Beach Replenishment					
13- A/17.00 Beach Replenishment					
13- A/17.00.01 Mobilization, Demob & Prep Work					
13- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
13- A/17.00.17 Hopper Dredging					
13- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
13- A/17.00.99 Associated General Items					
13- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
13- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
13- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
13- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT CO.
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
13- B Non-Construction Cost					
13- B/01 Lands and Damages		0	0	0	
13- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
13- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 9 Years		4,205,404	630,811	4,836,215	
14 Estero Island-Ren at 12 Years					
14- A Construction Cost					
14- A/17 Beach Replenishment					
14- A/17.00 Beach Replenishment					
14- A/17.00.01 Mobilization, Demob & Prep Work					
14- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
14- A/17.00.17 Hopper Dredging					
14- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
14- A/17.00.99 Associated General Items					
14- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
14- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
14- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
14- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
14- B Non-Construction Cost					
14- B/01 Lands and Damages		0	0	0	
14- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
14- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 12 Years		4,205,404	630,811	4,836,215	
15 Estero Island-Ren at 15 Years					
15- A Construction Cost					
15- A/17 Beach Replenishment					
15- A/17.00 Beach Replenishment					
15- A/17.00.01 Mobilization, Demob & Prep Work					
15- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
15- A/17.00.17 Hopper Dredging					
15- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
15- A/17.00.99 Associated General Items					
15- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
15- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
15- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
15- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
15- B Non-Construction Cost					
15- B/01 Lands and Damages		0	0	0	
15- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
15- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 15 Years		4,205,404	630,811	4,836,215	
16 Estero Island-Ren at 18 Years					
16- A Construction Cost					
16- A/17 Beach Replenishment					
16- A/17.00 Beach Replenishment					
16- A/17.00.01 Mobilization, Demob & Prep Work					
16- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
16- A/17.00.17 Hopper Dredging					
16- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
16- A/17.00.99 Associated General Items					
16- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
16- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
16- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
16- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
16- B Non-Construction Cost					
16- B/01 Lands and Damages		0	0	0	
16- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
16- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 18 Years		4,205,404	630,811	4,836,215	
17 Estero Island-Ren at 21 Years					
17- A Construction Cost					
17- A/17 Beach Replenishment					
17- A/17.00 Beach Replenishment					
17- A/17.00.01 Mobilization, Demob & Prep Work					
17- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
17- A/17.00.17 Hopper Dredging					
17- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
17- A/17.00.99 Associated General Items					
17- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
17- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
17- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
17- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
17- B Non-Construction Cost					

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT CC
17- B/01 Lands and Damages		0	0	0	
17- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
17- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 21 Years		4,205,404	630,811	4,836,215	
18 Estero Island-Ren at 24 Years					
18- A Construction Cost					
18- A/17 Beach Replenishment					
18- A/17.00 Beach Replenishment					
18- A/17.00.01 Mobilization, Demob & Prep Work					
18- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
18- A/17.00.17 Hopper Dredging					
18- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
18- A/17.00.99 Associated General Items					
18- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
18- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
18- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
18- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
18- B Non-Construction Cost					
18- B/01 Lands and Damages		0	0	0	
18- B/30 Planning, Engineering and Design		280,214	42,032	322,247	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
18- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 24 Years		4,205,404	630,811	4,836,215	
19 Estero Island-Ren at 27 Years					
19- A Construction Cost					
19- A/17 Beach Replenishment					
19- A/17.00 Beach Replenishment					
19- A/17.00.01 Mobilization, Demob & Prep Work					
19- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
19- A/17.00.17 Hopper Dredging					
19- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
19- A/17.00.99 Associated General Items					
19- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
19- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
19- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
19- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
19- B Non-Construction Cost					
19- B/01 Lands and Damages		0	0	0	
19- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
19- B/31 Construction Management		356,449	53,467	409,917	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT CO
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 27 Years		4,205,404	630,811	4,836,215	
20 Estero Island-Ren at 30 Years					
20- A Construction Cost					
20- A/17 Beach Replenishment					
20- A/17.00 Beach Replenishment					
20- A/17.00.01 Mobilization, Demob & Prep Work					
20- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
20- A/17.00.17 Hopper Dredging					
20- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.3
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
20- A/17.00.99 Associated General Items					
20- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
20- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
20- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
20- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
20- B Non-Construction Cost					
20- B/01 Lands and Damages		0	0	0	
20- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
20- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
TOTAL Estero Island-Ren at 30 Years		4,205,404	630,811	4,836,215	
21 Estero Island-Ren at 33 Years					
21- A Construction Cost					
21- A/17 Beach Replenishment					
21- A/17.00 Beach Replenishment					
21- A/17.00.01 Mobilization, Demob & Prep Work					
21- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
21- A/17.00.17 Hopper Dredging					
21- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
21- A/17.00.99 Associated General Items					
21- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
21- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
21- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
21- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
21- B Non-Construction Cost					
21- B/01 Lands and Damages		0	0	0	
21- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
21- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 33 Years		4,205,404	630,811	4,836,215	

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
22 Estero Island-Ren at 36 Years					
22- A Construction Cost					
22- A/17 Beach Replenishment					
22- A/17.00 Beach Replenishment					
22- A/17.00.01 Mobilization, Demob & Prep Work					
22- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
22- A/17.00.17 Hopper Dredging					
22- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
22- A/17.00.99 Associated General Items					
22- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
22- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
22- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
22- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
22- B Non-Construction Cost					
22- B/01 Lands and Damages		0	0	0	
22- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
22- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 36 Years		4,205,404	630,811	4,836,215	
23 Estero Island-Ren at 39 Years					

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
23- A Construction Cost					
23- A/17 Beach Replenishment					
23- A/17.00 Beach Replenishment					
23- A/17.00.01 Mobilization, Demob & Prep Work					
23- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
23- A/17.00.17 Hopper Dredging					
23- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
23- A/17.00.99 Associated General Items					
23- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
23- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
23- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
23- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
23- B Non-Construction Cost					
23- B/01 Lands and Damages		0	0	0	
23- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
23- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 39 Years		4,205,404	630,811	4,836,215	
24 Estero Island-Ren at 42 Years					
24- A Construction Cost					

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
24- A/17 Beach Replenishment					
24- A/17.00 Beach Replenishment					
24- A/17.00.01 Mobilization, Demob & Prep Work					
24- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
24- A/17.00.17 Hopper Dredging					
24- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
24- A/17.00.99 Associated General Items					
24- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
24- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
24- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
24- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
24- B Non-Construction Cost					
24- B/01 Lands and Damages		0	0	0	
24- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
24- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 42 Years		4,205,404	630,811	4,836,215	
25 Estero Island-Ren at 45 Years					
25- A Construction Cost					
25- A/17 Beach Replenishment					

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COST
25- A/17.00 Beach Replenishment					
25- A/17.00.01 Mobilization, Demob & Prep Work					
25- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
25- A/17.00.17 Hopper Dredging					
25- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
25- A/17.00.99 Associated General Items					
25- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
25- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
25- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
25- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
25- B Non-Construction Cost					
25- B/01 Lands and Damages		0	0	0	
25- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
25- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 45 Years		4,205,404	630,811	4,836,215	
26 Estero Island-Ren at 48 Years					
26- A Construction Cost					
26- A/17 Beach Replenishment					
26- A/17.00 Beach Replenishment					

** PROJECT OWNER SUMMARY - Task **

	QUANTITY UOM	CONTRACT	CONTING	TOTAL COST	UNIT COS
26- A/17.00.01 Mobilization, Demob & Prep Work					
26- A/17.00.01/ 1 Dredging, Mobil & Demobil.		846,622	126,993	973,616	
TOTAL Mobilization, Demob & Prep Work		846,622	126,993	973,616	
26- A/17.00.17 Hopper Dredging					
26- A/17.00.17/ 1 Excavation from Borrow Area	244400.00 CY	2,631,110	394,667	3,025,777	12.38
TOTAL Hopper Dredging		2,631,110	394,667	3,025,777	
26- A/17.00.99 Associated General Items					
26- A/17.00.99/ 1 Turbidity Monitoring		12,404	1,861	14,264	
26- A/17.00.99/ 2 Manatee Observer		26,579	3,987	30,566	
26- A/17.00.99/ 3 Sea Turtle Observer/Relocations		44,299	6,645	50,943	
26- A/17.00.99/ 4 Beach Tilling		7,727	1,159	8,885	
TOTAL Associated General Items		91,008	13,651	104,659	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Beach Replenishment		3,568,741	535,311	4,104,052	
TOTAL Construction Cost		3,568,741	535,311	4,104,052	
26- B Non-Construction Cost					
26- B/01 Lands and Damages		0	0	0	
26- B/30 Planning, Engineering and Design		280,214	42,032	322,247	
26- B/31 Construction Management		356,449	53,467	409,917	
TOTAL Non-Construction Cost		636,664	95,500	732,163	
TOTAL Estero Island-Ren at 48 Years		4,205,404	630,811	4,836,215	

No errors detected...

* * * END OF ERROR REPORT * * *

SUMMARY REPORTS SUMMARY PAGE

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

No Detailed Estimate...

No Backup Reports...

* * * END TABLE OF CONTENTS * * *

**** TOTAL PROJECT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

ACCOUNT NUMBER	FEATURE DESCRIPTION	CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999 COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98 COST ($K)	CNTG ($K)	TOTAL ($K)	.....FULLY FUNDED ESTIMATE..... COST ($K)	CNTG ($K)	FULL ($K)
10—	BREAKWATERS AND SEAWALLS	212	32	15%	244	212	32	244	226	34	260
17—	BEACH REPLENISHMENT	66,236	9,946	15%	76,182	66,236	9,946	76,182	160,827	26,662	187,489
	TOTAL CONSTRUCTION COSTS =====>	66,448	9,978	15%	76,426	66,448	9,978	76,426	161,053	26,696	187,749
01—	LANDS AND DAMAGES	322	48	15%	370	322	48	370	332	50	382
30—	PLANNING, ENGINEERING AND DESIGN	5,287	791	15%	6,078	5,287	791	6,078	15,814	2,642	18,456
31—	CONSTRUCTION MANAGEMENT	6,700	1,012	15%	7,712	6,700	1,012	7,712	20,874	3,539	24,413
	TOTAL PROJECT COSTS ==========>	78,757	11,829	15%	90,586	78,757	11,829	90,586	198,073	32,927	231,000

TOTAL FEDERAL COSTS ==========> 146,700

TOTAL NON-FEDERAL COSTS ==========> 84,300

THIS TPCS REFLECTS A PROJECT COST CHANGE OF

THE MAXIMUM PROJECT COST IS =======>

DISTRICT APPROVED:

Anne D. Fore CHIEF, COST ENGINEERING

CHIEF, REAL ESTATE

CHIEF, PLANNING

CHIEF, ENGINEERING

CHIEF, CON-OPS

CHIEF, PROGRAMS MANAGEMENT

PROJECT MANAGER

DDE (PM)

DIVISION APPROVED:

_____ CHIEF, COST ENGINEERING

_____ DIRECTOR, REAL ESTATE

_____ CHIEF, PROGRAMS MANAGEMENT

_____ DIRECTOR OF PPMD

APPROVED DATE: _____

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
10---	BREAKWATERS AND SEAWALLS	212	32	15%	244	0.0%	212	32	244	Feb 01	6.6%	226	34	260
17---	BEACH REPLENISHMENT	9,564	1,434	15%	10,998	0.0%	9,564	1,434	10,998	Feb 01	6.7%	10,191	1,544	11,735
	TOTAL CONSTRUCTION COSTS =====>	9,776	1,466	15%	11,242		9,776	1,466	11,242			10,417	1,578	11,995
01---	LANDS AND DAMAGES	322	48	15%	370	0.0%	322	48	370	May 00	3.2%	332	50	382
30---	PLANNING, ENGINEERING AND DESIGN													
	Initial Fill	773	116	15%	889	0.0%	773	116	889	May 00	4.6%	808	122	930
	Terminal Groin	18	3	17%	21	0.0%	18	3	21	May 00	4.8%	19	3	22
31---	CONSTRUCTION MANAGEMENT													
	Initial Fill	966	145	15%	1,111	0.0%	966	145	1,111	Feb 01	9.4%	1,054	161	1,215
	Terminal Groin	22	3	14%	25	0.0%	22	3	25	Feb 01	8.0%	24	3	27
	TOTAL COSTS ==========>	11,877	1,781	15%	13,658		11,877	1,781	13,658			12,654	1,917	14,571

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 04	17.6%	4,152	640	4,792
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			4,152	640	4,792
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 03	18.6%	332	51	383
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 04	23.8%	440	69	509
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			4,924	760	5,684

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 07	29.7%	4,569	713	5,282
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			4,569	713	5,282
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 06	34.7%	376	59	435
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 07	40.4%	498	79	577
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			5,443	851	6,294

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 10	42.9%	5,028	795	5,823
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			5,028	795	5,823
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 09	52.6%	426	67	493
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 10	59.1%	563	91	654
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			6,017	953	6,970

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 13	57.5%	5,534	884	6,418
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			5,534	884	6,418
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 12	72.8%	481	77	558
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 13	79.8%	635	104	739
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			6,650	1,065	7,715

2/

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 16	73.7%	6,092	983	7,075
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			6,092	983	7,075
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 15	94.7%	541	88	629
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 16	102.4%	714	118	832
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			7,347	1,189	8,536

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 19	91.4%	6,708	1,091	7,799
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			6,708	1,091	7,799
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 18	118.9%	608	99	707
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 19	127.7%	803	133	936
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			8,119	1,323	9,442

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 22	111.0%	7,386	1,211	8,597
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			7,386	1,211	8,597
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 21	146.4%	683	113	796
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 22	156.2%	902	151	1,053
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			8,971	1,475	10,446

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 25	132.6%	8,133	1,343	9,476
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			8,133	1,343	9,476
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 24	177.1%	767	128	895
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 25	188.3%	1,014	171	1,185
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			9,914	1,642	11,556

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 28	156.4%	8,956	1,489	10,445
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			8,956	1,489	10,445
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 27	211.8%	863	144	1,007
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 28	224.3%	1,140	193	1,333
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			10,959	1,826	12,785

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 31	182.6%	9,865	1,649	11,514
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			9,865	1,649	11,514
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 30	250.8%	970	163	1,133
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 31	264.7%	1,280	219	1,499
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			12,115	2,031	14,146

2/

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 34	211.5%	10,866	1,826	12,692
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			10,866	1,826	12,692
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 33	294.4%	1,090	184	1,274
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 34	310.2%	1,439	247	1,686
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			13,395	2,257	15,652

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 37	243.4%	11,969	2,022	13,991
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			11,969	2,022	13,991
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 36	343.7%	1,225	208	1,433
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 37	361.6%	1,618	279	1,897
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			14,812	2,509	17,321

2/:

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 40	278.5%	13,186	2,236	15,422
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			13,186	2,236	15,422
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 39	399.1%	1,377	235	1,612
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 40	419.2%	1,819	315	2,134
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			16,382	2,786	19,168

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 43	317.3%	14,527	2,473	17,000
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			14,527	2,473	17,000
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 42	461.6%	1,549	265	1,814
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 43	483.9%	2,045	355	2,400
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			18,121	3,093	21,214

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 46	359.9%	16,003	2,735	18,738
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			16,003	2,735	18,738
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 45	531.6%	1,741	299	2,040
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 46	556.9%	2,300	400	2,700
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			20,044	3,434	23,478

**** TOTAL CONTRACT COST SUMMARY ****

THIS ESTIMATE IS BASED ON THE SCOPE CONTAINED IN THE GRR, DATED: FEB 2000

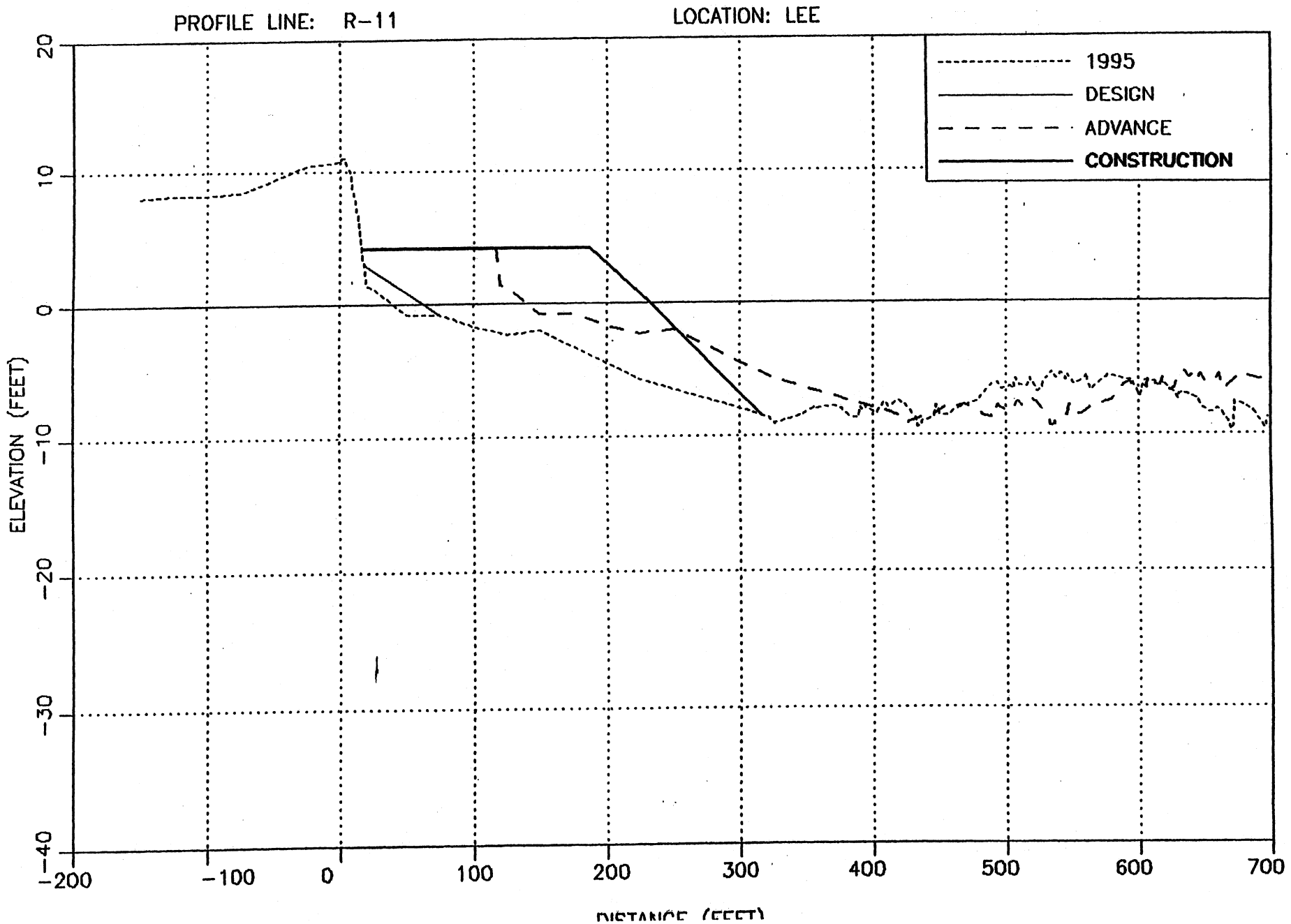
PROJECT: ESTERO ISLAND, LEE COUNTY BEC
LOCATION: LEE COUNTY, FLORIDA

DISTRICT: JACKSONVILLE
P.O.C.: ANNE D FORE, CHIEF, COST ENGINEERING

		CURRENT MCACES ESTIMATE PREPARED: DEC 1999 EFFECTIVE PRICING LEVEL: OCT 1999				AUTHORIZ./BUDGET YEAR: 2000 EFFECT. PRICING LEVEL: 1 OCT 98				.....FULLY FUNDED ESTIMATE.....				
ACCOUNT NUMBER	FEATURE DESCRIPTION	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	OMB (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	FEATURE MID PT	OMB (%)	COST ($K)	CNTG ($K)	FULL ($K)
17---	BEACH REPLENISHMENT	3,542	532	15%	4,074	0.0%	3,542	532	4,074	Feb 49	407.9%	17,662	3,028	20,690
	TOTAL CONSTRUCTION COSTS =====>	3,542	532	15%	4,074		3,542	532	4,074			17,662	3,028	20,690
01---	LANDS AND DAMAGES													
30---	PLANNING, ENGINEERING AND DESIGN	281	42	15%	323	0.0%	281	42	323	May 48	610.5%	1,958	337	2,295
31---	CONSTRUCTION MANAGEMENT	357	54	15%	411	0.0%	357	54	411	Feb 49	638.9%	2,586	451	3,037
	TOTAL COSTS ==========>	4,180	628	15%	4,808		4,180	628	4,808			22,206	3,816	26,022

GASPARILLA ISLAND

TYPICAL PROJECT CROSS-SECTIONS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LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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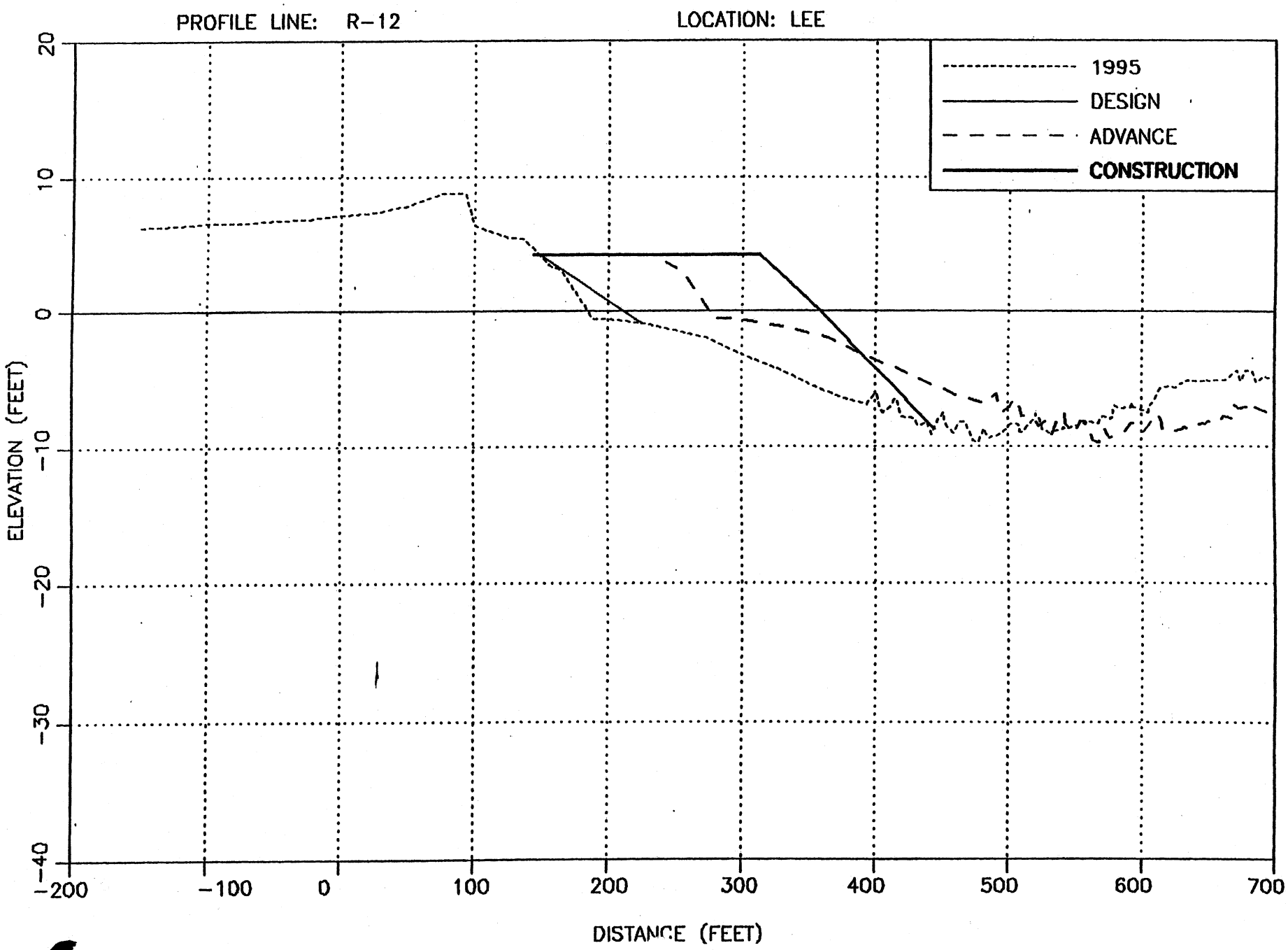
600
700
DISTANCE (FEET)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LOCATION: LEE
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ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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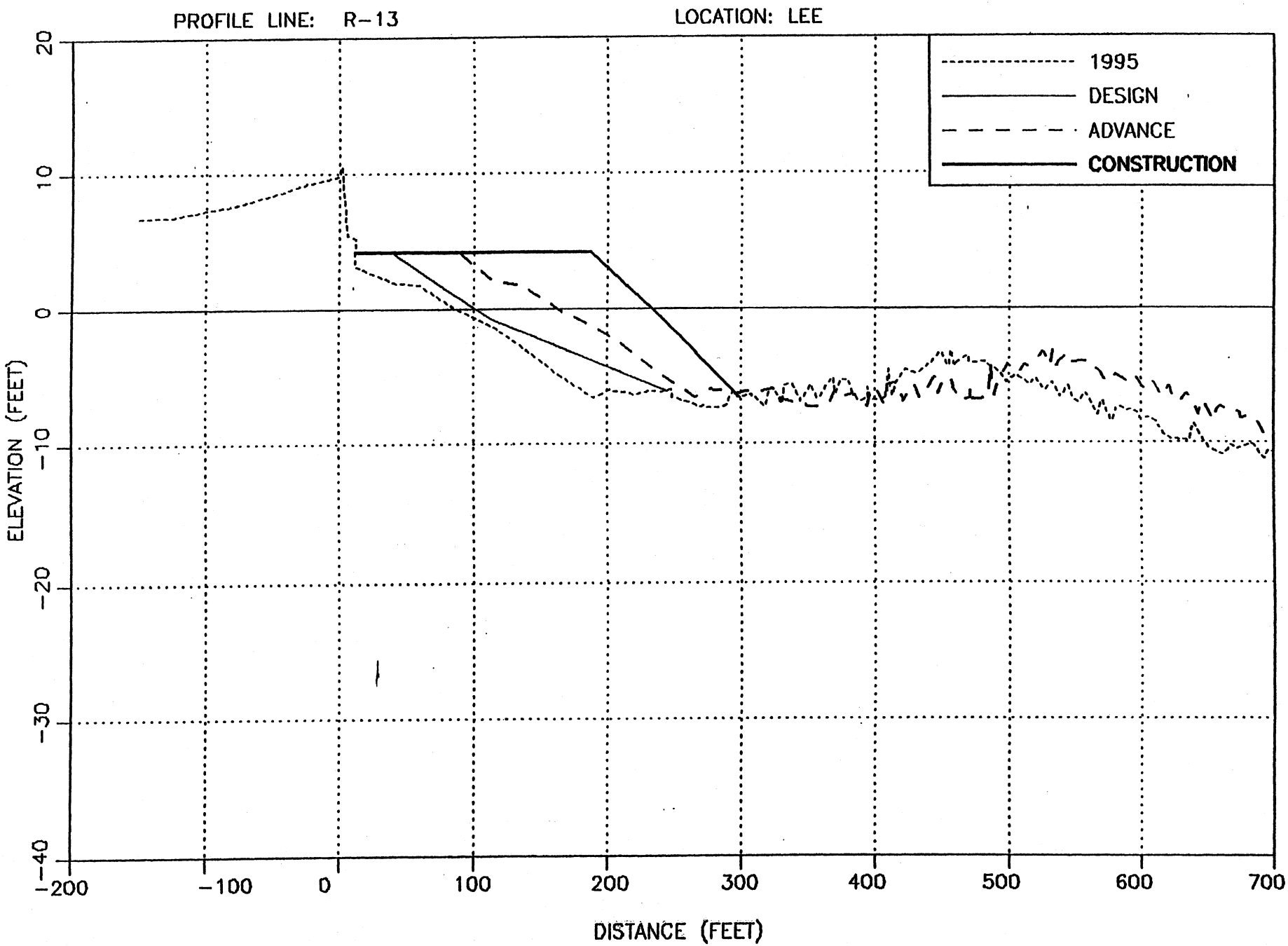
DISTANCE (FEET)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LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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-100
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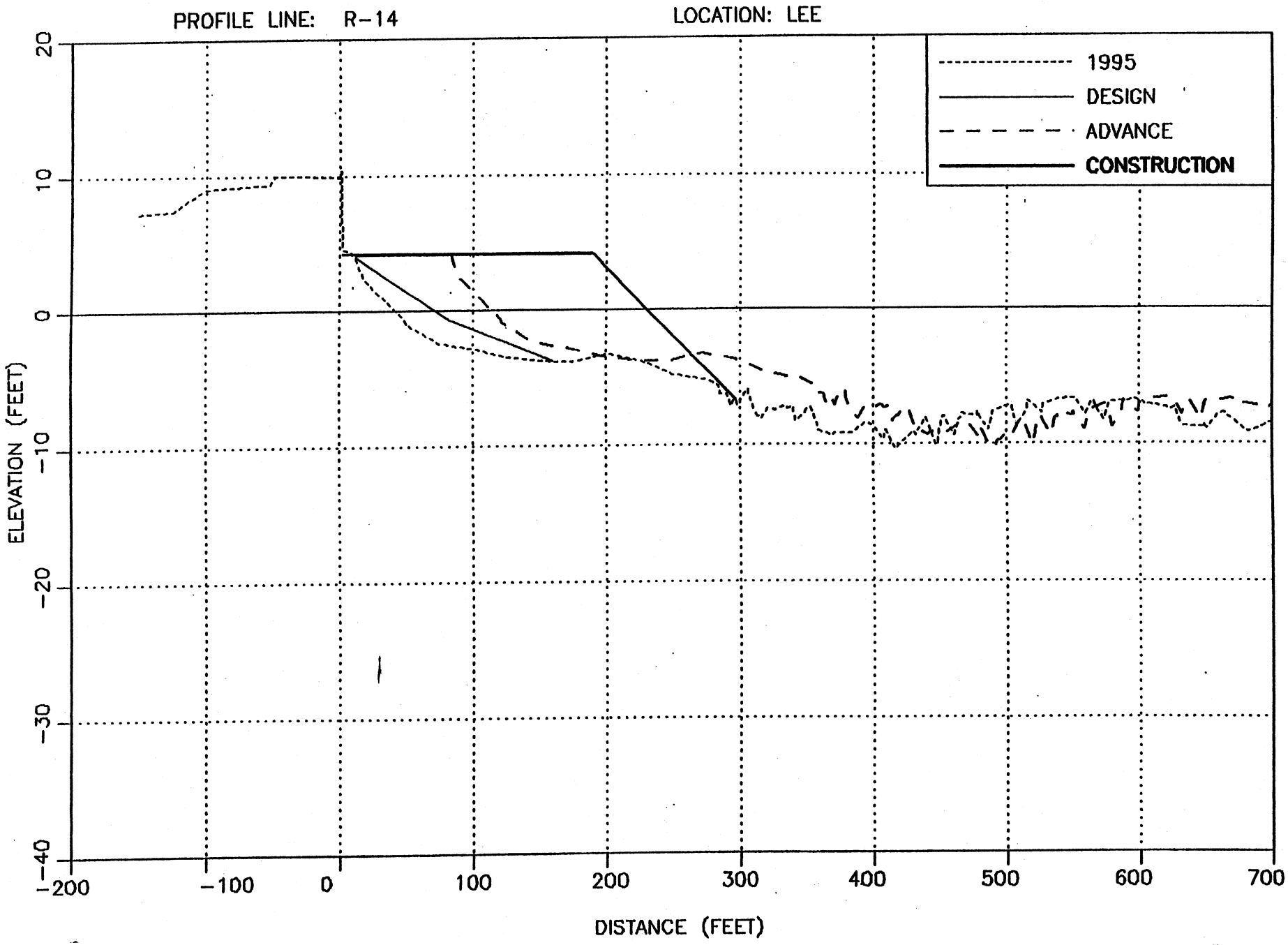
200
300
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-14
LOCATION: LEE
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DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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400
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600
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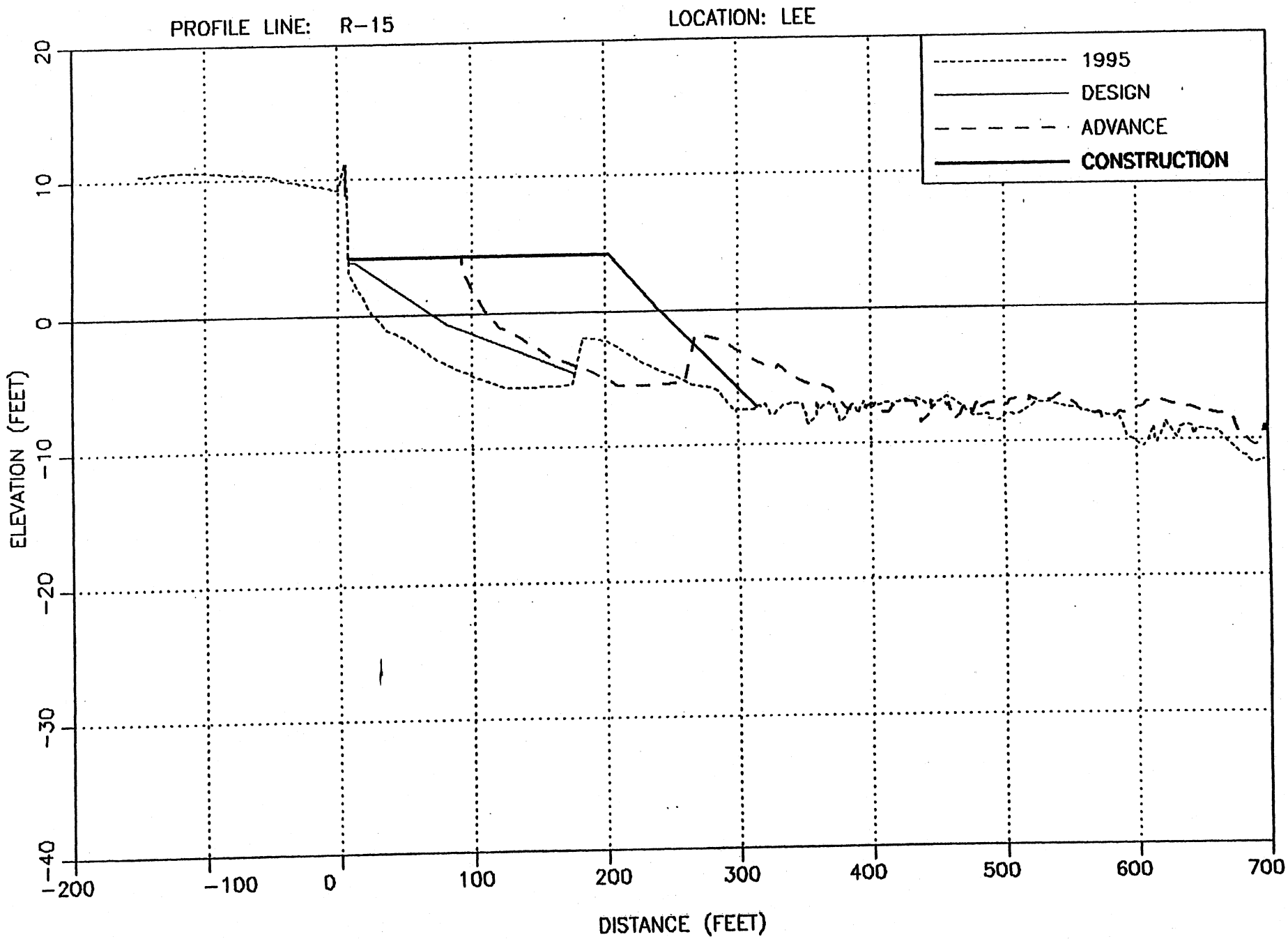
DISTANCE (FEET)


PROFILE LINE: R-15
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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-10
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-30
-40
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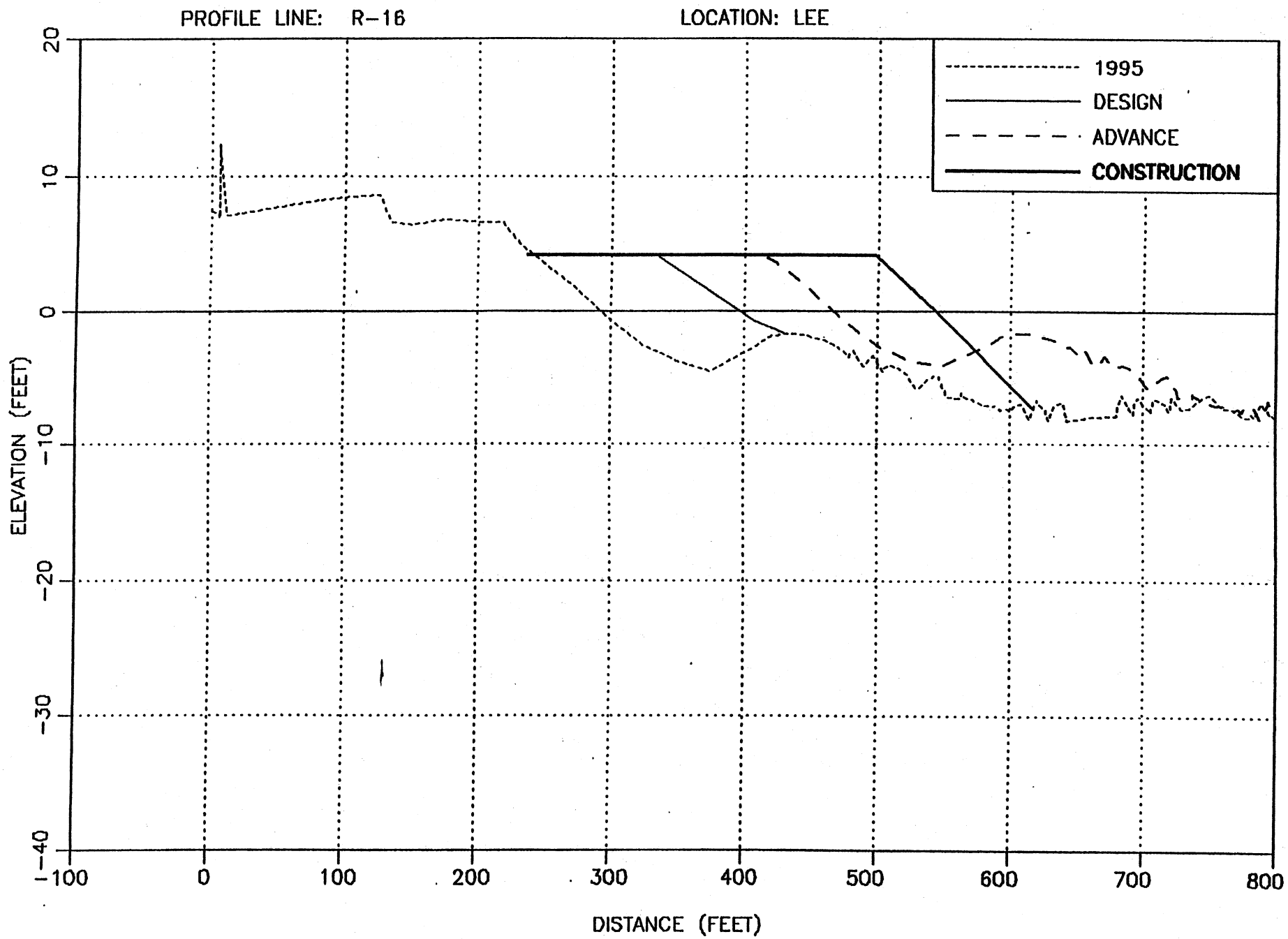
200
300
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-16
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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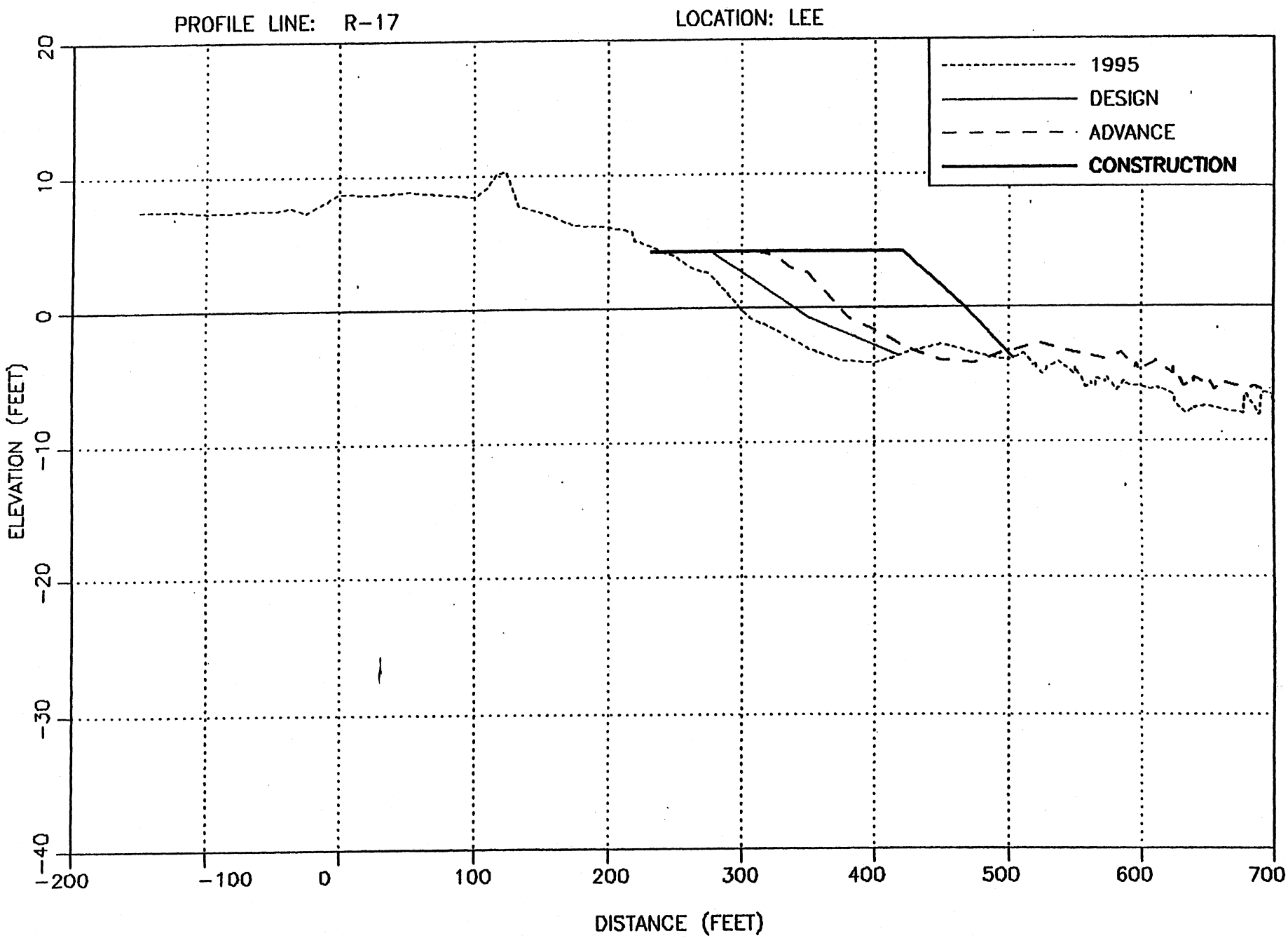
500
600
700
800
DISTANCE (FEET)


PROFILE LINE: R-17
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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10
0
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-20
-30
-40
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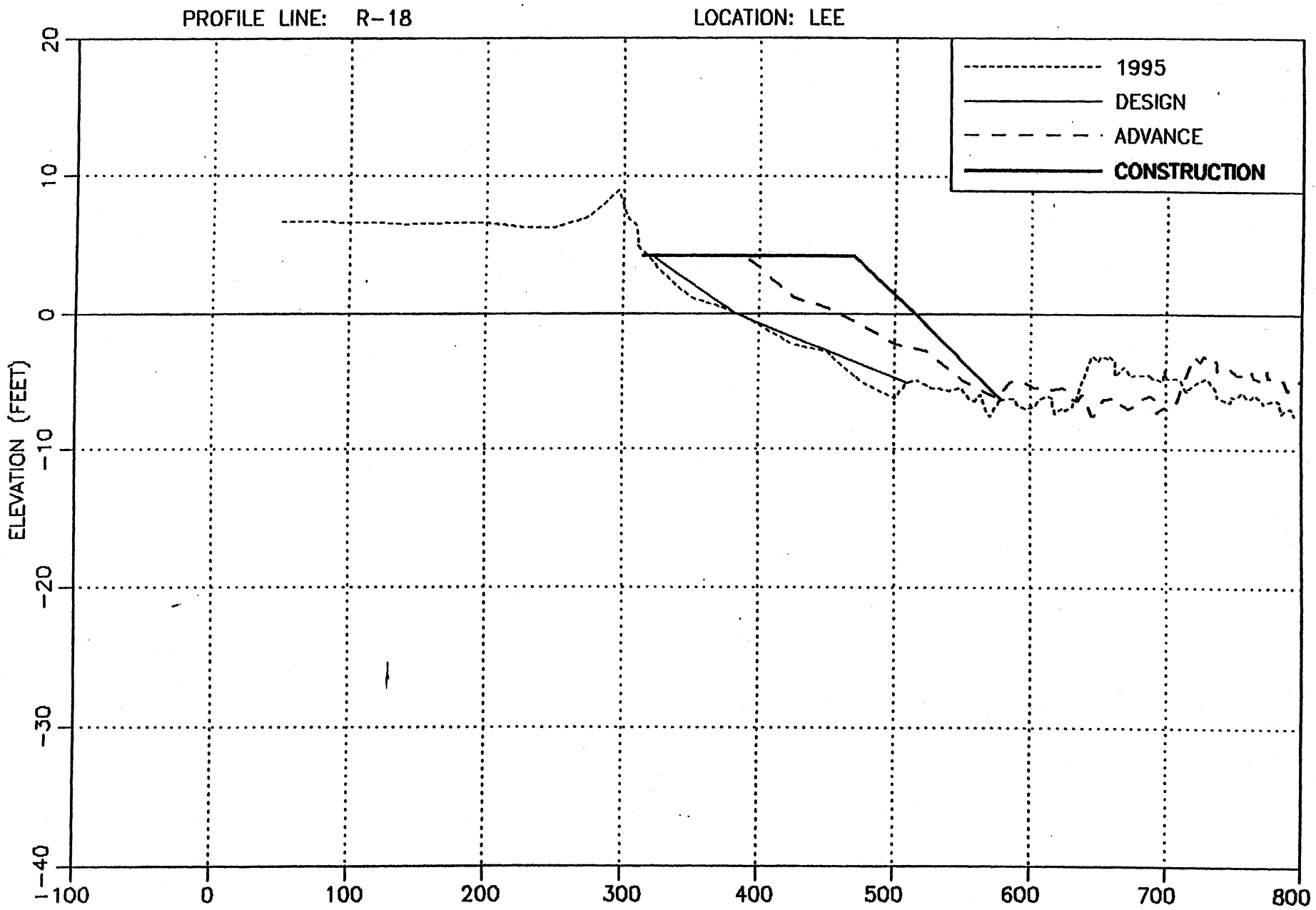
-100
0
100
200
300
400
500
600
700
DISTANCE (FEET)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LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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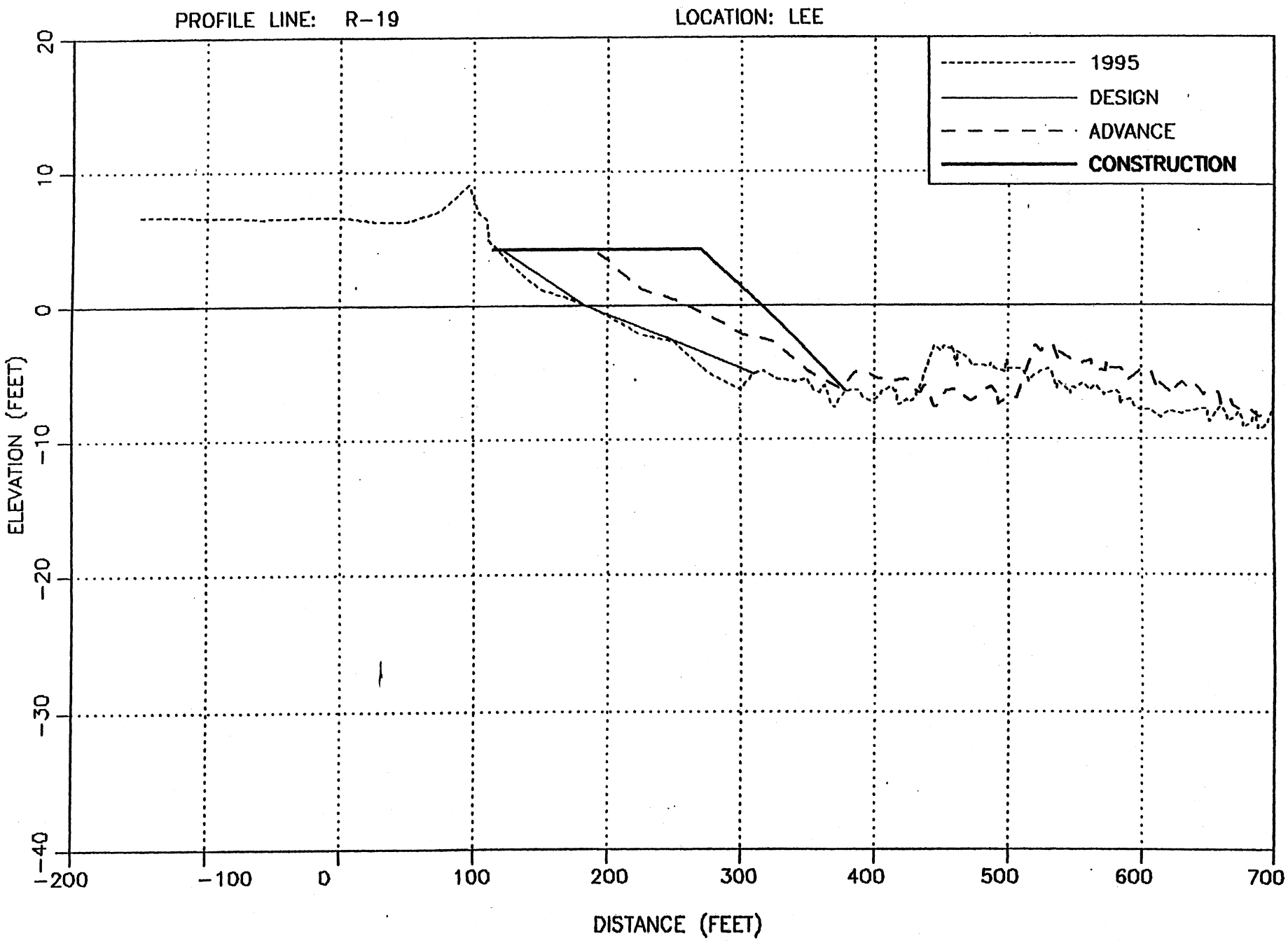
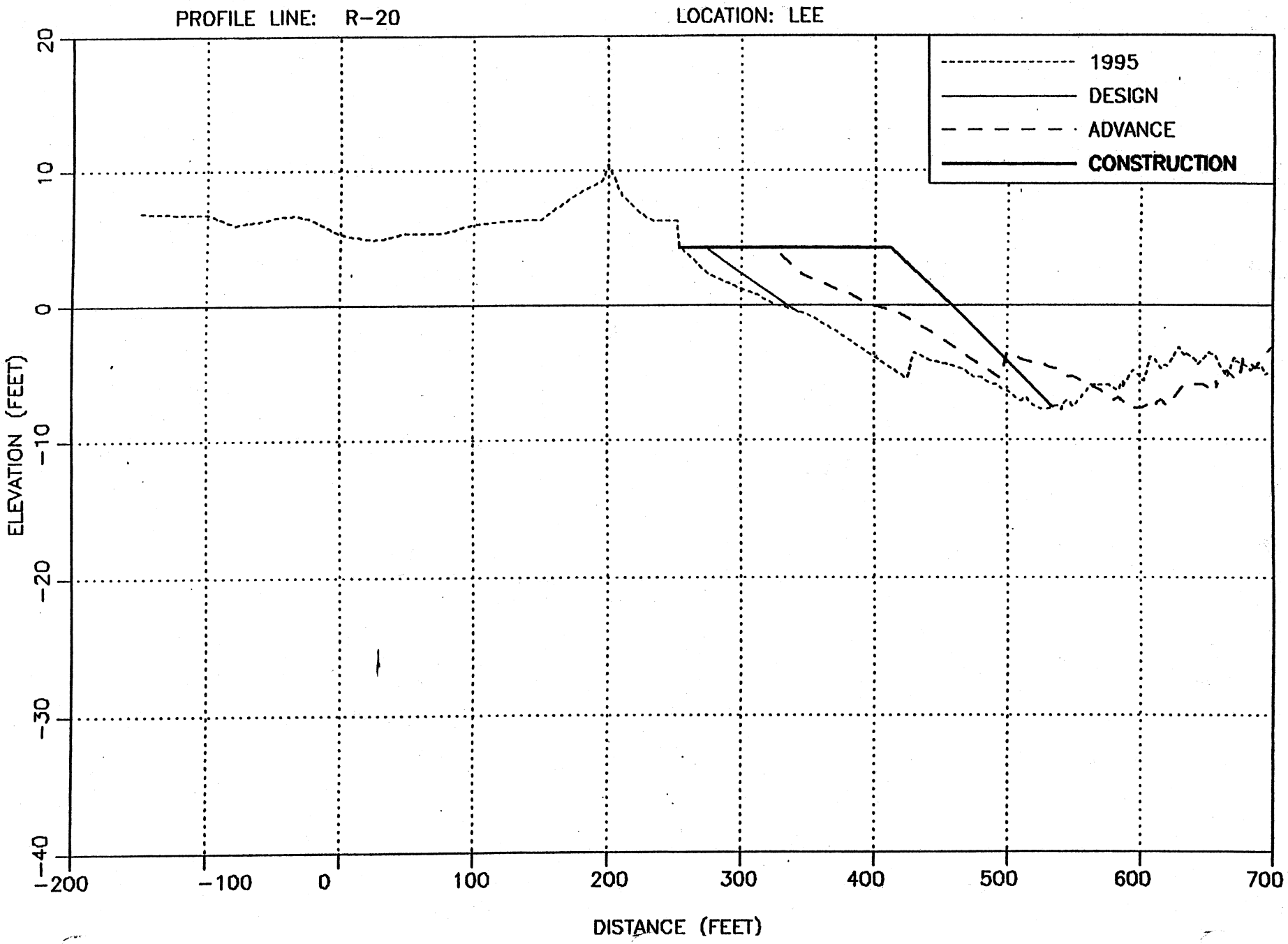
500
600
700
800


PROFILE LINE: R-19
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
-100
0
100
200
300
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-20
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
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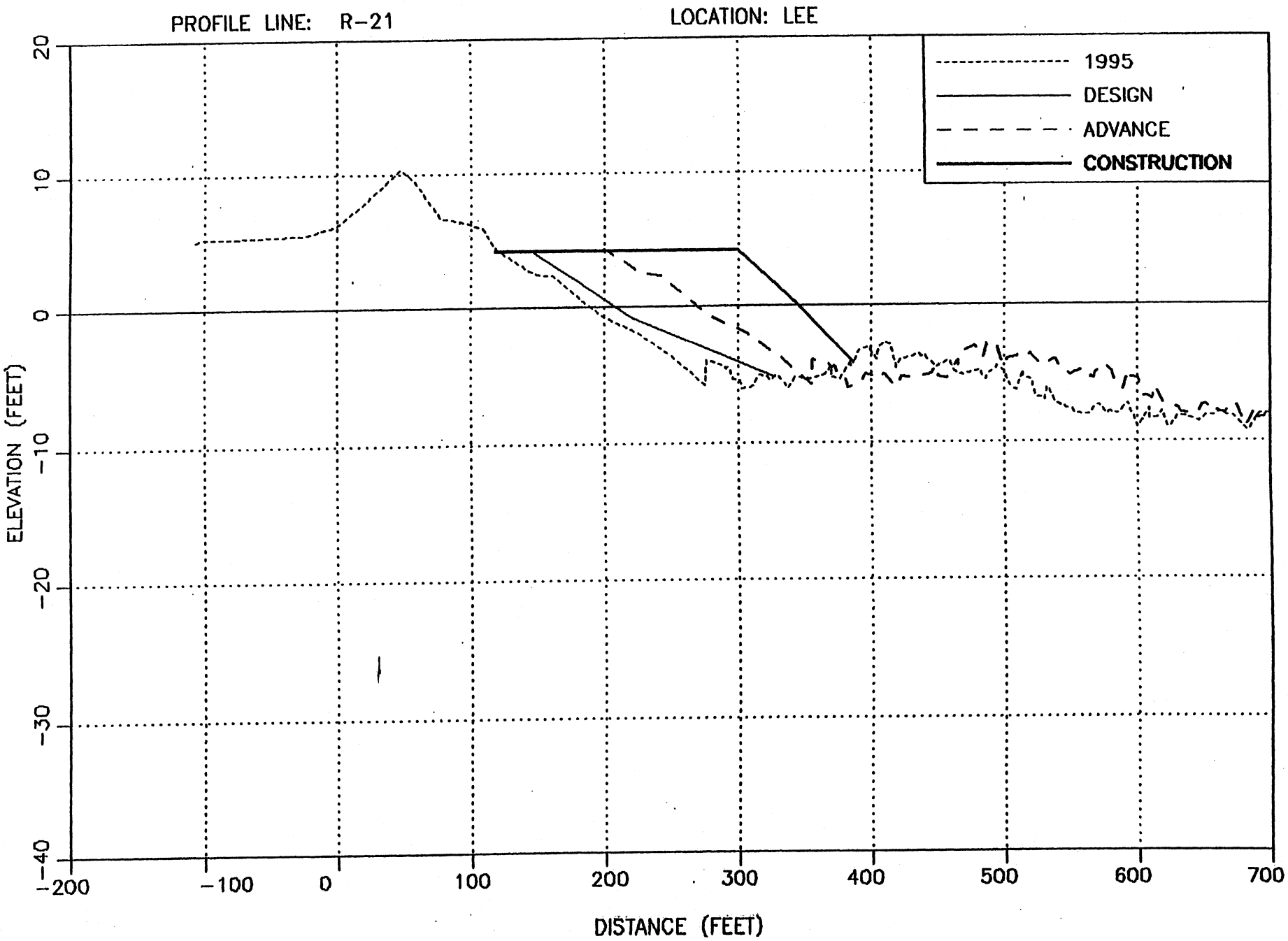
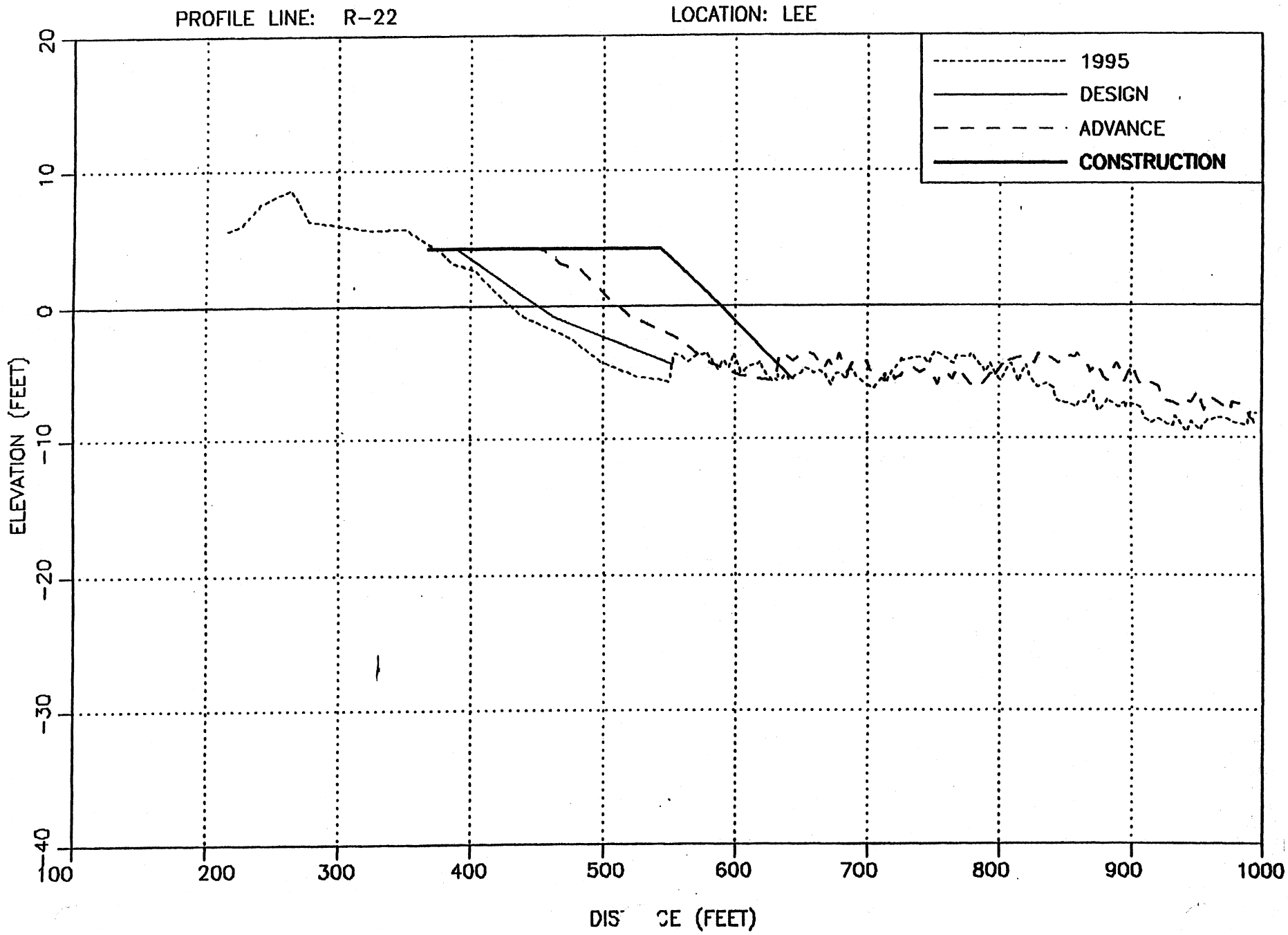
0
100
200
300
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-21
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
-100
0
100
200
300
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-22
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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10
0
-10
-20
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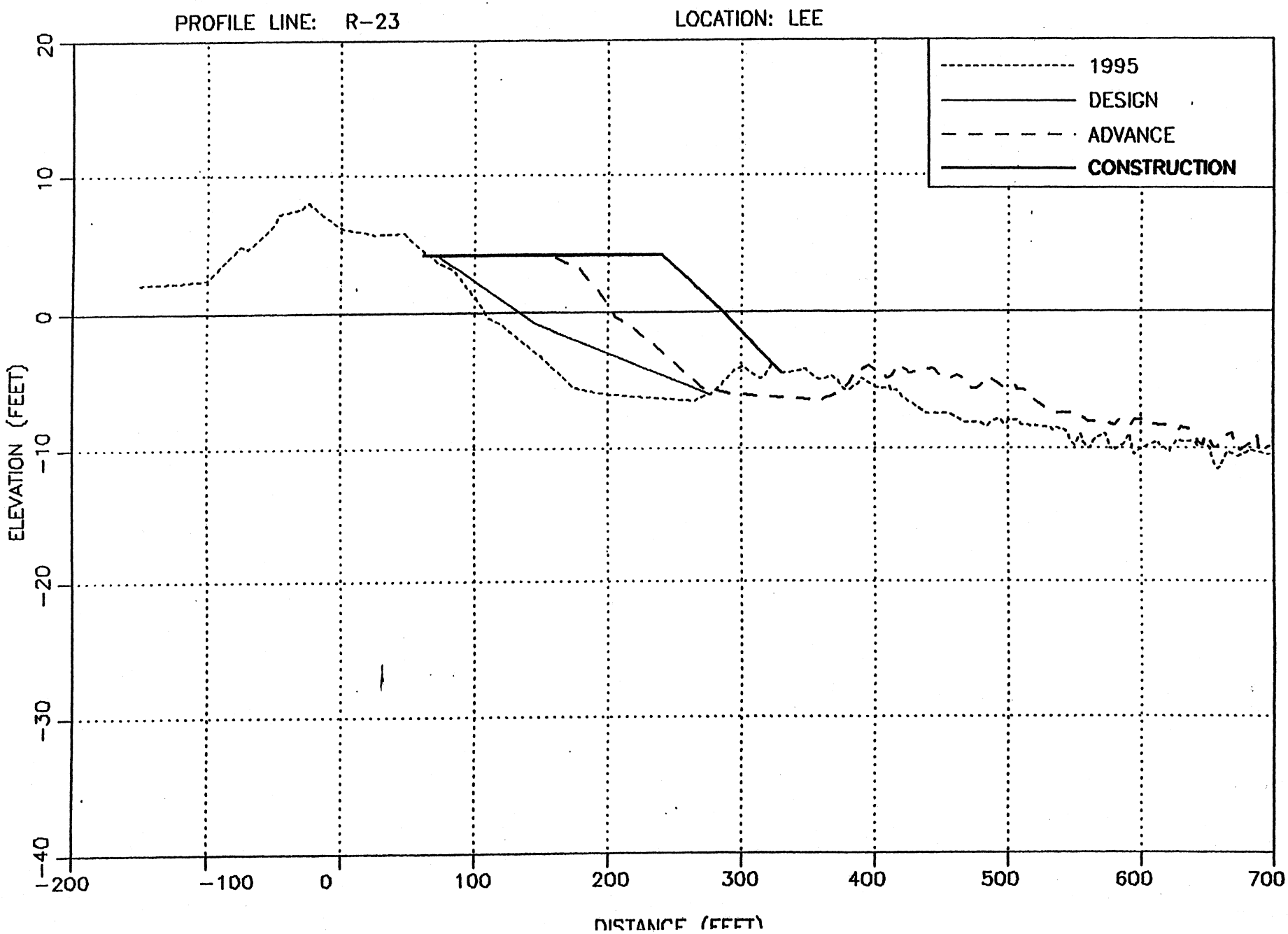
700
800
900
1000
DIS CE (FEET)


PROFILE LINE: R-23
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
20
10
0
-10
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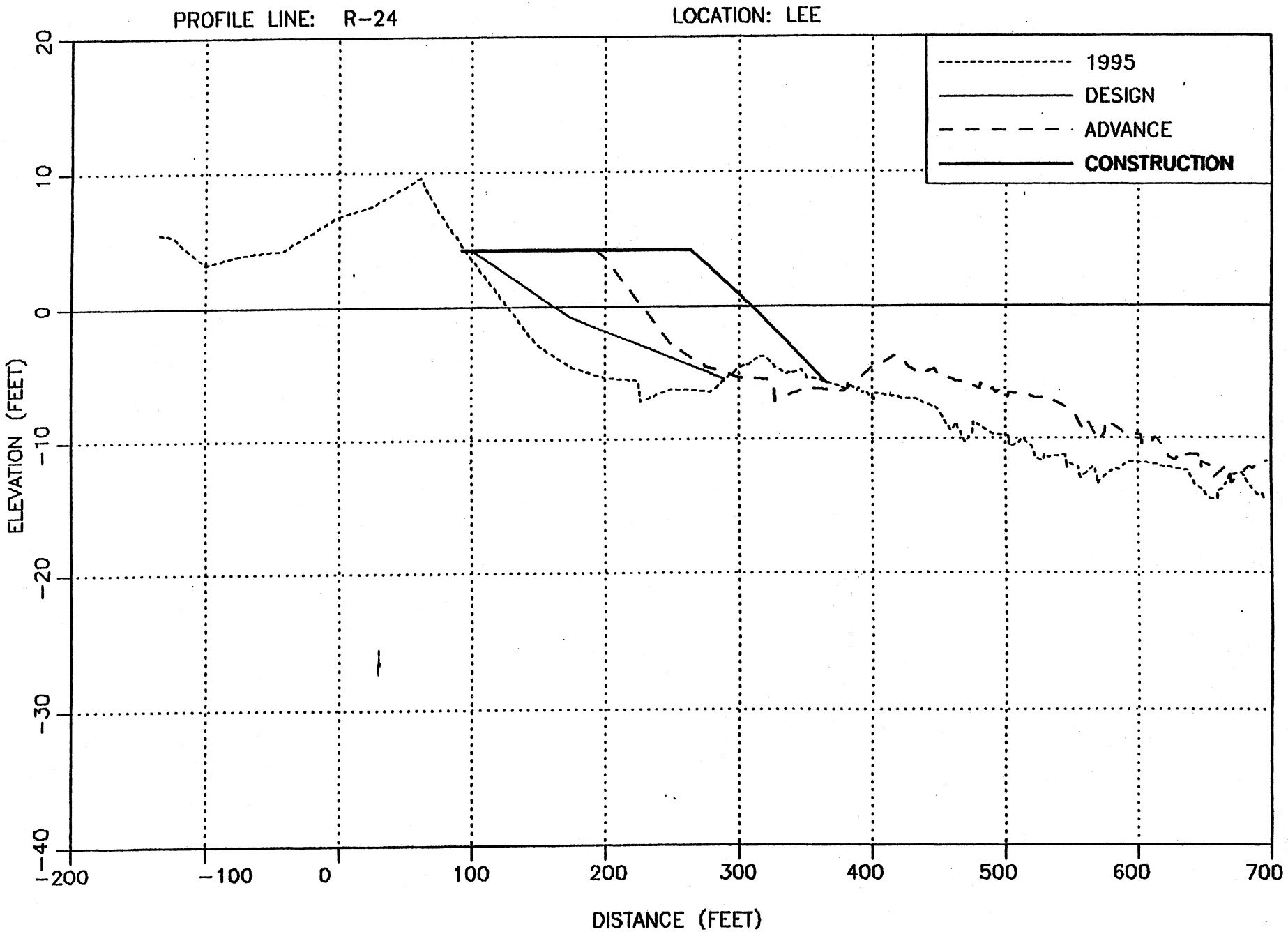
-30
-40
-200
-100
0
100
200
300
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-24
LOCATION: LEE
1995
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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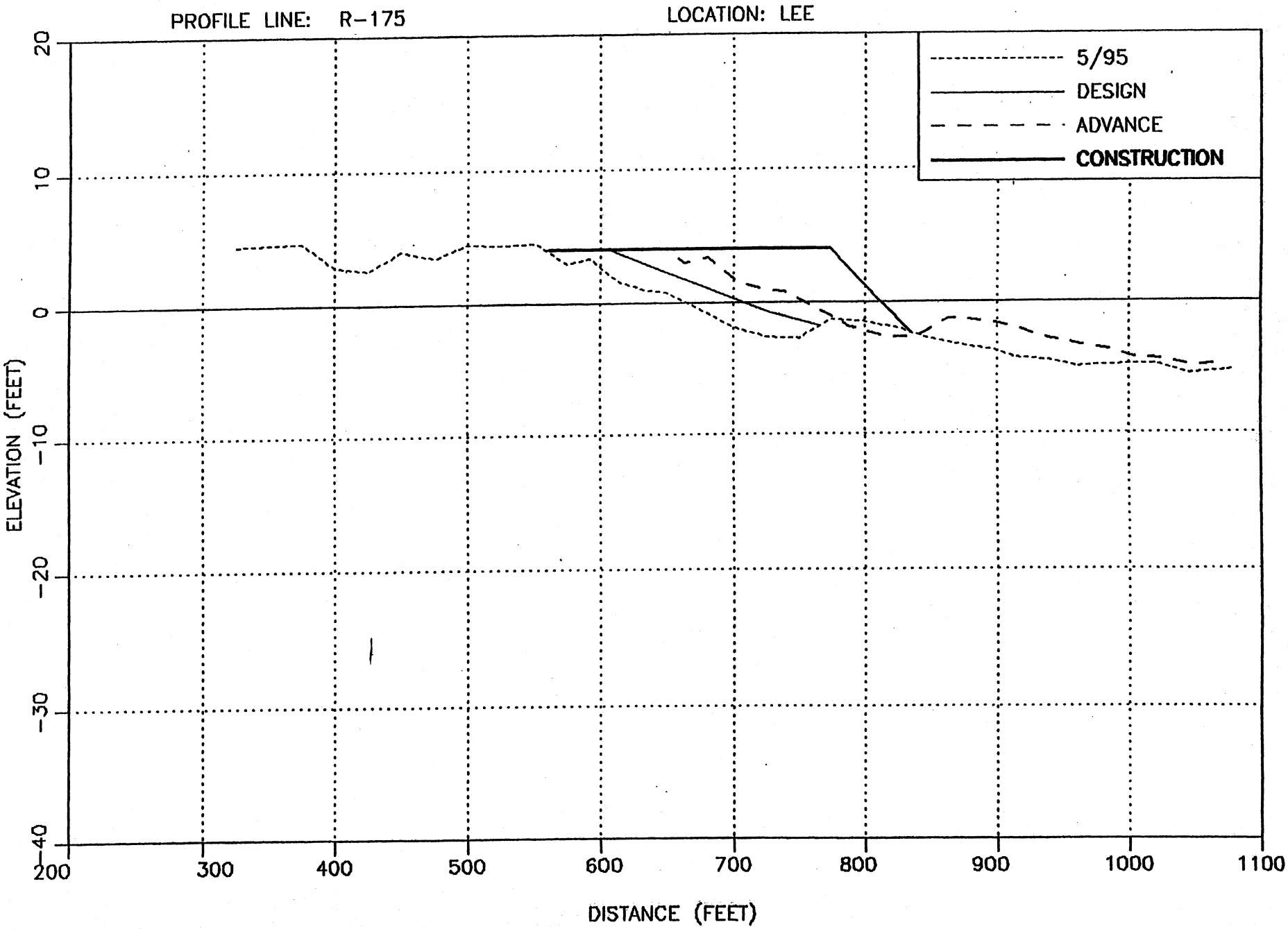
10
0
-10
-20
-30
-40
-200
-100
0
100
200
300
400
500
600
700
DISTANCE (FEET)

ESTERO ISLAND

TYPICAL PROJECT CROSS-SECTIONS


PROFILE LINE: R-175
LOCATION: LEE
5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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10
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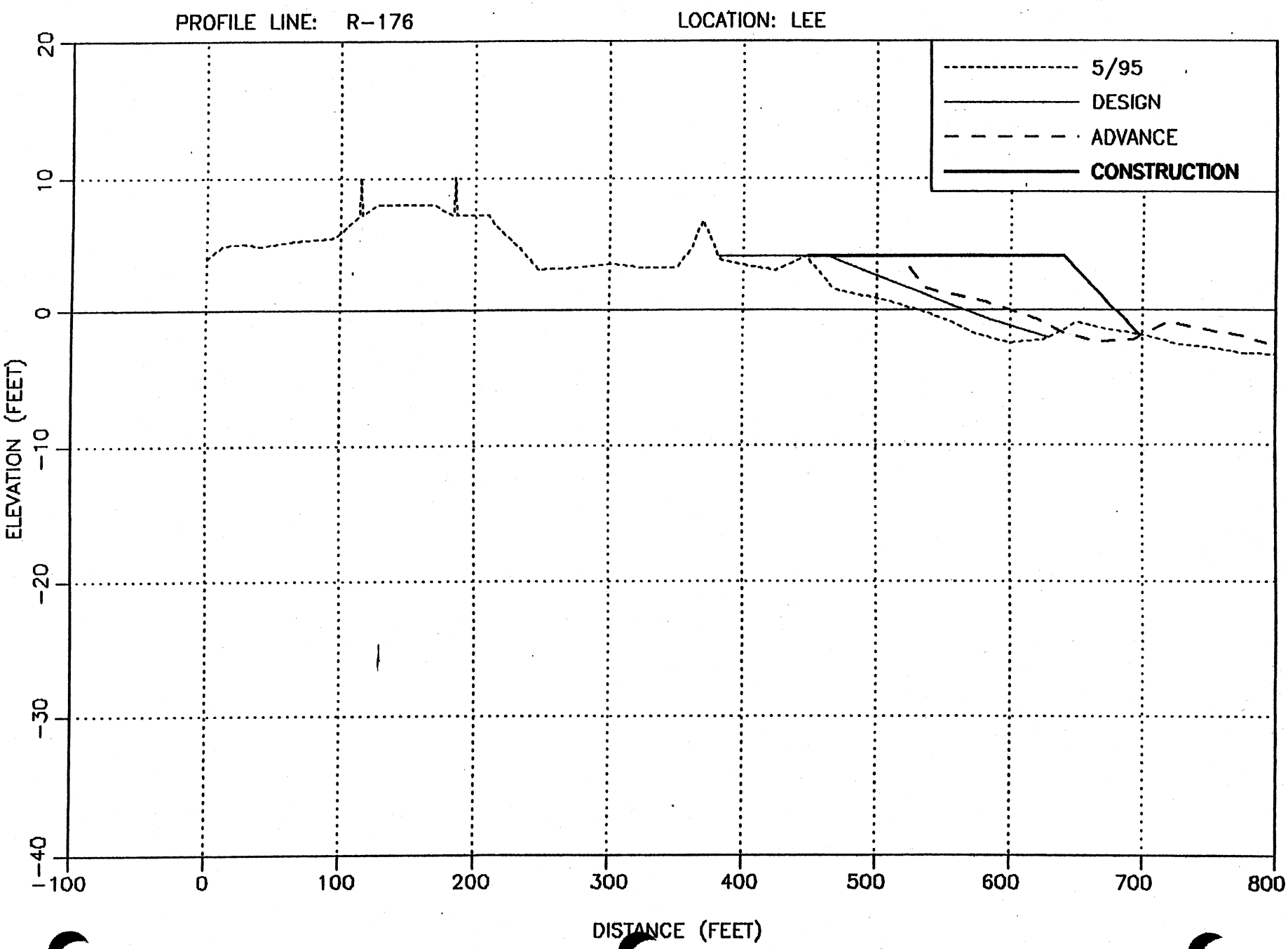
-10
-20
-30
-40
200
300
400
500
600
700
800
900
1000
1100
DISTANCE (FEET)


PROFILE LINE: R-176
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5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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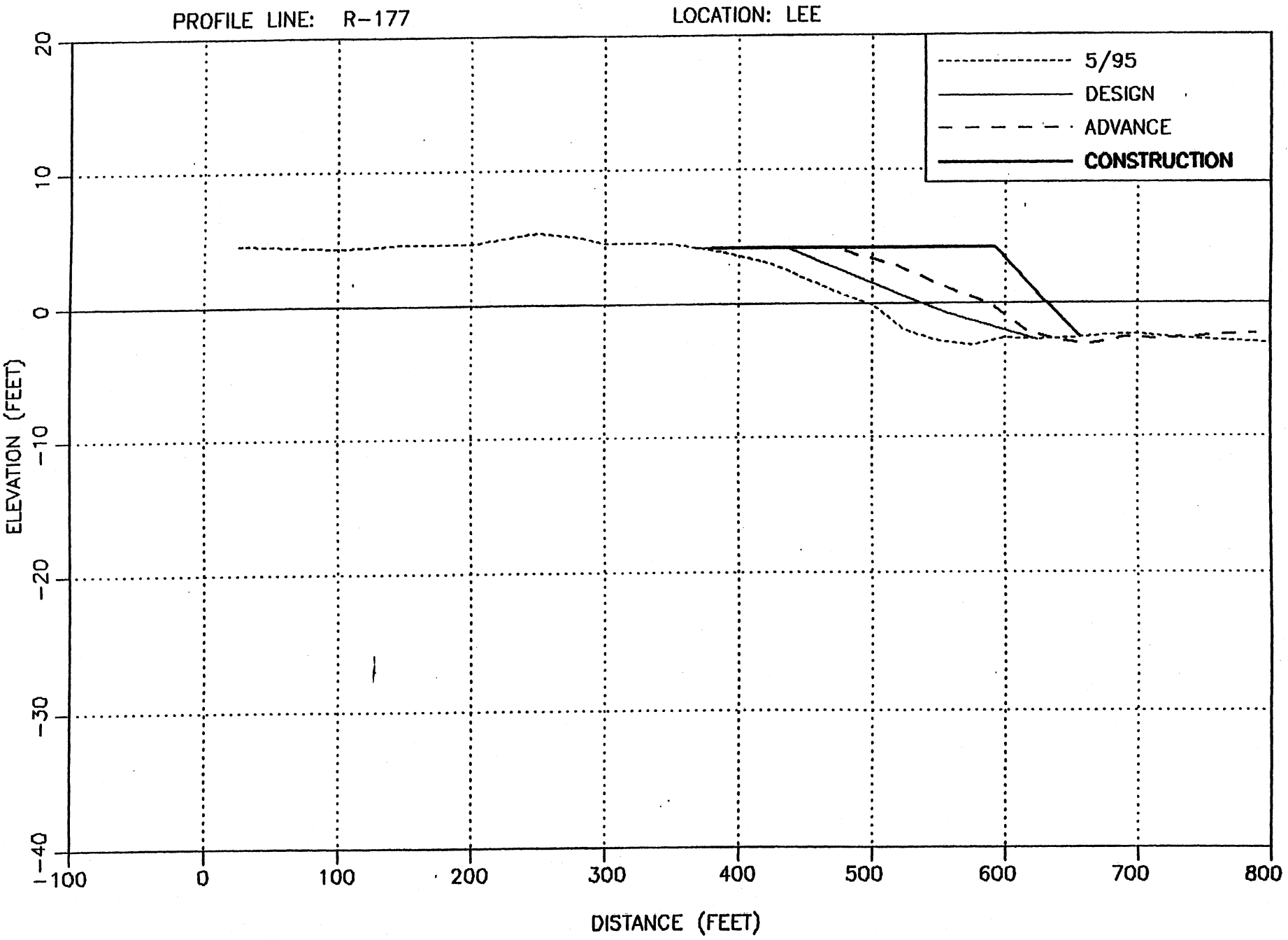
500
600
700
800
DISTANCE (FEET)


PROFILE LINE: R-177
LOCATION: LEE
5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
20
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-10
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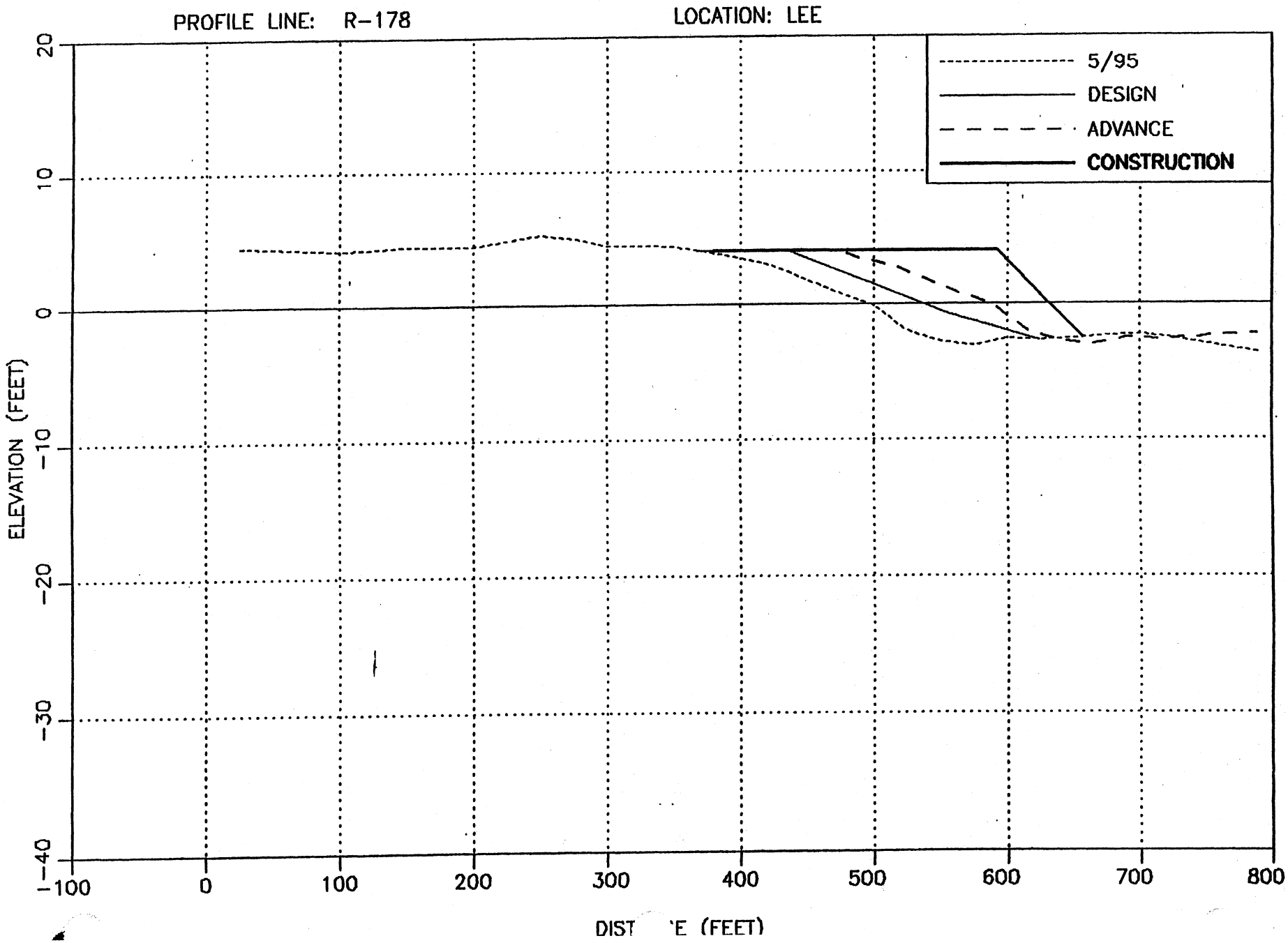
500
600
700
800
DISTANCE (FEET)


PROFILE LINE: R-178
LOCATION: LEE
5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
20
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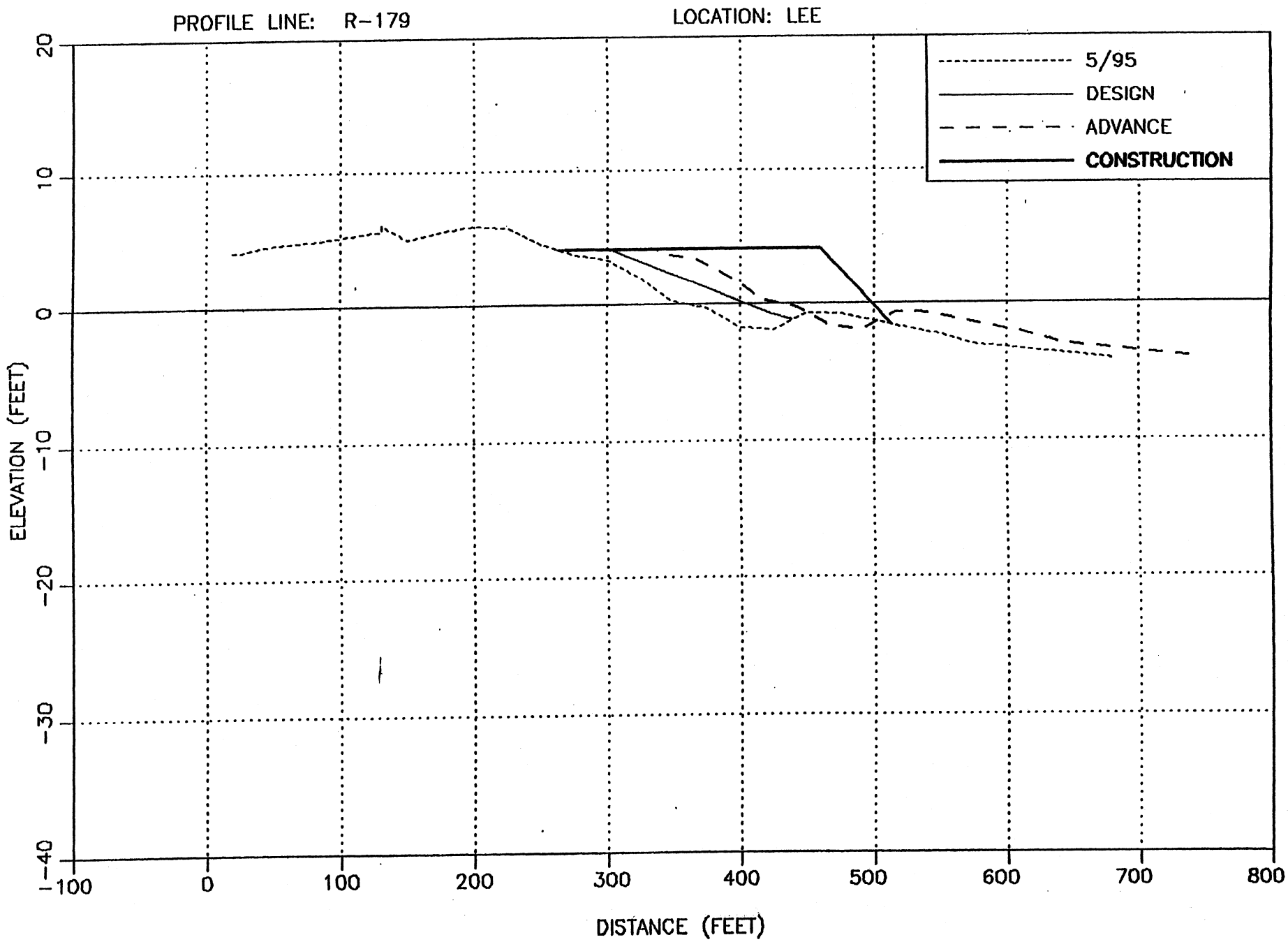
600
700
800
DIST 'E (FEET)


PROFILE LINE: R-179
LOCATION: LEE
5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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-40
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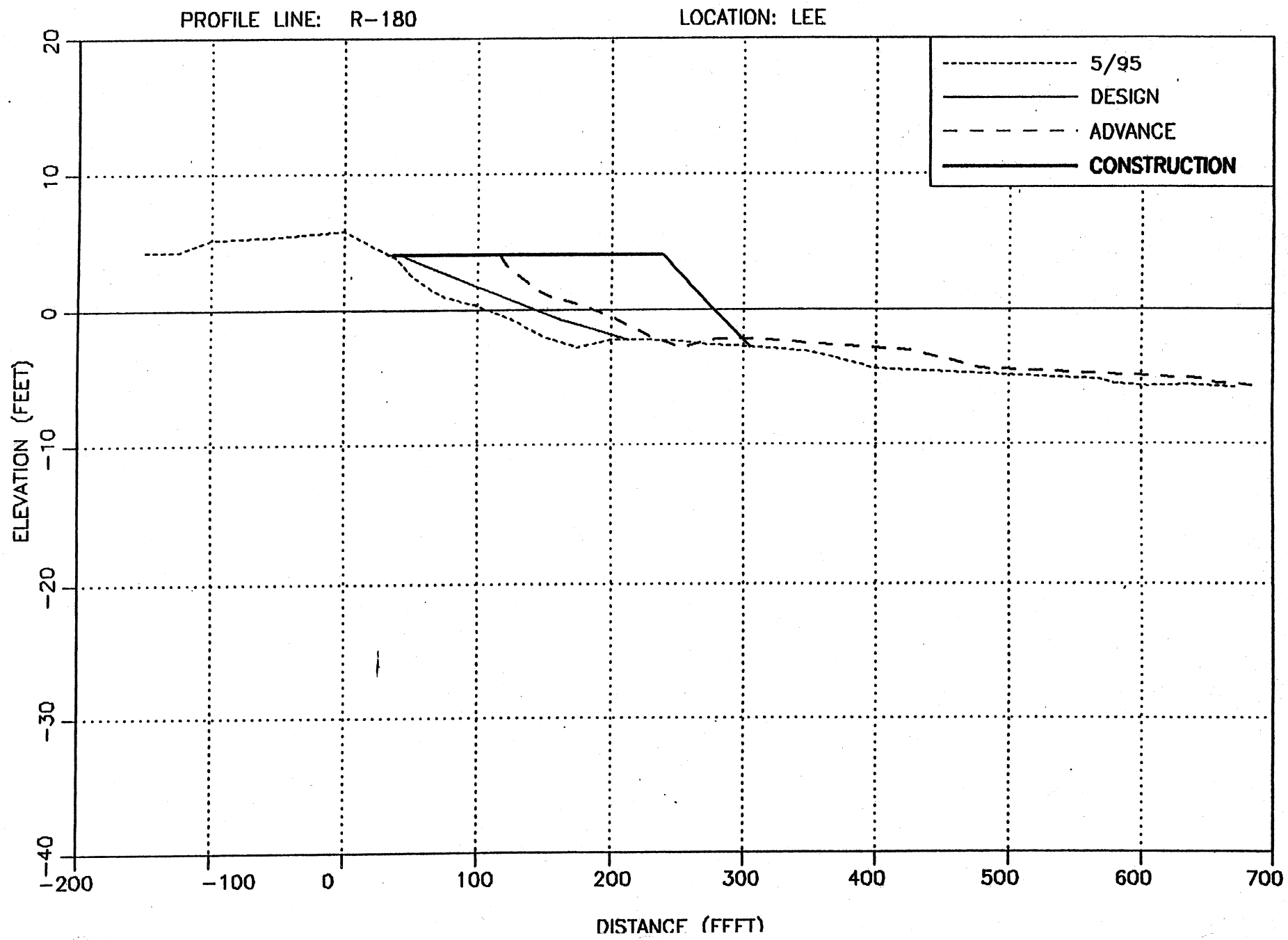
300
400
500
600
700
800
DISTANCE (FEET)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5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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400
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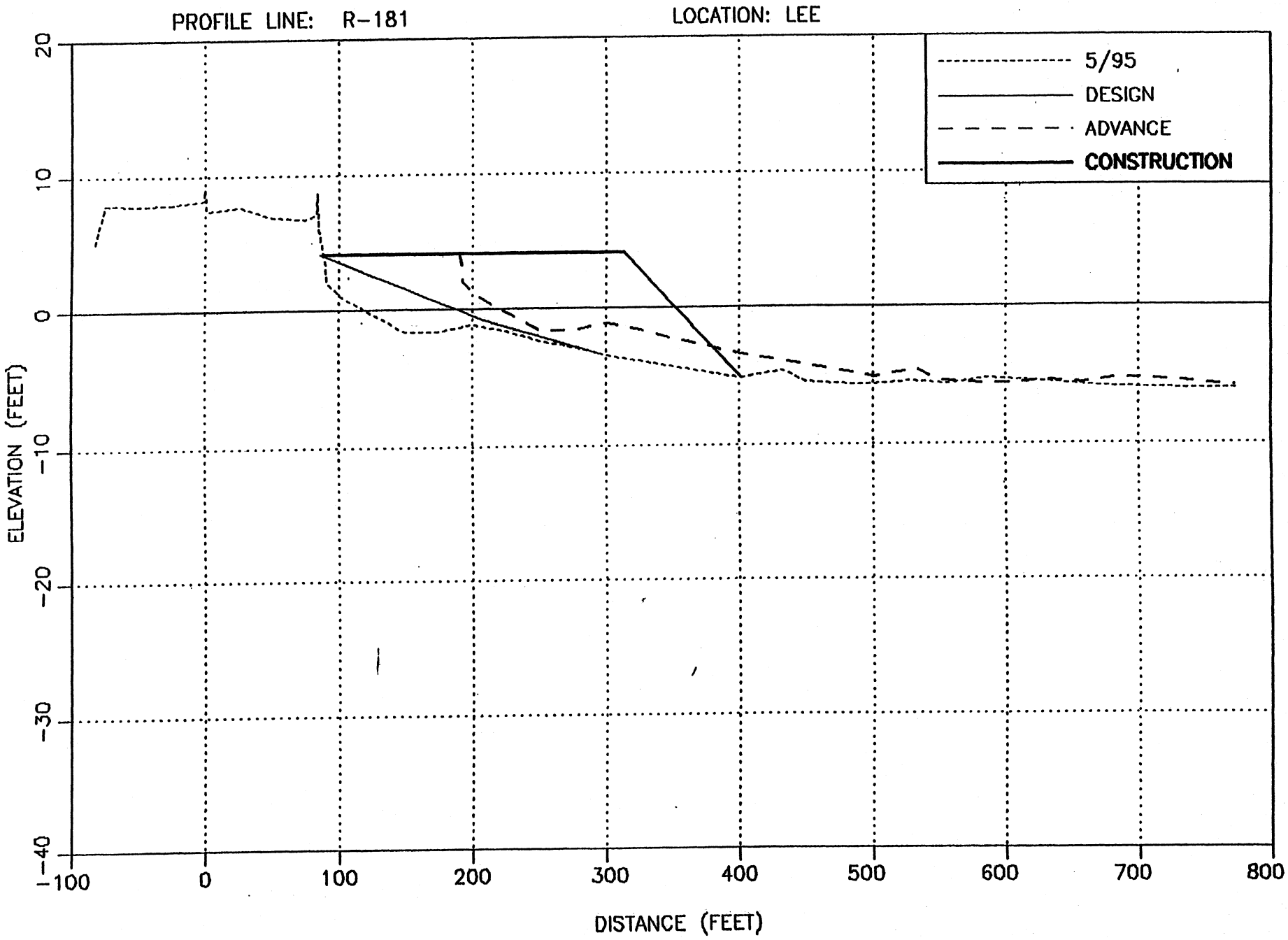
600
700
DISTANCE (FEET)


PROFILE LINE: R-181
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5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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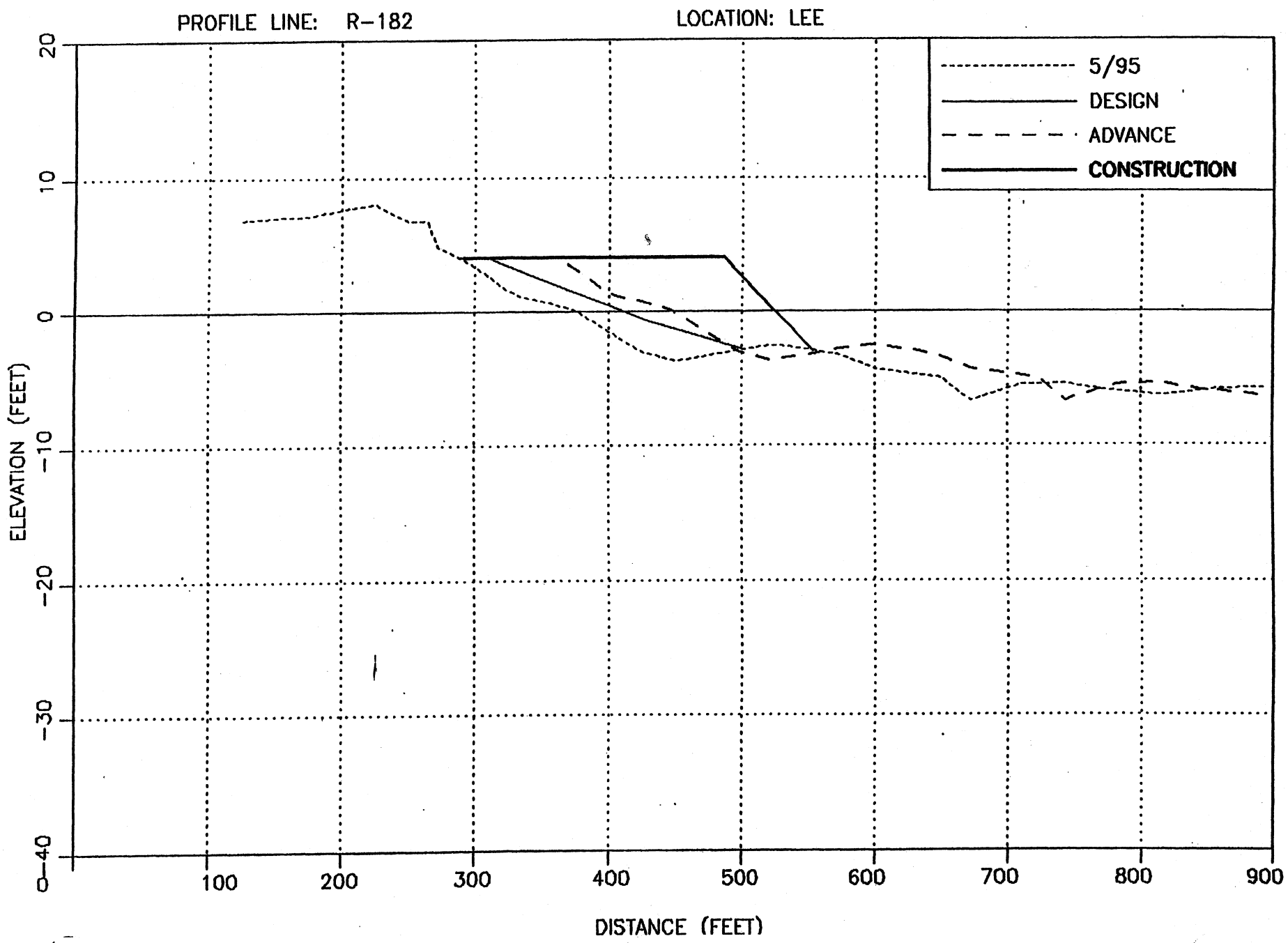
800
DISTANCE (FEET)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5/95
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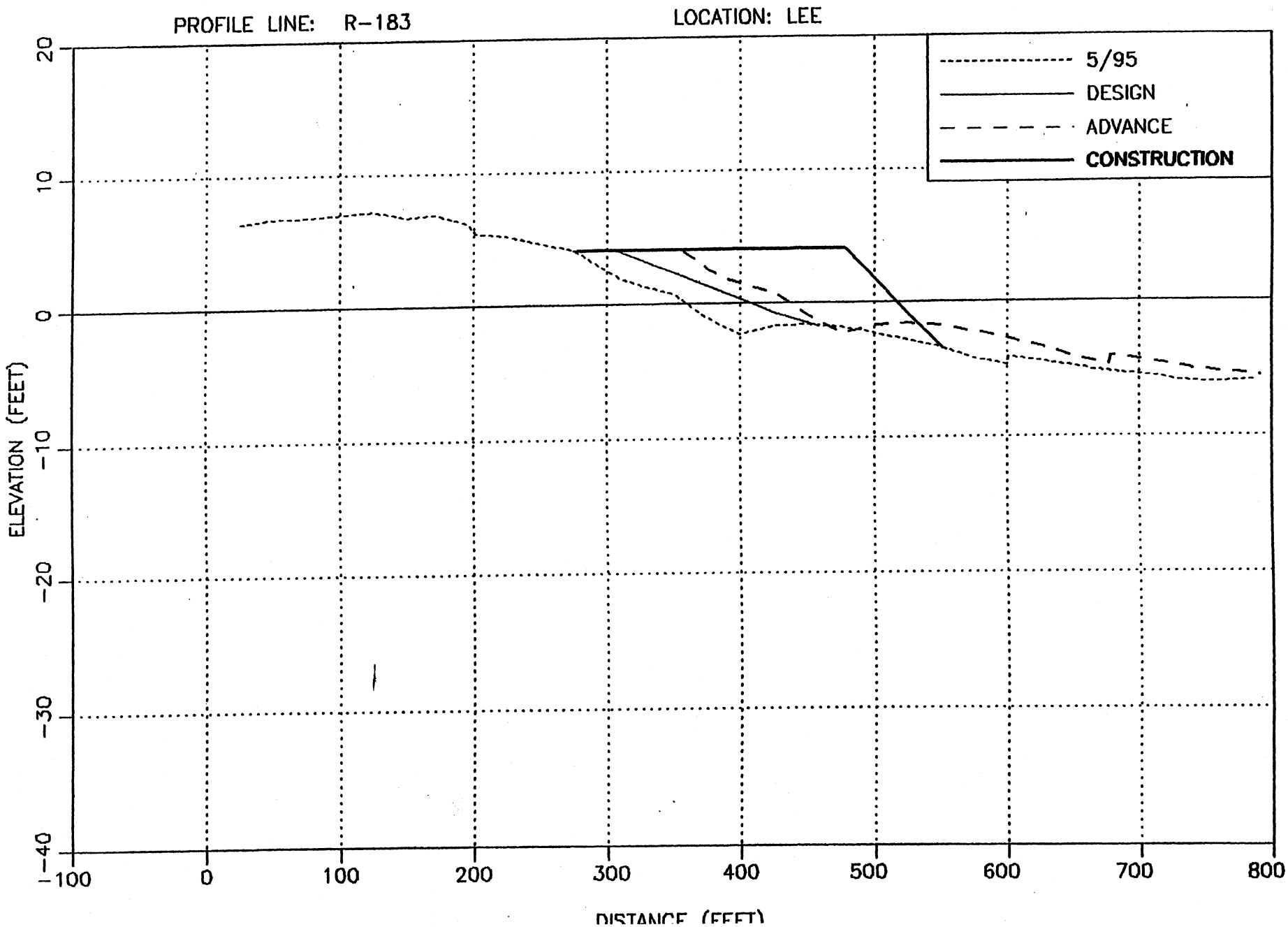
DISTANCE (FEET)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5/95
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ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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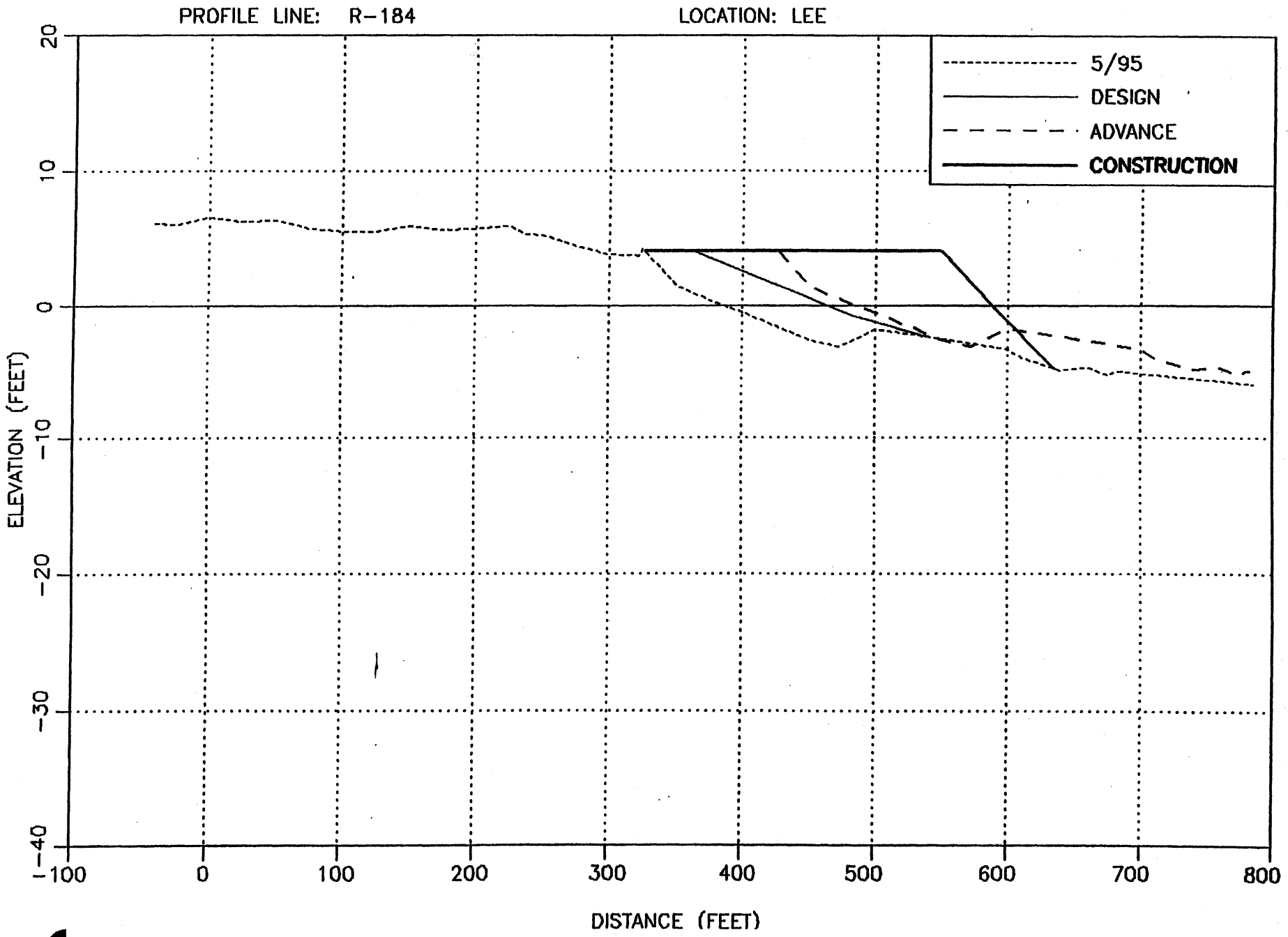
700
800
DISTANCE (FEET)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LOCATION: LEE
5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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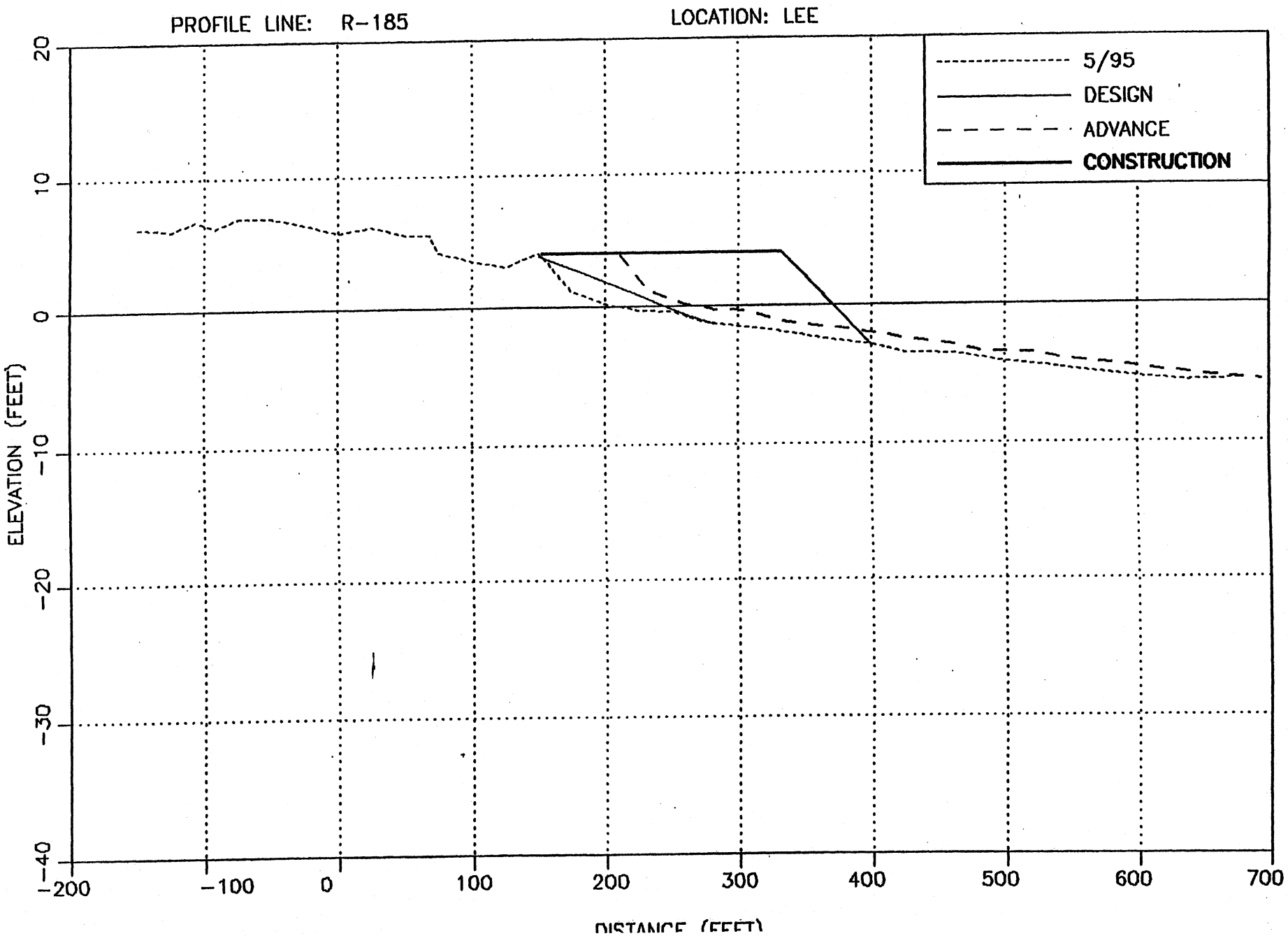
500
600
700
800
DISTANCE (FEET)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LOCATION: LEE
5/95
DESIGN
ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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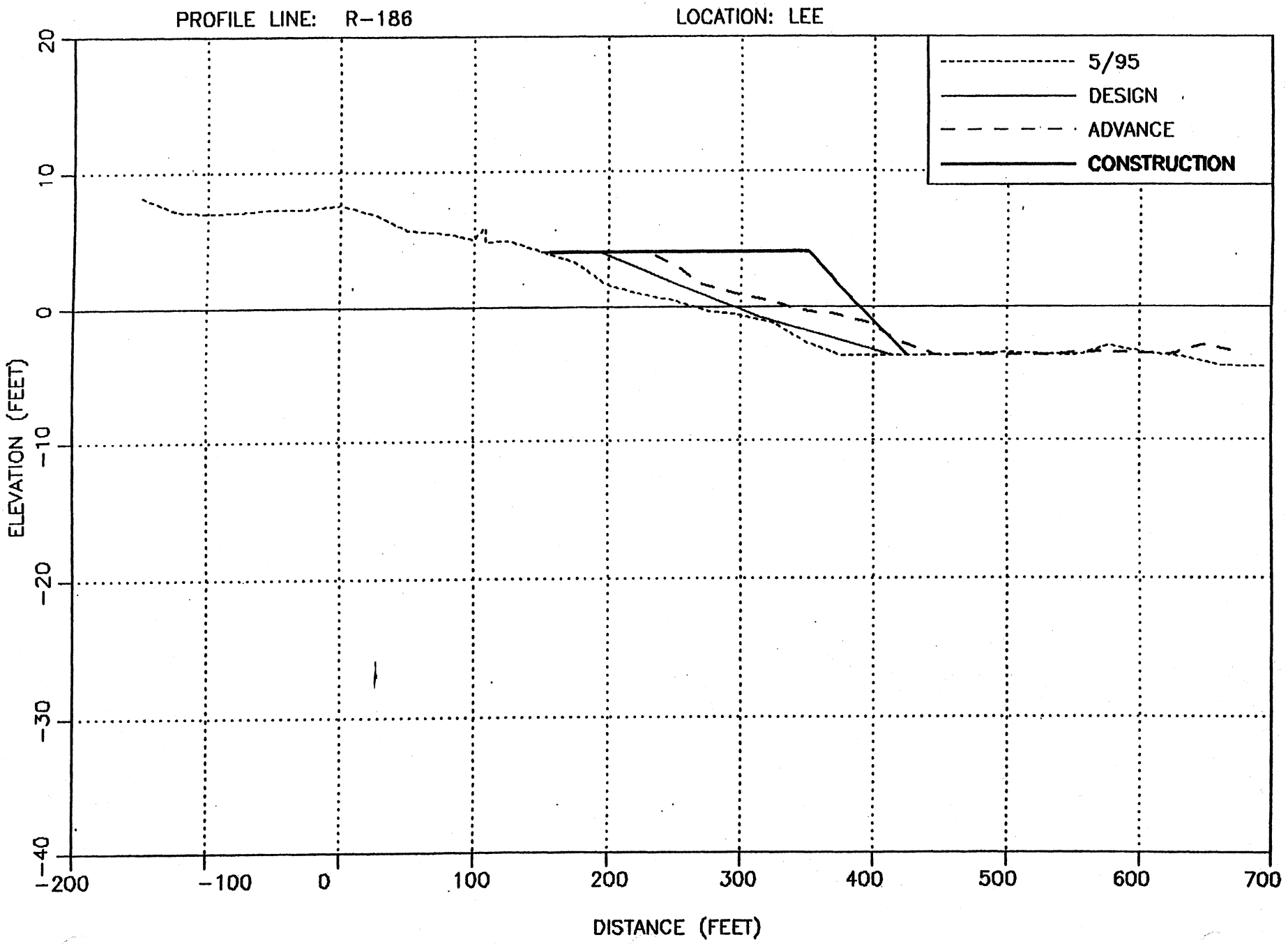
400
500
600
700
DISTANCE (FEET)


PROFILE LINE: R-186
LOCATION: LEE
5/95
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ADVANCE
CONSTRUCTION
ELEVATION (FEET)
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0
100
200
300
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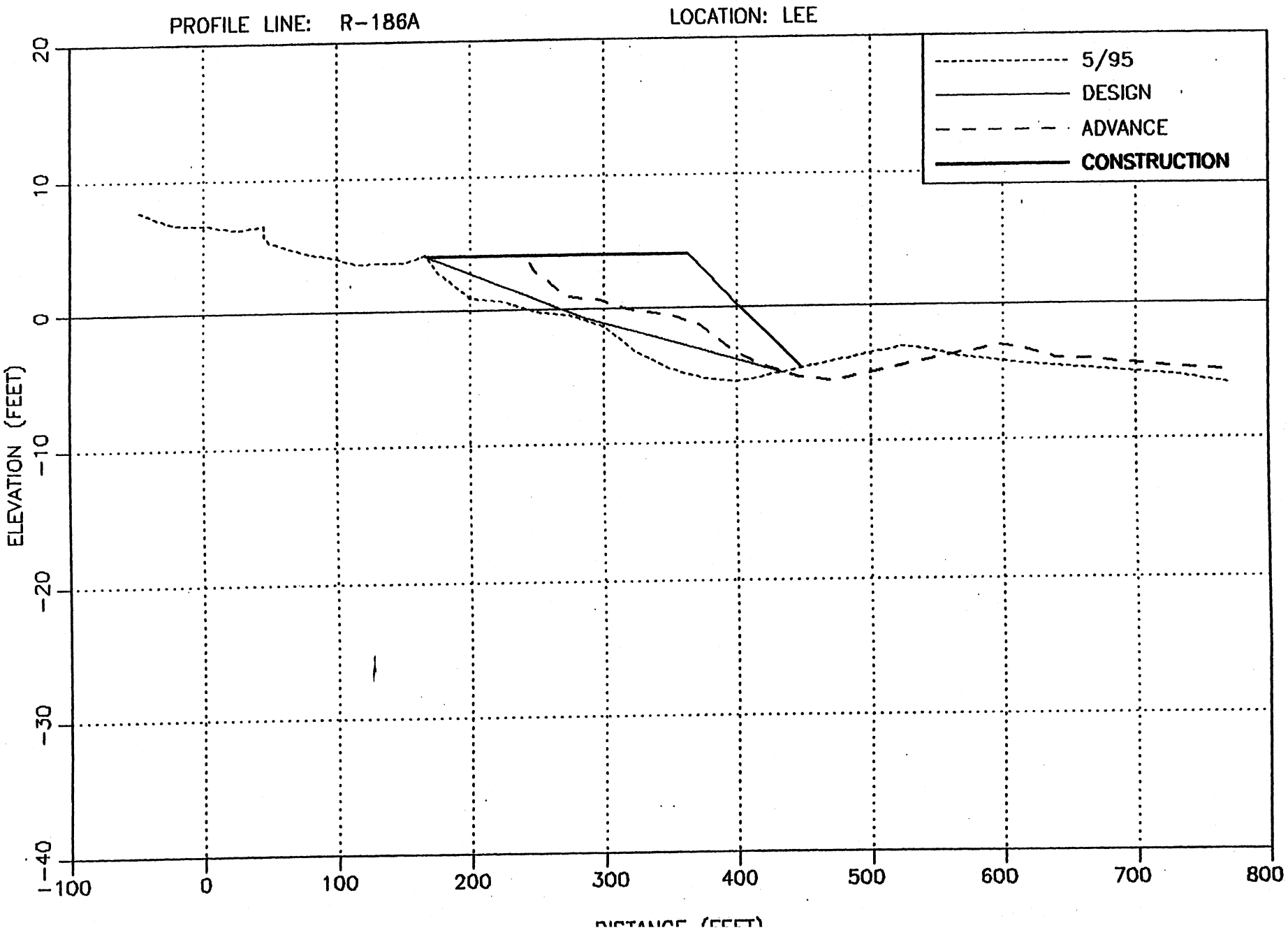
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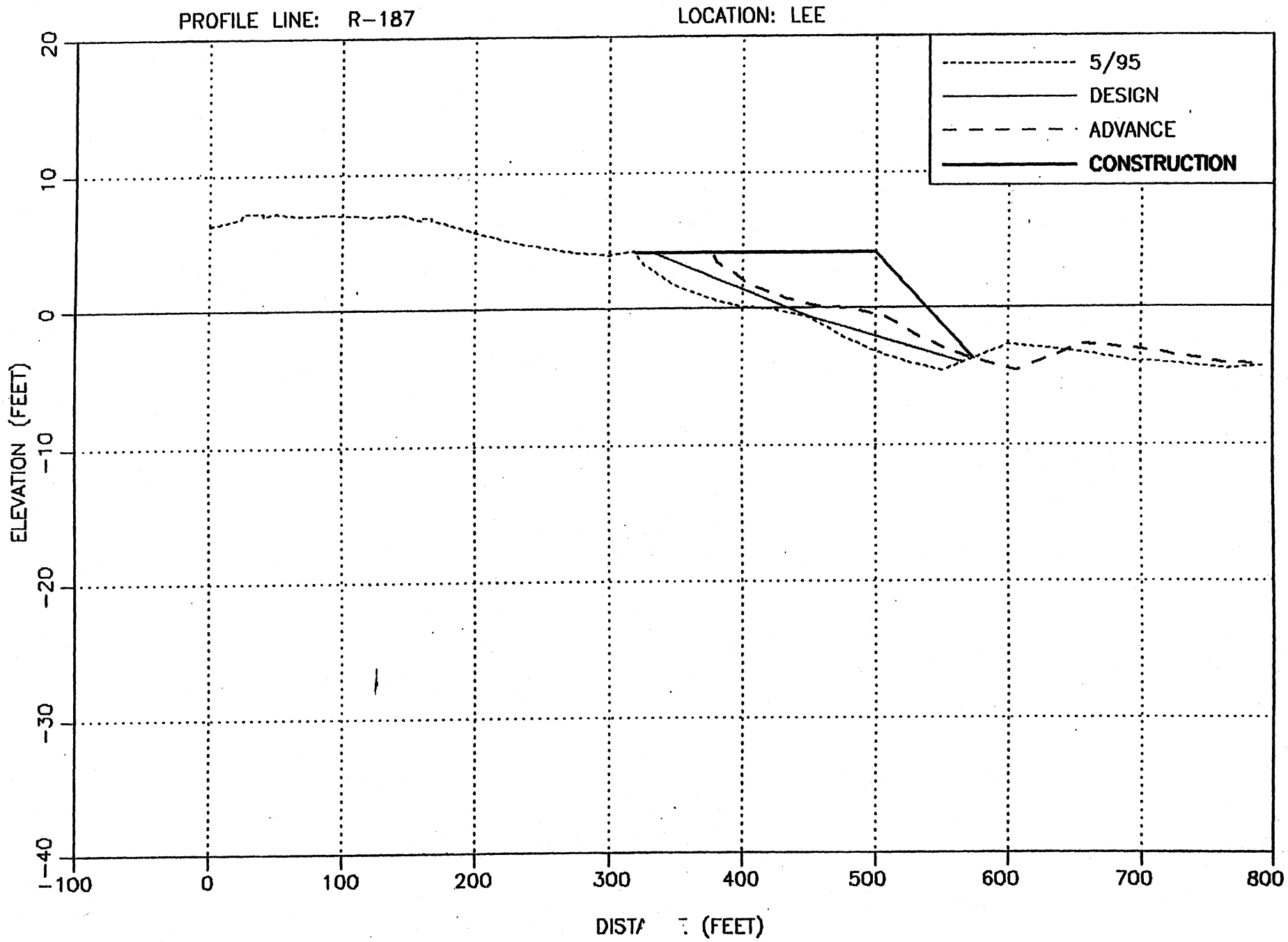
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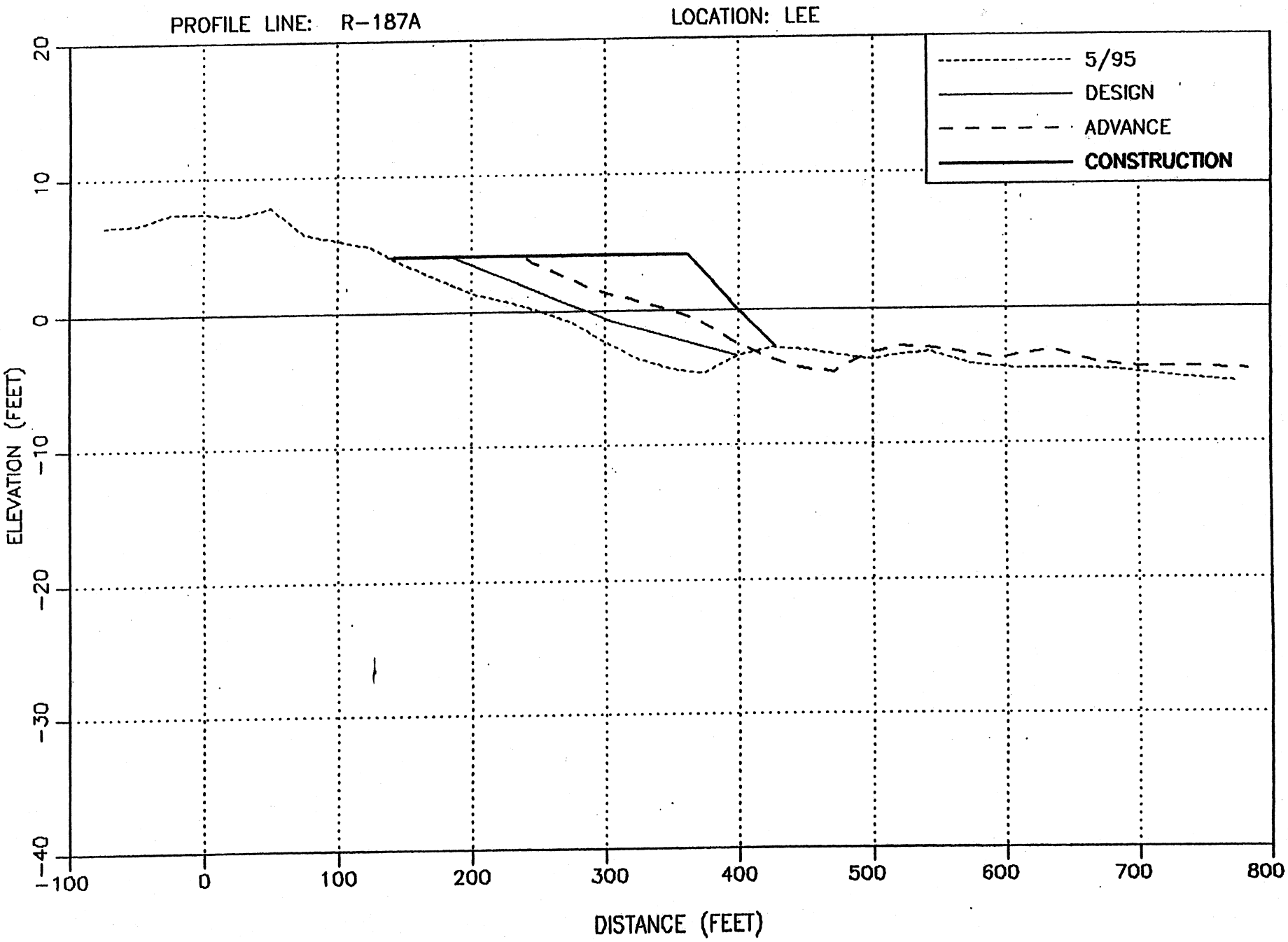
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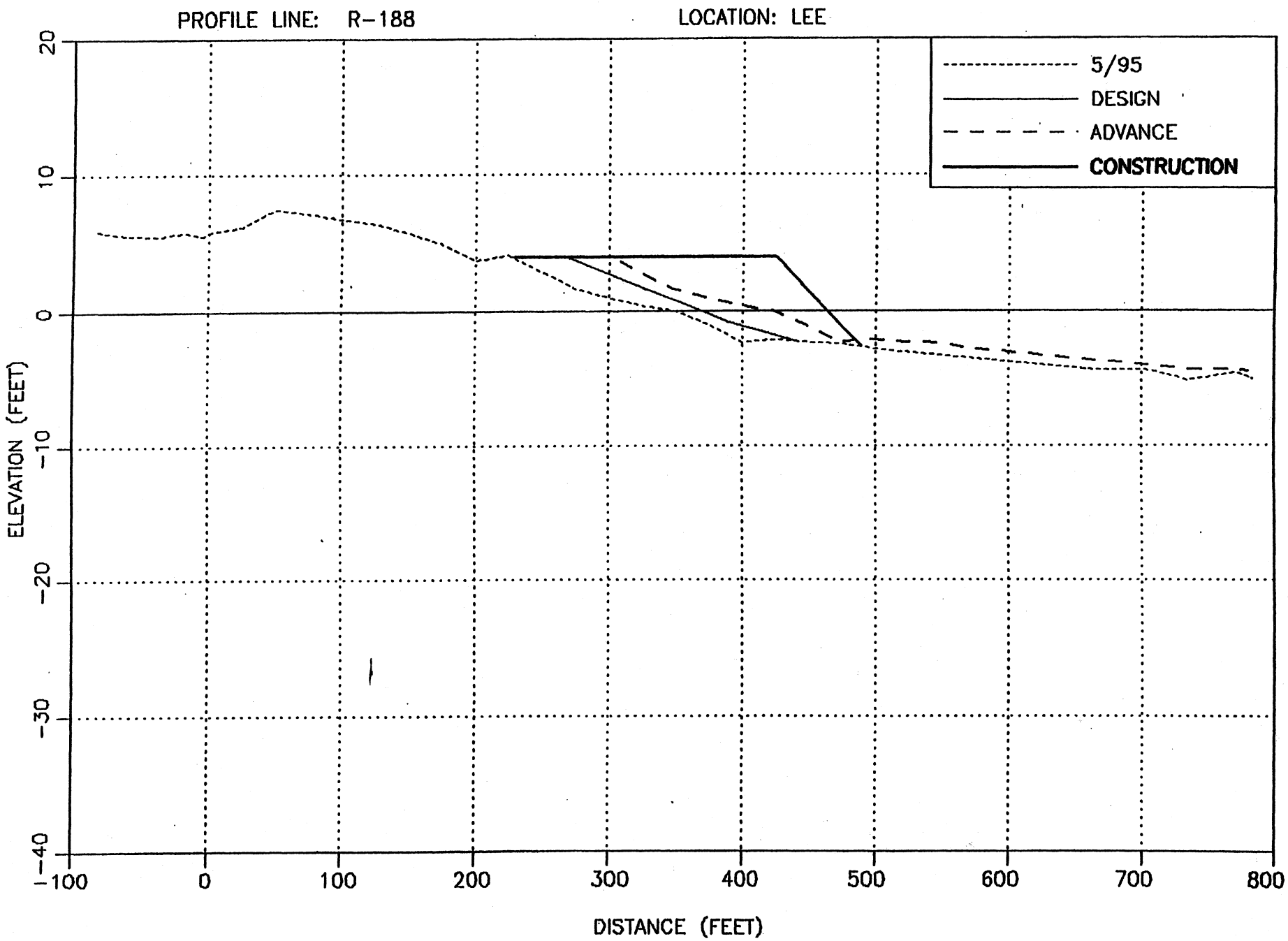
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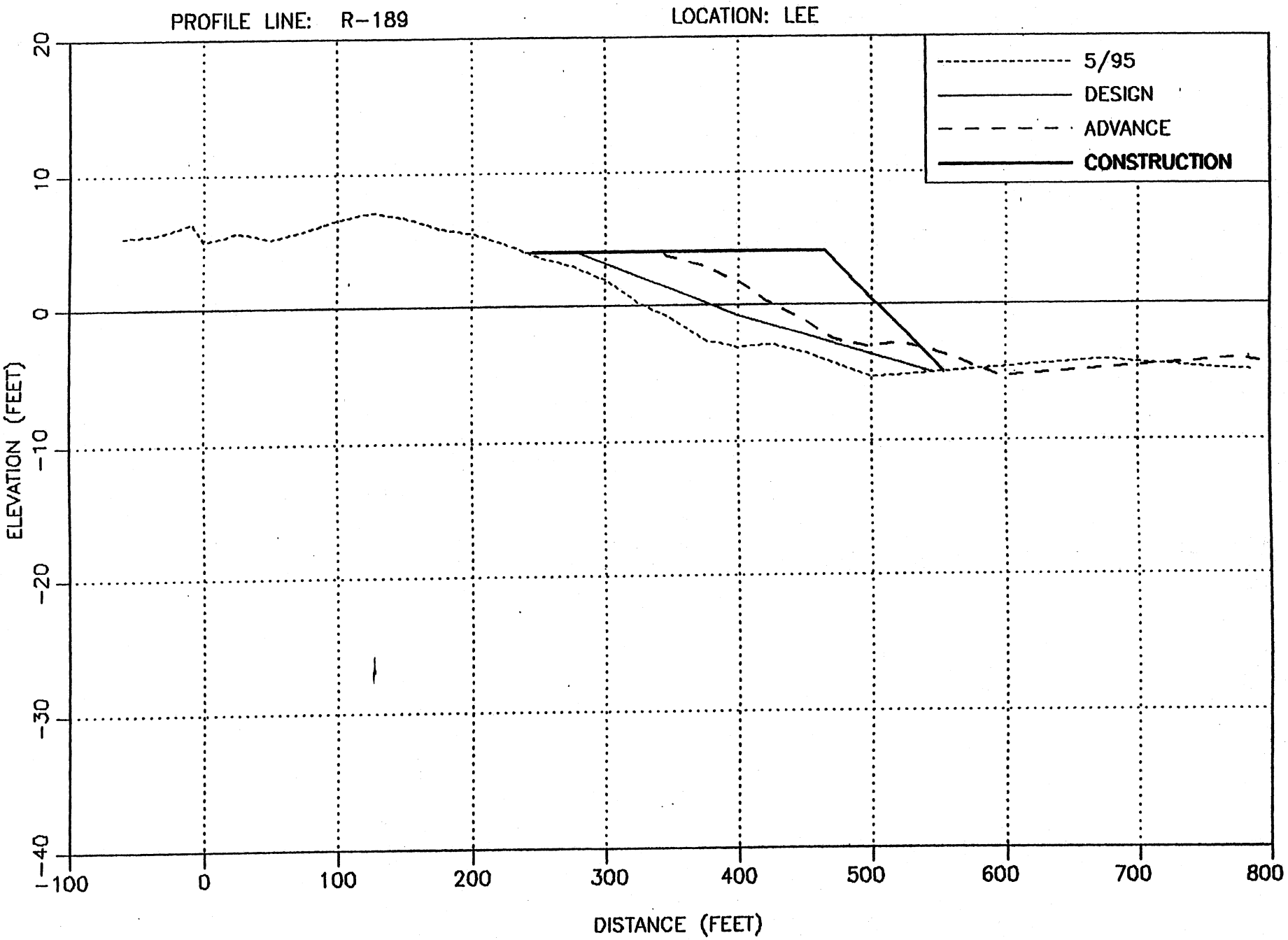
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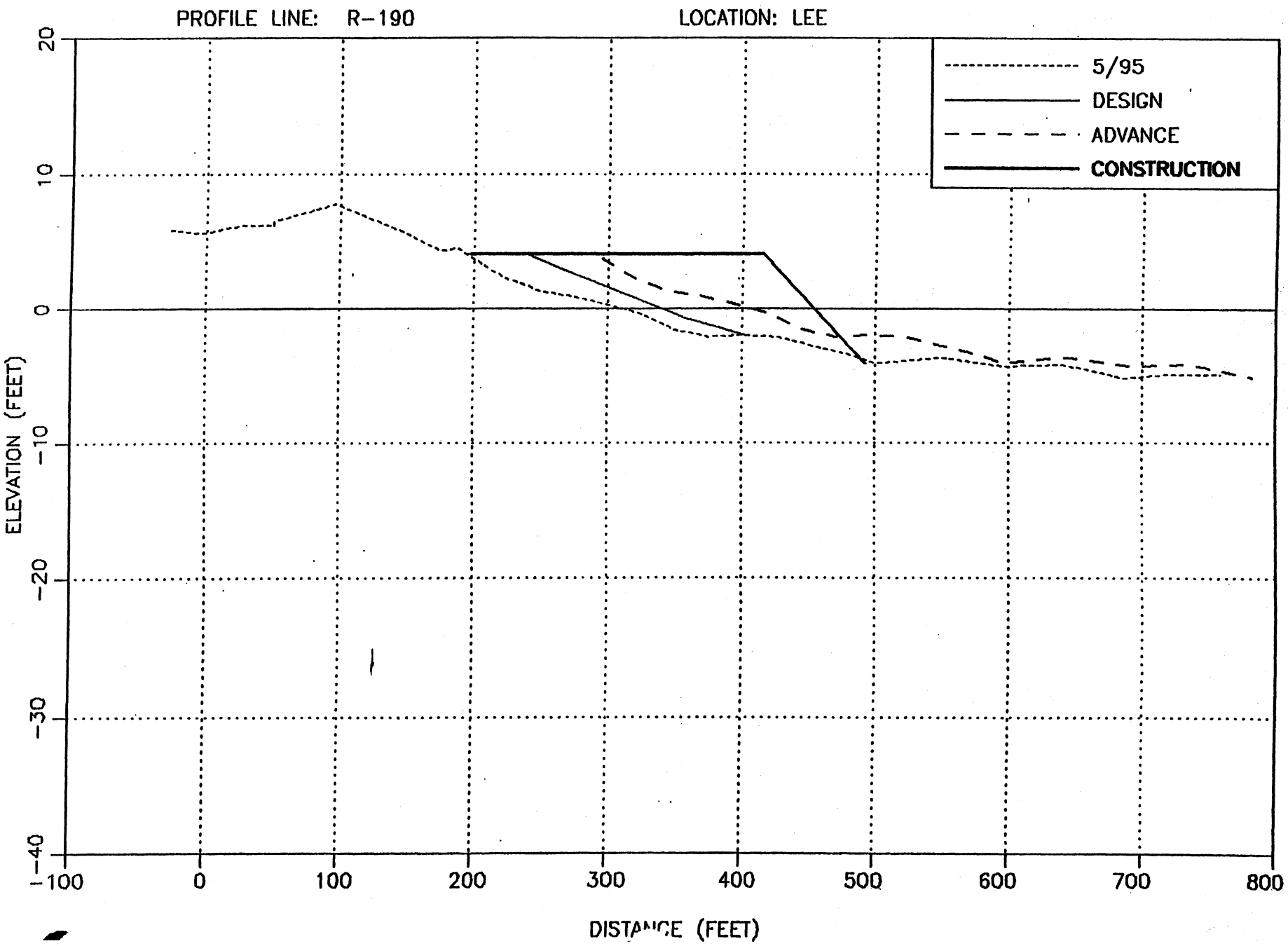
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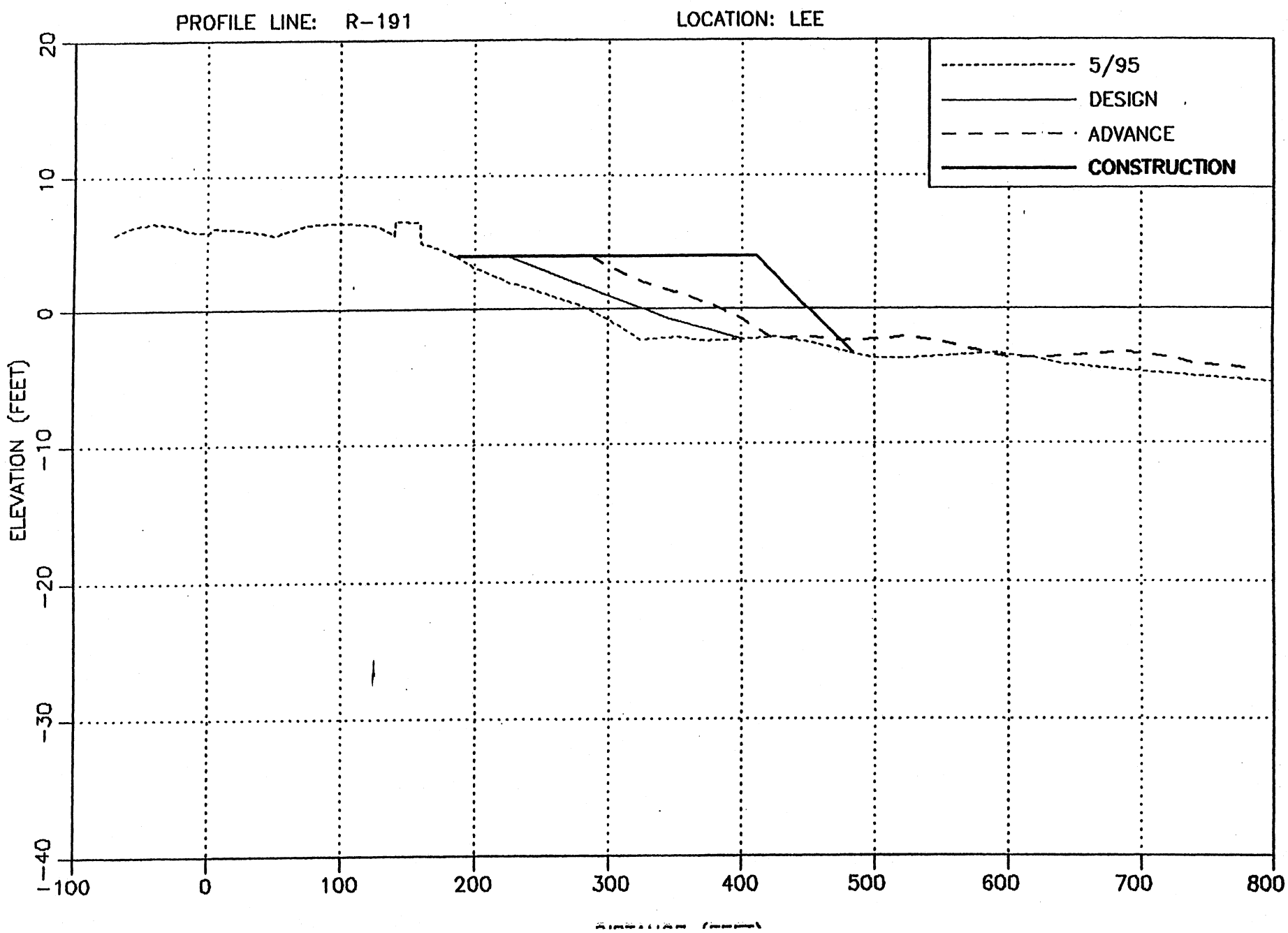
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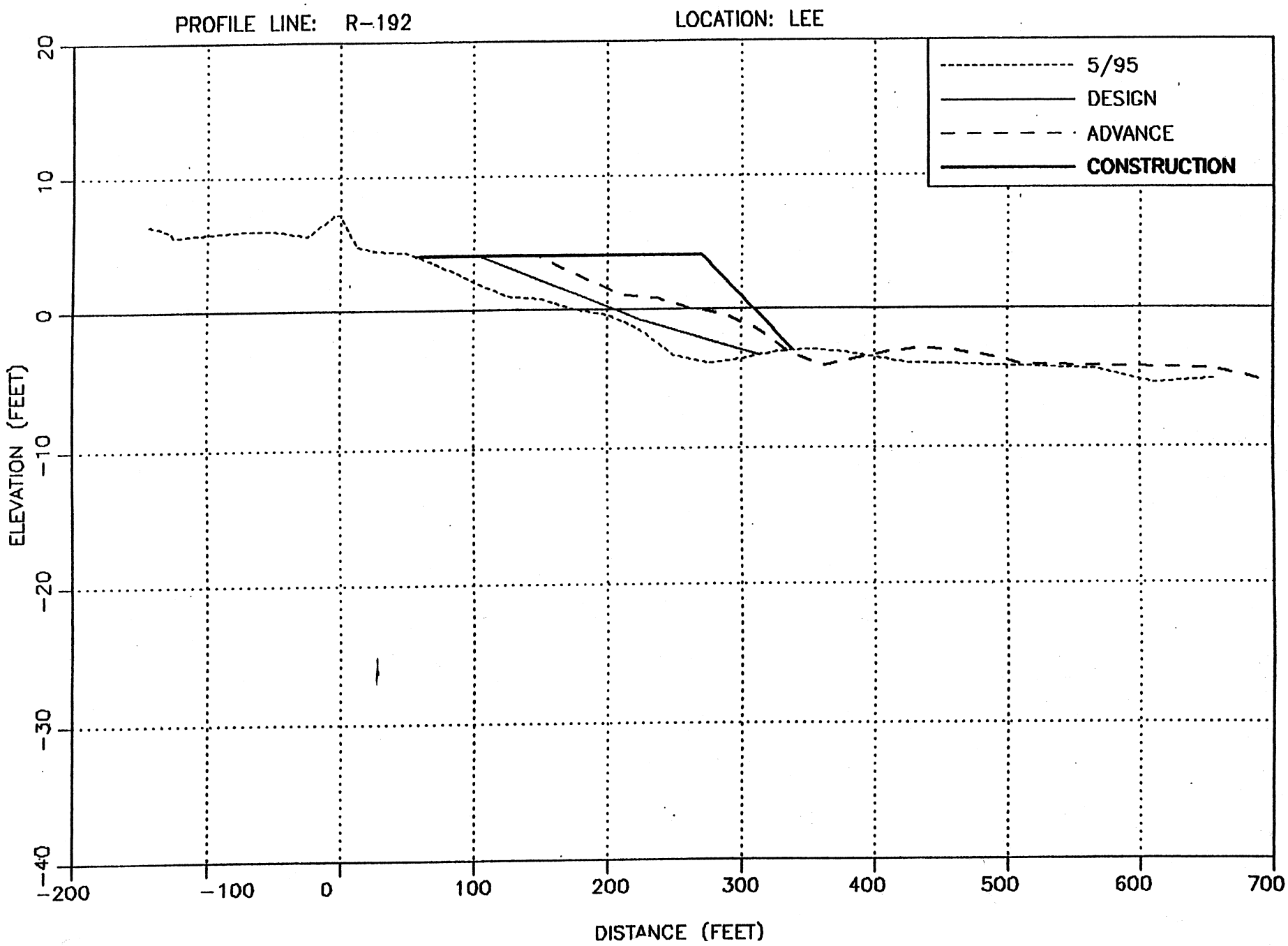
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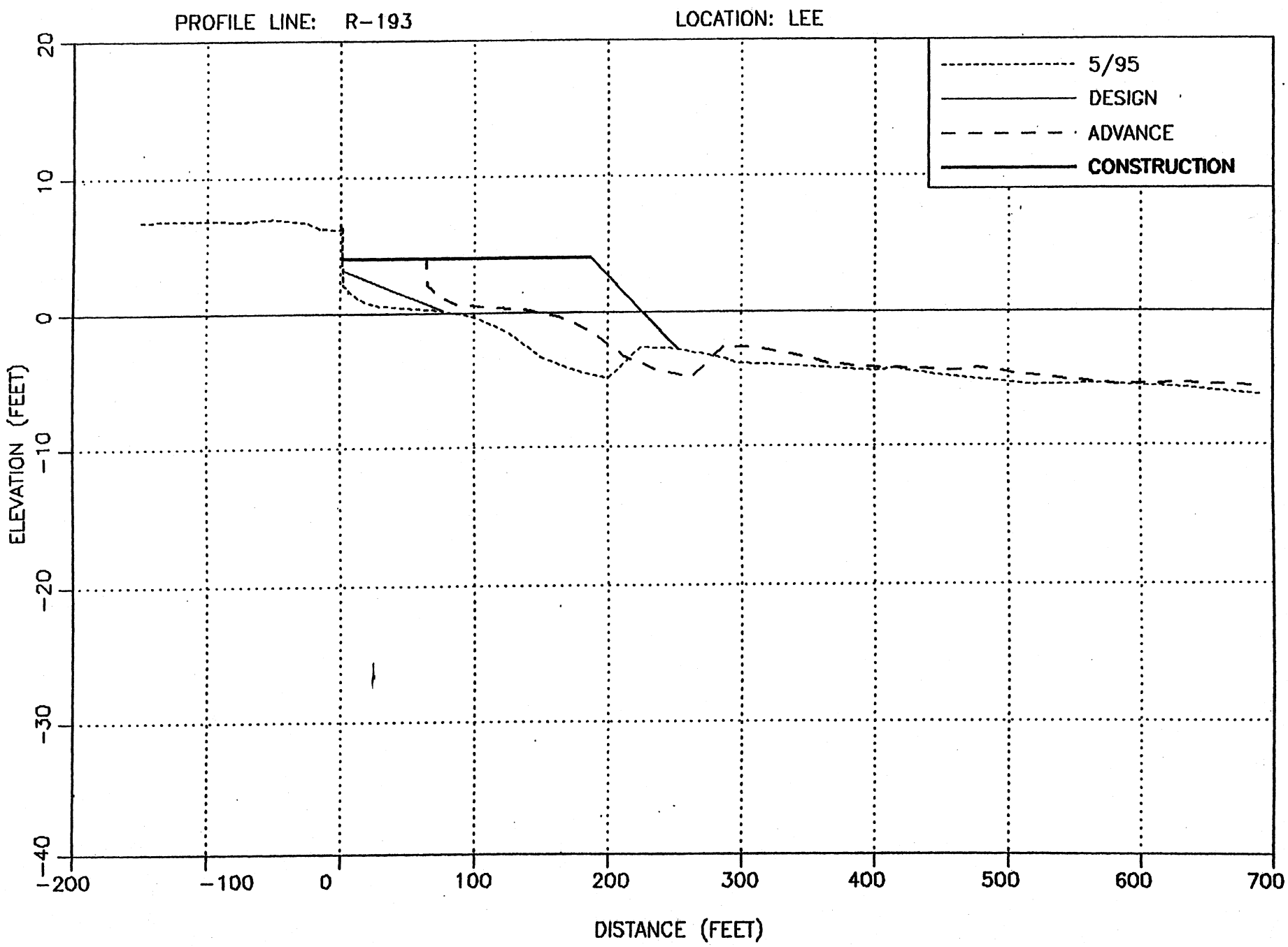
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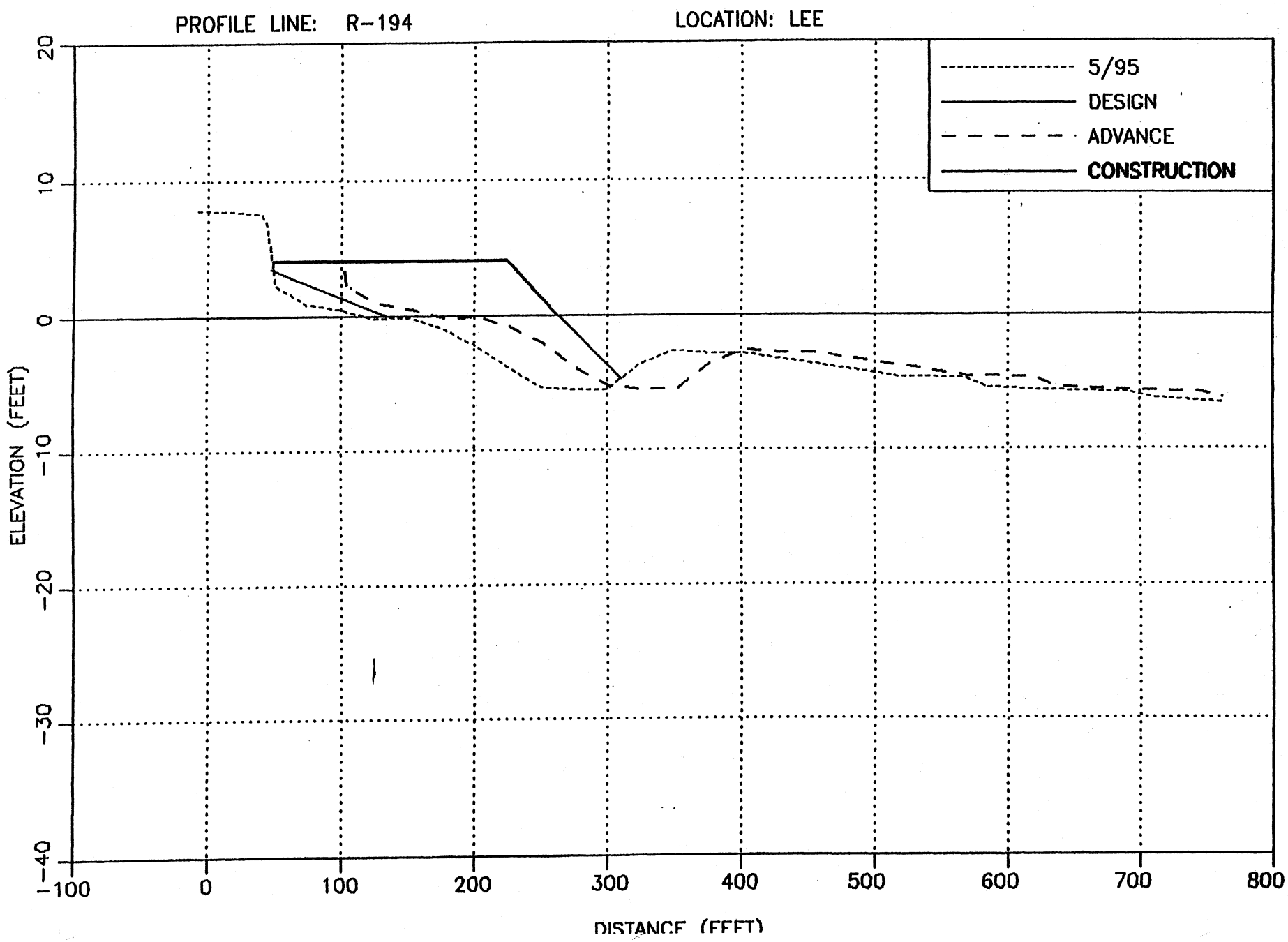
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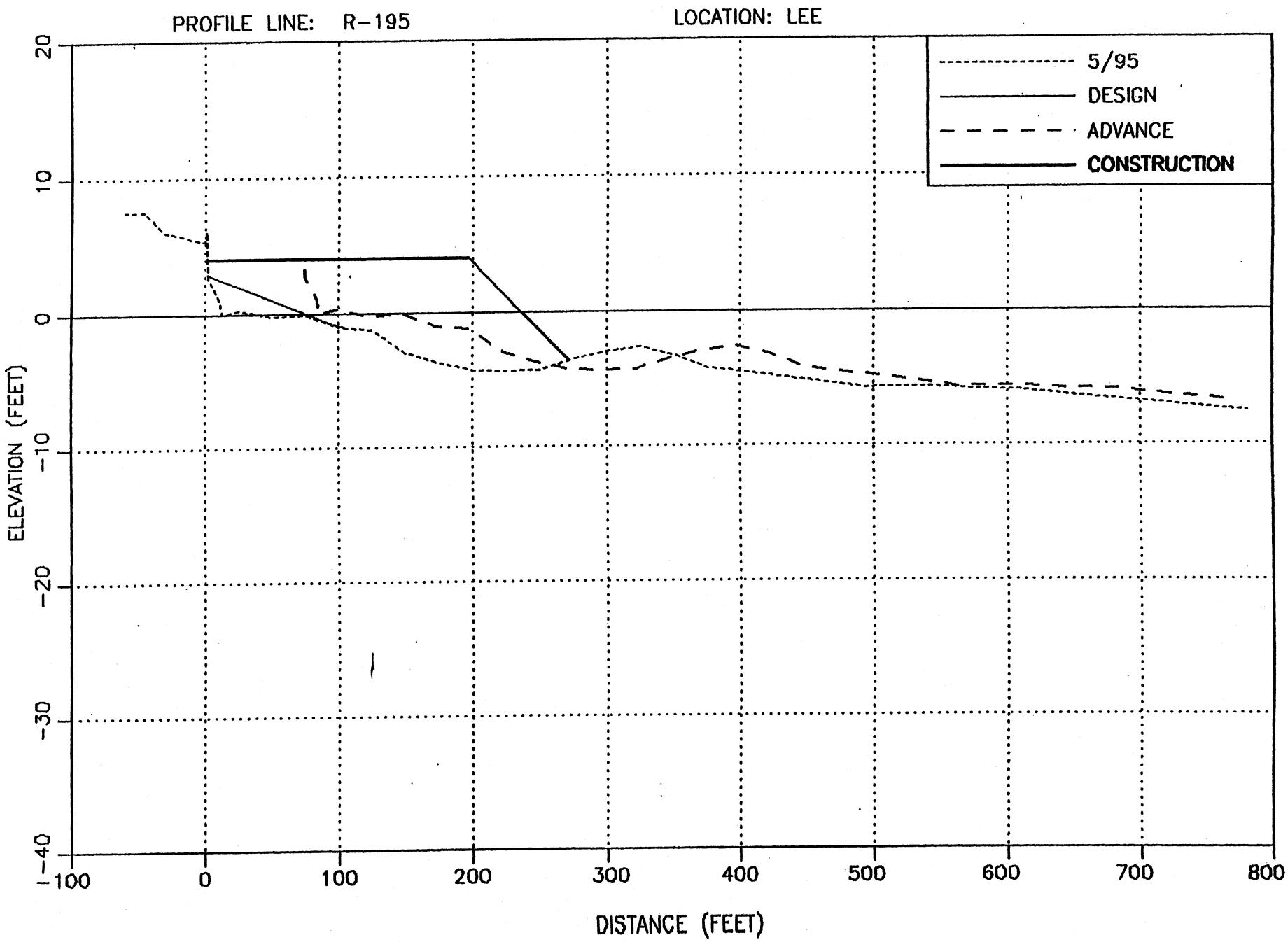
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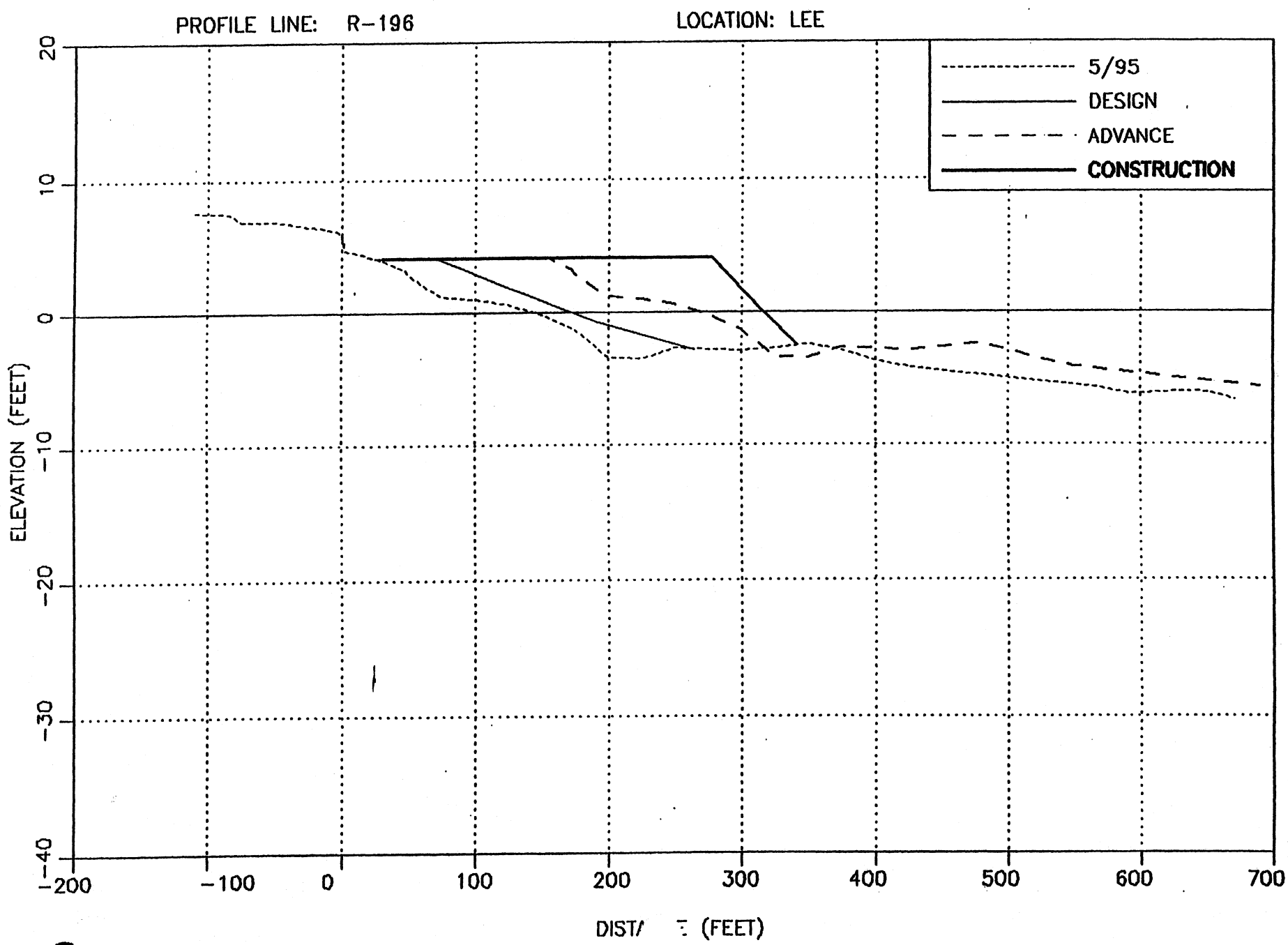
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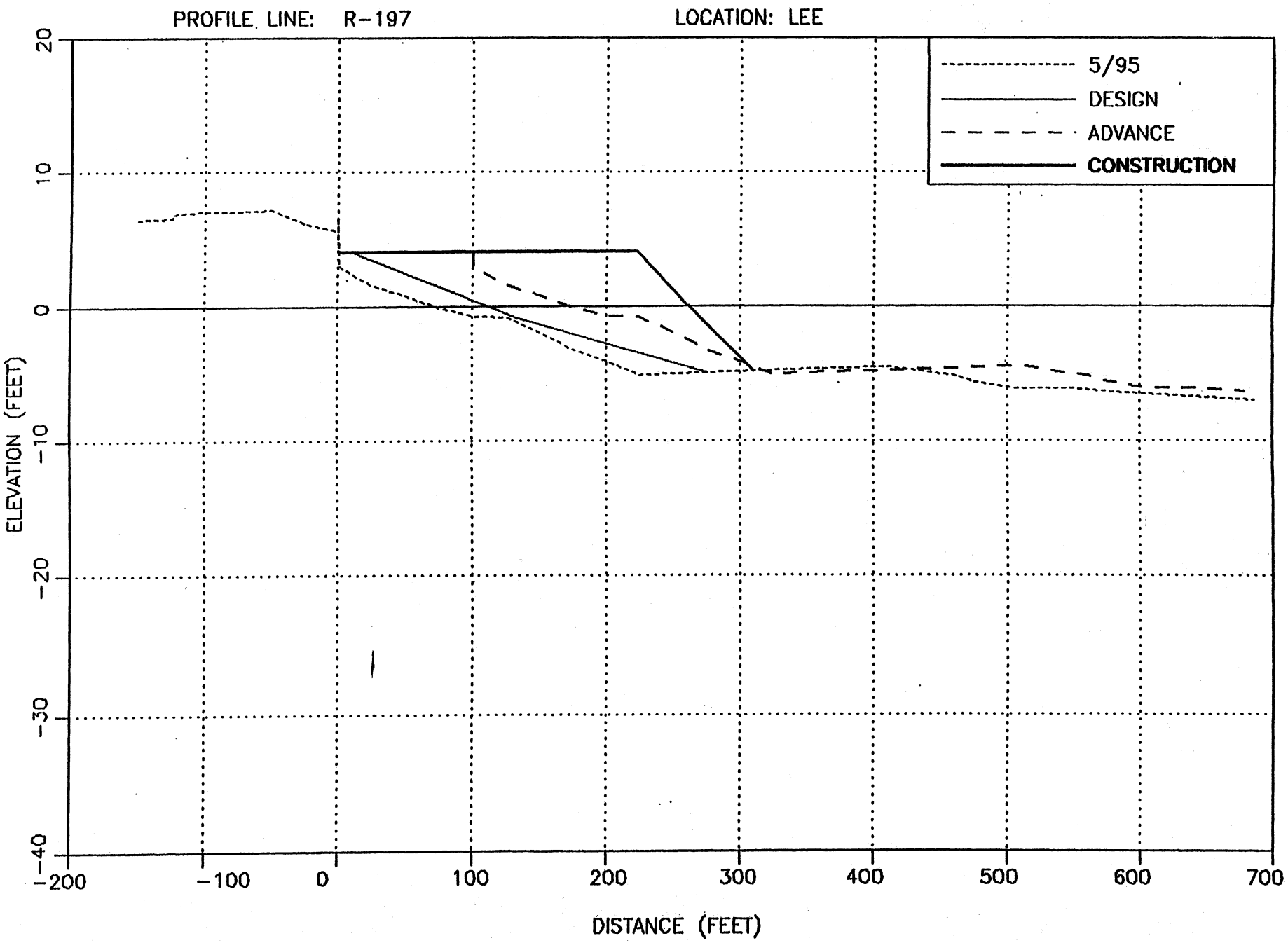
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DISTANCE (FEET)

APPENDIX B

GEOTECHNICAL

APPENDIX B

LEE COUNTY, SHORE PROTECTION PROJECT
ESTERO AND GASPARILLA ISLAND
GENERAL REEVALUATION REPORT

GEOTECHNICAL APPENDIX

Prepared For:

U.s. Army Corps of Engineers
Jacksonville District

Prepared By:

Ayres Associates
and
Coastal Planning & Engineering, Inc.

October 1998

APPENDIX B
LEE COUNTY, SHORE PROTECTION PROJECT
ESTERO AND GASPARILLA ISLAND
GENERAL REEVALUATION REPORT
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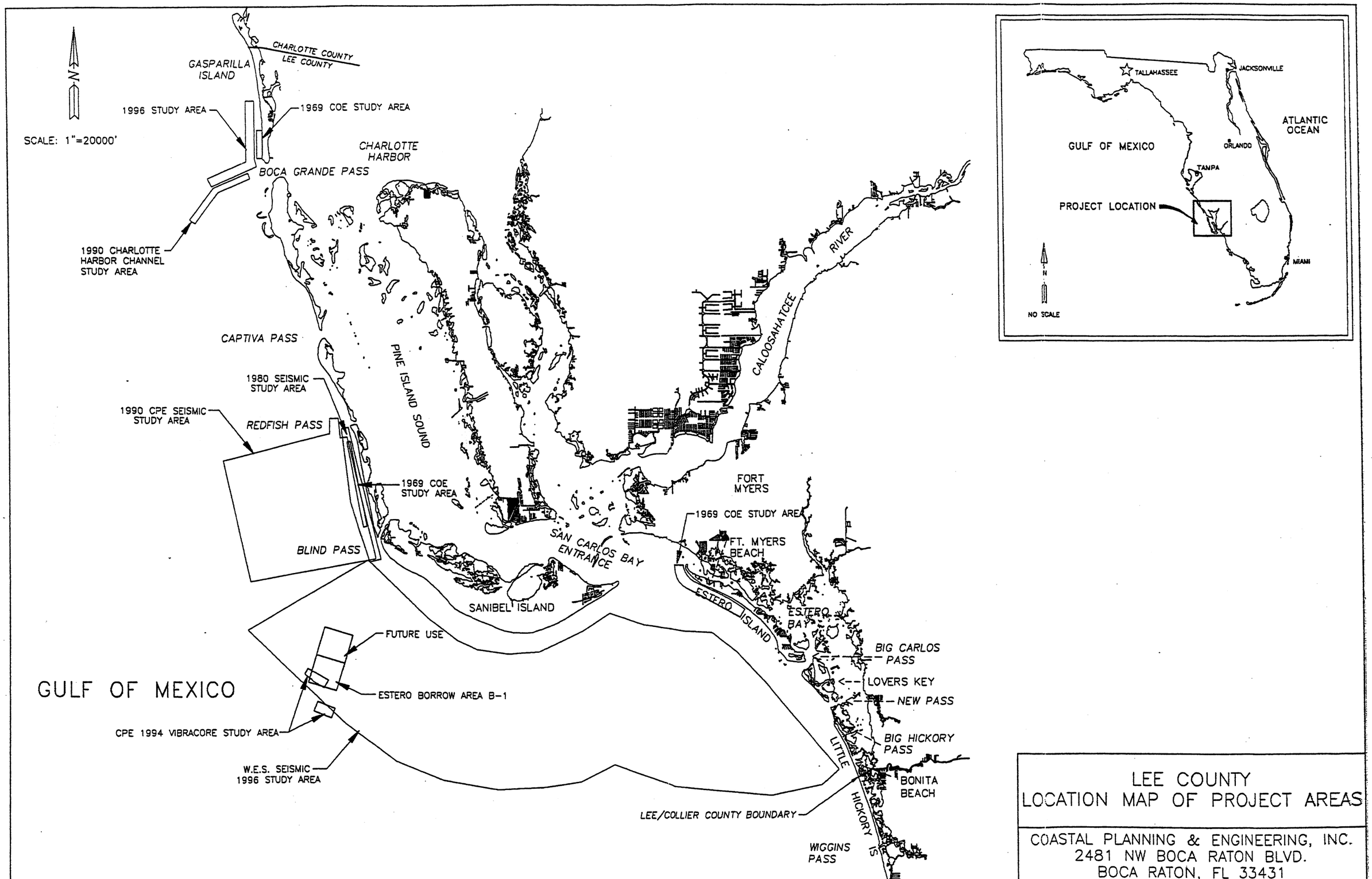
APPENDIX B
LEE COUNTY, SHORE PROTECTION PROJECT
ESTERO AND GASPARILLA ISLAND
GENERAL REEVALUATION REPORT
GEOTECHNICAL APPENDIX

Geology

B-1. Regional Geology. Peninsular Florida occupies a portion of the much larger geographic unit, the Florida Plateau. Deep water in the Gulf of Mexico is separated from deep water of the Atlantic Ocean by this partially submerged platform nearly 500 miles long and 250 to 450 miles wide. Since the Mesozoic Era, approximately 200 million years B.P. (before present), the plateau has been alternately dry land or covered by shallow seas. During that time 4,000 to greater than 20,000 feet (north-central and southernmost Florida, respectively) of carbonate and marine sediments were deposited. Either following or concurrent with one of the later periods of emergence, there appears to have been a tilting of the plateau about its longitudinal axis. The west coast was partially submerged, as indicated by the wide estuaries and offshore channels, while the east coast was correspondingly elevated, showing the characteristics of an emergent coastline.

B-2. During the Pleistocene Epoch, a series of four glacial periods, or ice ages, brought about drastic changes in sea level. As a result of these sea level fluctuations, the Florida peninsula was alternately covered and uncovered by shallow seas. Following the first Pleistocene glacial melt, sea level was nearly 270 ft. above its present level, the highest stand of Pleistocene sea levels. Dry land on the Florida peninsula was then restricted to a few small islands along the central Florida ridge in what is now Polk County, and a group of islands in the vicinity of Trail Ridge in Jacksonville (Cooke, 1945).

B-3. Local Geology. Lee County, in the southwest of Florida covers approximately 803 square miles. Its boundaries are formed by Charlotte County on the north, Hendry and Collier counties on the east, and Collier County on the south (Figure B-1). The shoreline of Lee County consists of a series of barrier bars broken by numerous inlets. It is further characterized by sandy barrier islands backed by shallow bays, marshes, and mangrove areas. The coastal plain in the vicinity of San Carlos Bay and Estero Bay is of low relief and low elevation. The Caloosahatchee River, the Peace River, and the Myakka River all drain the coastal plain and empty into the large *San Carlos Bay-Pine Island Sound-Charlotte Harbor* estuary system. Based on radiocarbon dating, Stapor et al (1991) found evidence that the barrier islands of Lee County initially formed around 4,400 years ago and prograded seaward. A reduction in the rate of Holocene sea level rise at that time, combined with a local sand supply and pre-existing topography, helped in the location and formation of the present barrier island chain (Hine, 1987).



LEE COUNTY
LOCATION MAP OF PROJECT AREAS

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

B-4. Charlotte Harbor lies within the Coastal Lowlands physiographic region characterized by terraced level plains. The topography is largely controlled by a series of marine terrace deposits formed during Pleistocene time, when sea level rose and fell in response to the advance and retreat of the continental ice sheets. When sea level is relatively stationary for long periods, shoreline features and marine plains develop. Shorelines above present sea level, not submerged by another transgression of the sea, are generally preserved (USACE, 1990).

B-5. Gasparilla Island. West of the Charlotte Harbor estuary system lies Gasparilla Island. Bounded on the north by Gasparilla Pass and on the south by Boca Grande Pass (Figure B-1), Gasparilla Island is a long narrow barrier island around 6.7 miles long. Its shoreline has been relatively stable along the northern portions of the island but has suffered increasing erosion towards the south end. The island varies in width from about 800 ft. near the middle to about 2,900 ft. near the south end. Net southerly transport for this island is the second highest net transport rate calculated for the entire Lee county coast. Most of this sediment is trapped within the enormous ebb-tidal delta system of the Boca Grande Pass. The net transport rate to the south and the relative, historical stability of this barrier island indicate that sands are largely being bypassed down the length of the island. In addition, large outcroppings of beachrock help to provide an overall stability (Godschalk and Associates, 1988). Natural ground elevations on Gasparilla Island are generally under 10 ft. mean low water.

Estero Island

B-6. Estero Island. Estero Island is located in the southern barrier island system of Lee County. To the south of Estero island is Big Carlos Pass, and to the north is Matanza Pass (Figure B-1). The gulf shoreline of Estero Island is about 7 miles long. The island varies in width from about 400 feet at the north end to about 3,800 ft. near the south end. Estero Island has well developed beach ridges of late Holocene age (5,000 years B.P.). Natural ground elevations are only around 5 to 10 ft. making it one of the more easily flooded barrier islands in Lee County. Like most other barrier islands, the ends of Estero Island are unstable due to the presence of inlets (Godschalk and Associates, 1988).

Investigations Performed

B-7. Previous Investigations. In Lee County previous offshore geotechnical studies have been performed by the U.S. Army Corps of Engineers and local government agencies since 1967. The Corps of Engineers performed borings in the Gulf of Mexico in 1967 offshore of Lee County as part of the Federal Beach Erosion Control Study (1969) (Figure B-1). The borings were located a distance of approximately 1,800 feet offshore in water depths of 6.0 to 20.8 feet MLW. Four (4) borings were taken offshore of the south end of Gasparilla Island and eight (8) offshore of Estero Island. Sand thickness varied from 10 to 43 feet offshore of Gasparilla Island and from 4 to 21 feet offshore of Estero Island. Sand material encountered in the core boring consisted of sand, silty sand and small amounts of clayey sand (USACE, 1969).

B-8. Ten core borings were obtained in February 1990 in the Charlotte Harbor channel to define maintenance dredge material to be placed on the beach. The channel borrow area contained poorly graded fine quartz sand with varying amounts of whole and broken shell. The composite mean grain size was found to be 2.08 phi (0.24mm) with a composite sorting of 1.47 or poorly sorted (USACE, 1990). Silt content (passing the 200 sieve) ranged from 2 to 22 percent with an average of 9 percent. The borrow sediment was found to be a good source material for beach disposal (USACE, 1990).

B-9. Huang and Goodell (1967) investigated sediments of the Charlotte Harbor area, including an area up to three nautical miles offshore of Boca Grande Pass and San Carlos Bay Entrance/Matanzas Pass. Sediments were found to consist primarily of terrigenous quartz and biogenic carbonates, with minor amounts of fine material. Subaqueous surface sediments had mean grain sizes ranging from 1.9 phi (0.27 mm) to 2.1 phi (0.23 mm) offshore of Boca Grande Pass, and 2.7 phi (0.15 mm) to 3.3 phi (0.10 mm) offshore of San Carlos Bay Entrance. Percent sand (assumed to represent the quartz fraction versus carbonate fraction) was found to be 90 to 95% offshore of Boca Grande Pass, and 35 to 80% offshore of San Carlos Bay Entrance (Balsillie and Clark, In Review).

B-10. Numerous investigations and reports conducted by the Captiva Erosion Prevention District have been undertaken between Redfish Pass and the north end of Sanibel Island. These investigations are not generally part of this study but are included for completeness. Project areas are shown on Figure B-1.

B-11. In 1967 the Corps of Engineers performed seven (7) offshore borings of Captiva Island. Twenty-seven (27) vibracores were obtained in 1979 on the ebb tidal shoal of Redfish Pass and an additional forty-eight (48) cores were obtained offshore of Captiva Island in 1980 (Tetra Tech, Inc., 1980). In 1988 fifteen (15) cores were taken from the ebb tidal shoal of Redfish Pass (Alpine Ocean Seismic Survey, Inc., 1988). Between 1990 and 1994, a total of eighty-nine (89) cores were obtained offshore of Captiva Island and the north end of Sanibel Island (CPE, 1990; CPE, 1991; CPE, 1992 and CPE, 1994).

B-12. Seismic surveys offshore of Captiva Island included 40 line miles run within 1 mile of shore in 1980 (Van Reenan, 1980) and over 60 line miles of chirp seismic data collected out to five miles offshore between Redfish Pass and Blind Pass (CPE 1991).

B-13. The general results showed a thickening of the sand to a maximum of 15 feet in the nearshore zone of Captiva Island and a thinning away from the island. The core data indicates the sand closer to the island has a higher percentage of silt (generally over 20%) and does not appear to be suitable for beach replenishment material (CPE 1991). The sediments offshore decreases in thickness and silt content (10-16%) and could be a useable sediment source depending on the acceptability of the silt content (CPE 1991). The third zone mapped by the seismic and vibracore studies seaward of Captiva included an area of sand wave development (3-6 miles offshore). The sand waves contained medium grain sand and shell fragments with low silt (less than 5%). The sand ridges and waves vary in height from 3 to 6 feet above the adjacent seafloor. These sand ridges have been recently used in March of 1997 to renourish Captiva and the north end of Sanibel Island.

B-14. Recent Investigation. Eroding areas of the Lee County shoreline in the vicinity of Ft. Myers Beach resulted in a need to investigate the shallow offshore areas of the Gulf of Mexico adjacent to the southern portion of Lee County for suitable borrow areas (USACE, 1997). The survey area encompassed the nearshore shelf off of Sanibel Island, Fort Myers Beach (Estero Island), Lover's Key, Big Hickory and Little Hickory Islands, and Bonita Beach (Figure B-1).

B-15. This study was performed in conjunction with another geoacoustic study by the Corps of Engineers Waterways Experiment Station (WES) conducted offshore of the St. Johns County coast in the Atlantic Ocean for the Jacksonville District.

B-16. The Corps of Engineers Waterways Experiment Station (WES) has developed a high-resolution seismic reflection technique to quantitatively assess the characteristics of bottom and subbottom marine sediments. The technique describes marine sediments in terms of their engineering properties, i.e., density, mean grain size, soil classification, and provides a continuous picture of the horizontal and vertical extent of those properties. The Jacksonville District requested application of this technique in support of the Fort Myers Beach, Lee County, Feasibility Study (USACE, 1997).

B-17. The study area was investigated with seismic and bathymetric surveys, and thirty (30) vibracores to determine if offshore sand deposits could supply fill for beach renourishment projects within southern Lee County. Vibracore logs are provided in Sub-Appendix B-1.

B-18. The objective of the investigation was to perform adequate sediment characterization to identify potential areas of nearshore sand suitable for use as beach fill by attempting to quantify the bottom and subbottom sediments in terms of *in situ* density, mean grain size, and soil type from the seafloor surface to a depth of about 20 feet below the bottom, where possible, for the Estero Island study area (Figure B-1). This study was a reconnaissance-level investigation intended to locate areas to target for detail design studies as required. The results provided initial estimates of the sediment characteristics for the purpose of defining the limits of available granular materials. The acoustic data and physical sediment data were combined to characterize the lateral and vertical extents of the sediment within the project area. Based on this characterization, specific areas were identified as potential borrow areas and cited for detailed evaluations.

B-19. In July of 1996 Alpine Ocean Survey, Inc., under contract to the Jacksonville District Corps of Engineers, obtained ten (10) cores offshore of Gasparilla Island (Figure B-1). Five cores (1-5) were obtained approximately 3,000 feet offshore of the south end of Gasparilla Island. Five cores (6-10) were obtained on the shoal adjacent to Boca Grande Pass. Vibracore logs are provided in Sub-Appendix 3. The cores will be utilized to identify the borrow areas for the Gasparilla Island renourishment described in this GRR.

B-20. Native Beach Sampling. In 1969 (USACE, 1969) beach surface sand samples were collected along four profiles in Estero Island and three profiles in Gasparilla Island. The samples were taken at seven locations along each profile. Table B-1 shows the results of

these surveys. The results of these samples are shown for completeness, but will not be used to compute overfill and renourishment factors in this analysis.

Table B-1

Grain Size of Surface Sand Samples Collected on Beach Profiles
Median Diameter in Millimeters (including shell)

Location of Sample on Profile	Gasparilla Island			Estero Island			
	PROFILES						
	1	4	7	24	27	31	35
Dune	0.17	0.15	0.30	0.11	0.16	0.16	0.14
High Water	0.19	0.30	0.39	0.13	0.16	0.14	0.17
Low Water	0.26	0.30	0.68	0.14	0.13	0.16	0.60
-3	0.13	0.17	0.26	0.10	0.10	0.10	0.11
-6	0.12	0.11	0.40	0.10	0.10	0.09	0.10
-12	0.09	0.09	0.14	0.27	0.43	0.11	N.A.
-18	0.11	0.08	N.A.	N.A.	N.A.	N.A.	N.A.
	Project Average = 0.22 mm			Project Average = 0.17 mm			

(After USACE, 1969)

NOTE: N.A. – Not available.

B-21. Native beach samples for twenty-one sites were collected on August 31, 1993 (USACE, 1997), on the north end of Ft. Myers Beach (Estero Island). An analysis was performed by the South Atlantic Division sediment laboratory. They used 15 sieves in the size analysis. The sample data sets were from the three beach transects on Estero Island (R176, R179, and R183). Seven samples were collected by elevation along each transect, starting on the back shore around 5 to 6 feet above NGVD and progressing seaward to a depth of –6 to –10 feet NGVD. Three of the samples were collected above NGVD, one at 0.0 ft NGVD and three below NGVD on each transect. The weight percent data for each sample was analyzed at WES to compute grain size statistics using the sediment analysis program and method of moments. The Jacksonville District also supplied grain size data on two composite samples (one with shell and one without shell) where portions of each of the 21 beach samples were physically mixed together and sieved. This provided an average sample for the fill project area. A mathematical composite was computed at WES for each profile line from the seven individual samples on that line and one combining all 21 sample data sets to produce a project composite.

B-22. Surface beach samples were collected on Gasparilla Island in January 1990 along three profiles lines spaced 2,000 feet apart within the project reach (R16, R18 and 20). Samples were obtained along each profile line at 3-foot increments of elevation above –3.0 MLW (Mean Low Water), and 5 foot increments below elevation –5.0 MLW. In addition, 2 core borings on profile lines R16 and R20 were drilled through the beach to establish the

composition of Gasparilla Island and define a vertical distribution of grain sizes on the beach.

Results of Investigations

B-23. In order to properly design a beach nourishment project, the condition of the existing native beach needs to be determined. Characterization of the sediment grain size distribution and active beach profile envelope is needed to properly define volume of fill material required, the design profile template, and suitability of grain size distribution of the borrow material (USACE, 1991). A native beach model has been developed for each of the study areas. All sample grain size statistics used for comparisons are shown in Table B-2.

B-24. Native Beach. The composite grain size distributions for the 1993 pre-nourishment sampling of Estero Island is shown on Figure B-2. The grain size statistics are shown on Table B-2. The frequency distribution curves (Figure B-2a) visually shows the comparison between the composite distributions. Figure B-2b shows the cumulative distribution curves. The composite mean grain size for Gasparilla Island beach is coarser at 1.64 phi (0.32 mm) than Estero Island beach at 2.73 phi (0.15 mm). The composite phi sorting for Gasparilla Island is 2.04 (very poorly sorted). Shell content was found to be 35 percent by weight (USACE, 1990). Estero Island beach contained less than 16% shell material and was found to have a composite phi sorting of 1.02 or moderately sorted to poorly sorted (USACE, 1997).

B-25. Borrow Area Investigations. Geophysical studies including seismic surveys, surface grab samples and vibracores were conducted on the nearshore shelf between Captiva Island and Bonita Beach (Figure B-1) in 1995 by the U.S. Army Corps of Engineers Waterways Experiment Station (1997). From the data obtained, three possible borrow areas were identified from the seismic and vibracore data (Borrow Areas A, B, and C). Two additional areas (D and E) based on the seismic data and surface grab samples (Figure B-3) were cited for additional studies.

B-26. Two criteria were employed to identify possible borrow areas: the depth of unconsolidated sediment over the limestone layer and the grain size distributions of the sediment. The acoustic profiles and cores indicate that most of the study area is composed of a thin (less than 5 ft thick) layer of sediment over an irregular limestone layer. The deepest deposits of unconsolidated sediment were found on the eastern side of the study area, within an area of filled channels. The limestone layer is also deeper in the nearshore area off of both Sanibel and Estero Islands (USACE, 1997). This is similar to findings offshore of Captiva (Tetra Tech, 1980 and CPE, 1991) and Estero Island (U.S. Army, 1969).

B-27. As discussed above, three possible borrow areas were identified and two areas were cited for further investigations. Area A is located within the filled channel area on the eastern edge of the study and consists of deposits of medium to fine sand/shell mix with a high silt content. Unconsolidated sediment thicknesses range from 8 to 10 feet. Area B is located on the western edge of the study and consists of 5 to 10 foot thick layers of shell and sand. This area has higher percentage of shell and shell fragments (USACE, 1997). One

TABLE B-2
LEE COUNTY COMPOSITE GRAIN DATA

COMPOSITE	MEAN GRAIN SIZE		STANDARD DEVIATION (PHI SORTING)	PERCENT SILT	
	phi	mm		FINER THAN 0.074 mm	FINER THAN 0.062 mm
NATIVE BEACH					
ESTERO ISLAND BEACH	2.73	0.15	1.02	4.95	1.90
GASPARILLA ISLAND BEACH	1.64	0.32	2.04	5.70	3.80
BORROW AREAS					
ESTERO ISLAND BEACH	-0.05	1.04	1.53	7.40	7.10
CPE BA IIIA	1.28	0.41	0.95	3.81	1.91
CPE BA IIIB	1.46	0.36	0.90	4.04	2.02
GASPARILLA ISLAND BA1	1.80	0.29	0.96	3.30	2.20
GASPARILLA ISLAND BA2	1.25	0.42	1.74	2.42	2.05

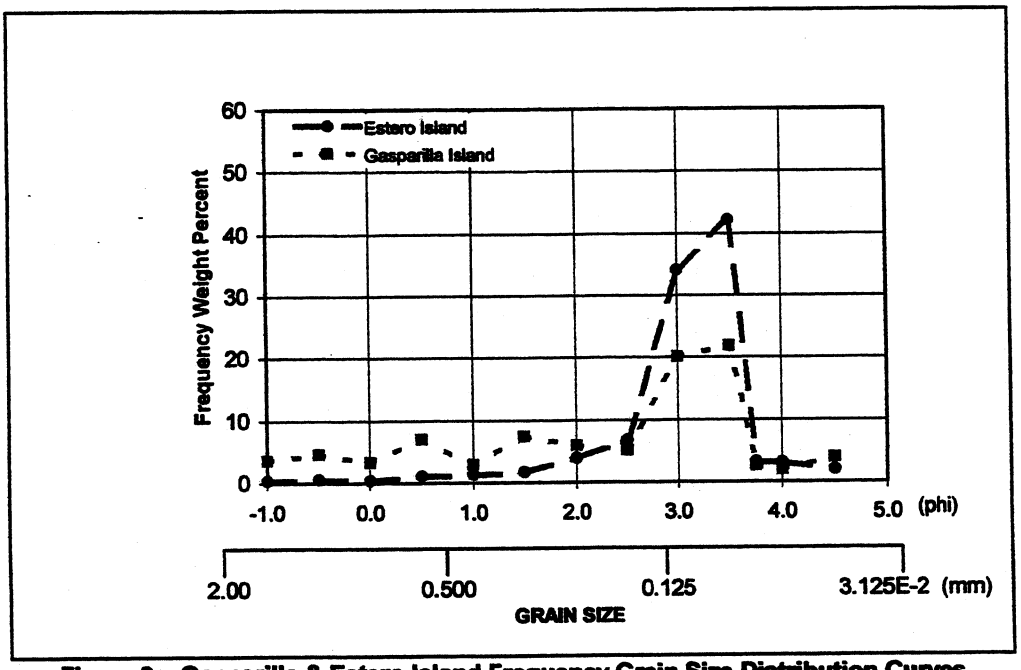


Figure 2a. Gasparilla & Estero Island Frequency Grain Size Distribution Curves

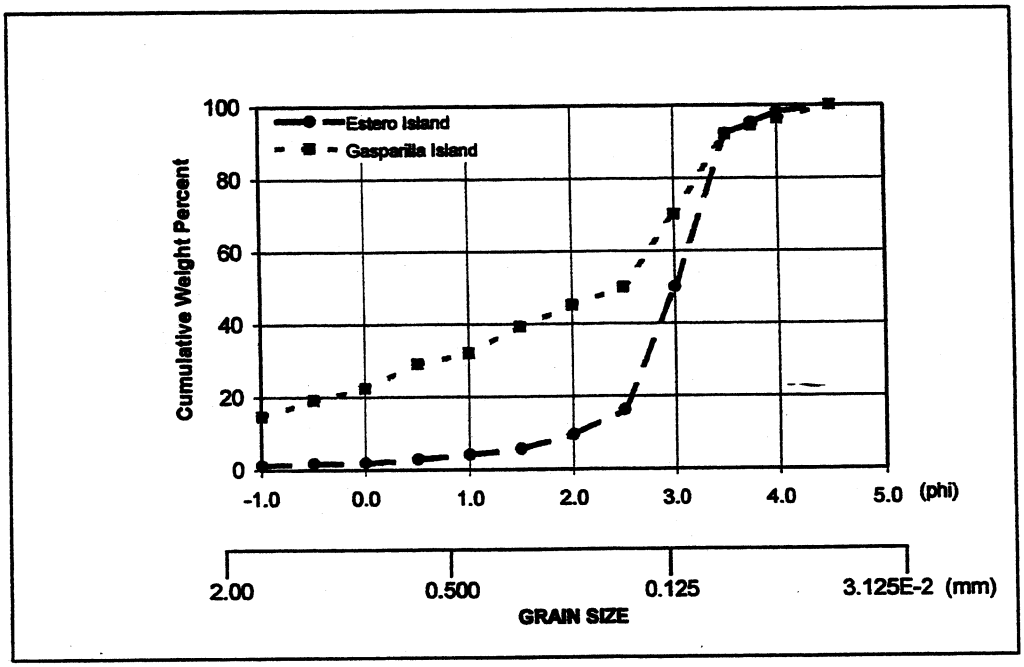


Figure 2b. Gasparilla & Estero Island Cumulative Grain Size Distributions

Figure B-2. Prenourishment Grain Size Distributions

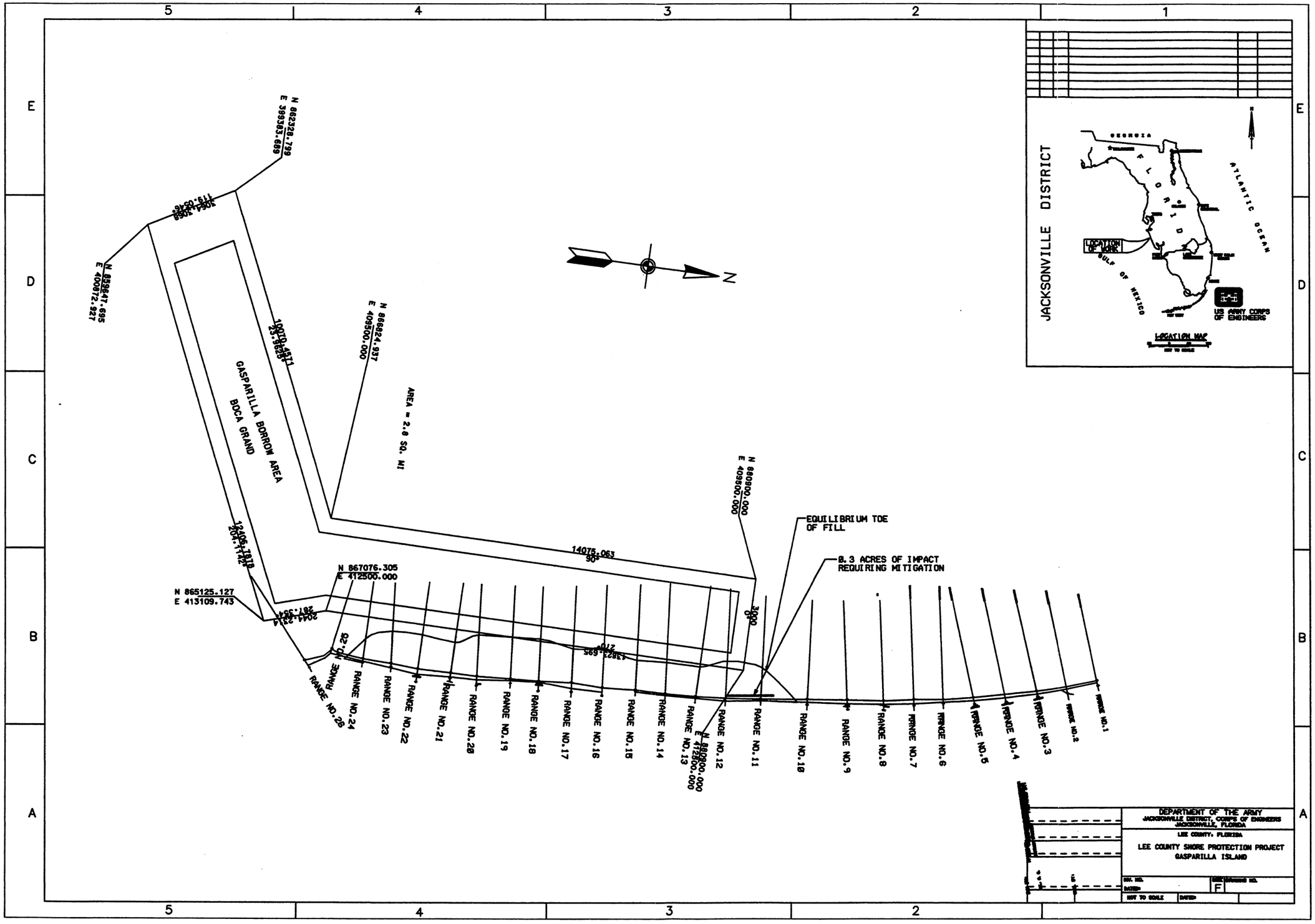


FIGURE 6. NEARSHORE HARDGROUNDS GASPARILLA ISLAND

core within Area B had a low silt content (7%) in the upper three feet (CB-LC-19). This core was used to select the borrow area to be utilized for the Estero Island renourishment (Figure B-3). The borrow area covers an area of 1.59 square miles and includes a portion of the Captiva/Sanibel Borrow Area III-A, dredged in 1997 (Figure B-4). A typical geologic cross-section through the Estero borrow area is shown in Figure B-5.

B-28. The composite mean grain size for the Estero borrow area B-1 based on core CB-LC-19 is –0.05 phi (1.04 mm) with a phi sorting of 1.53 or poorly sorted. The composite mean grains size for the Captiva/Sanibel Borrow Area III-A is 1.28 phi (0.41 mm) with a phi sorting of 0.95 or moderately sorted. Table B-2 shows the grain size data for the Estero borrow area. Figure B-6 shows a graphic comparison of the grain size distribution for each area and the overall composite distribution.

B-29. A second borrow area identified for the Captiva/Sanibel project lies offshore and just outside the WES seismic study area (Figure B-3). This borrow area has not been dredged. A total of nineteen (19) cores were taken within these borrow areas in 1994. The logs for these cores are provided in Sub-Appendix B-2.

B-30. The remaining borrow areas were described by the USACE (1997) report as follows: Area C, located in the embayment of the San Carlos Bay entrance is recommended for further investigation to determine the suitability of the surface sediments. Core CB-LC-02 and Grab 03, located within Area C, show that the surface sediments are comparable to the native beach composite, however, the acoustic impedance in this area indicate low densities which typically represent fine-grained sediments, therefore further investigation of the area is warranted. Area D, located nearshore off of Sanibel Island, is also recommended for further study as a possible borrow area. This area appears to be a basin with thicker sediments over the limestone deposits, but lacks coring information. Only one sample, Grab 08, was taken in this area. This sample indicated a medium shell/sand mix which would be suitable for beach fill, therefore it is recommended that this area be further studied. Area E, located on the southeastern portion of the study, also has deeper depressions or channels within the limestone that are filled with sediment. The depth of suitable sediment is highly variable in this area and will require care in identifying a suitable borrow area boundary. Each possible borrow area contains sediment that has a much higher shell content than the native beach. (Silt contents are also typically higher than acceptable by the State permitting agencies.) The depths of the sediment are on the order of 5 feet in most of the identified possible borrow areas except in the northwest corner where the depths are around 8 feet and within the buried channels of the San Carlos embayment and the outer edge of the buried channels area, where the depths of suitable sediment are 8 to 10 feet deep. The irregular surface of the limestone layer will present problems in identifying a suitable dredging plan. Use of the acoustic profiles along with coring information will help to facilitate in developing the dredging plan, however, care should be taken. Additional cores may be helpful closer to Sanibel Island and on the ebb shoal of San Carlos Bay entrance, to better define possible suitable sediment in areas where this study had limited sediment information.

LEE CO. GRR ESTERO BORROW AREA		
P.I.	X	Y
A	425,741	754,410
B	432,278	752,420
C	430,379	746,182
D	423,874	748,162
E	427,671	760,638
F	434,176	758,658

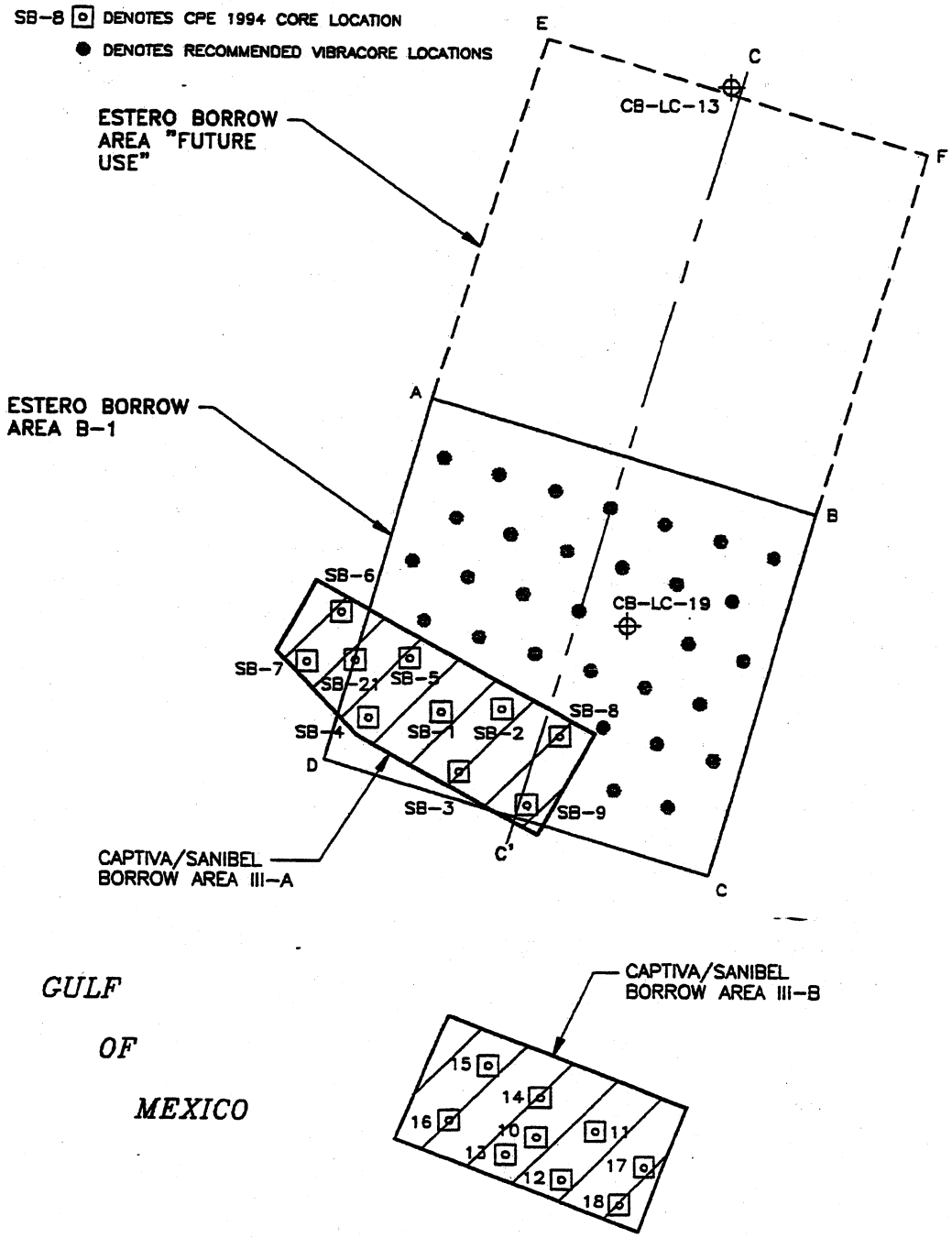
N

1" = 3000'

CB-LC-19 DENOTES ALPINE 1996 CORE LOCATION

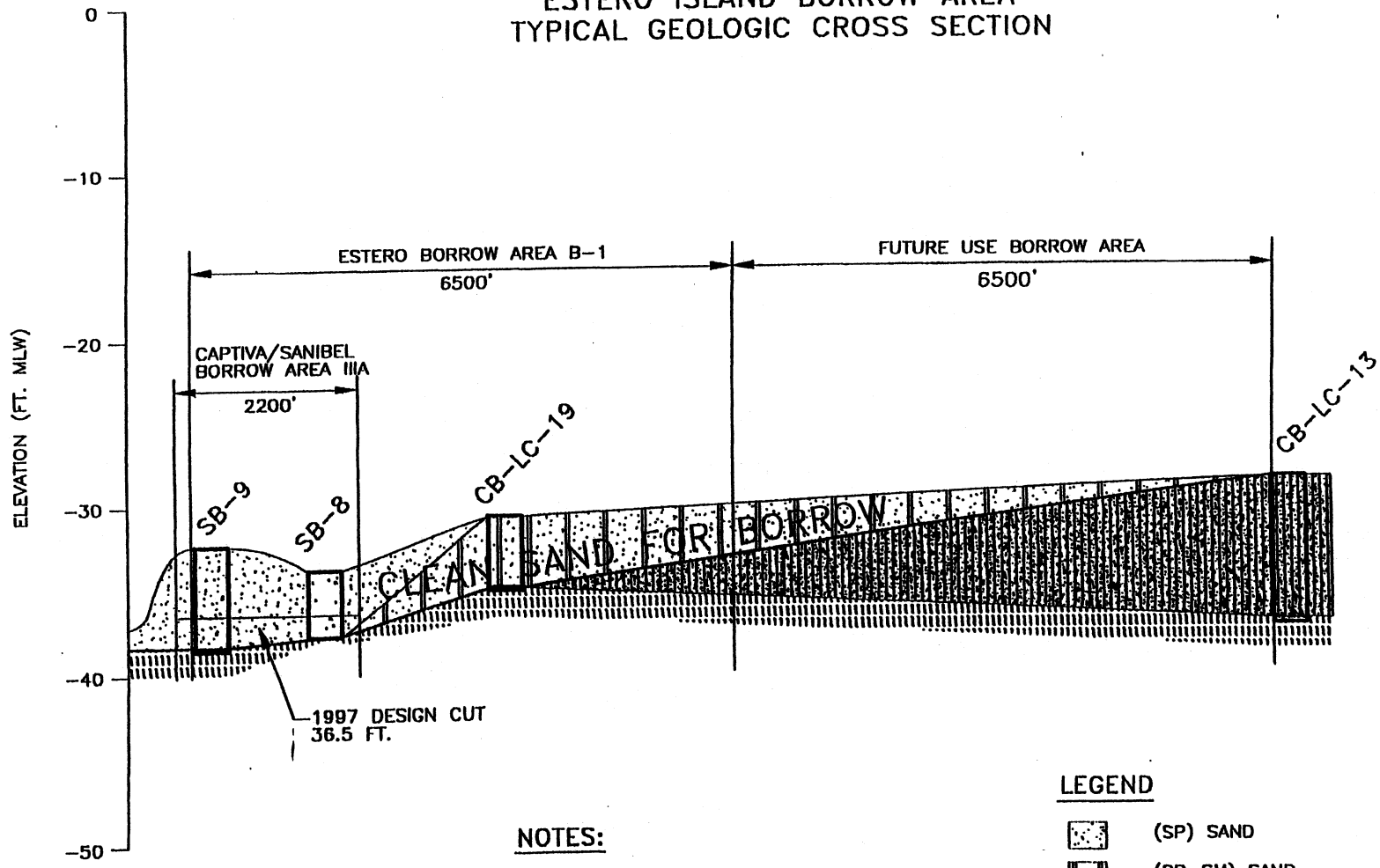
SB-8 DENOTES CPE 1994 CORE LOCATION

● DENOTES RECOMMENDED VIBRACORE LOCATIONS



US ARMY CORPS OF ENGINEERS JACKSONVILLE DISTRICT	LEE COUNTY GRR ESTERO BORROW AREA	DATE : 9/3/98 FIGURE NO. B-4

ESTERO ISLAND BORROW AREA
TYPICAL GEOLOGIC CROSS SECTION



NOTES:

1. CAPTIVA/SANIBEL BORROW AREAS WAS DREDGED IN MARCH 1997
2. CORES DO NOT FALL DIRECTLY ON CROSS SECTION LINE, BUT HAVE BEEN ASSUMED TO CONTAIN SIMILAR MATERIAL

LEGEND

- (SP) SAND
- (SP-SM) SAND
- (SM) SILTY SAND
- LIMESTONE

SCALE:

VERTICAL: 1"=200'
HORIZONTAL: 1"=200'

US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LEE COUNTY SPP
CROSS SECTION C-C'
ESTERO BEACH AREA

DATE : 9/4/98

FIGURE NO. B-5

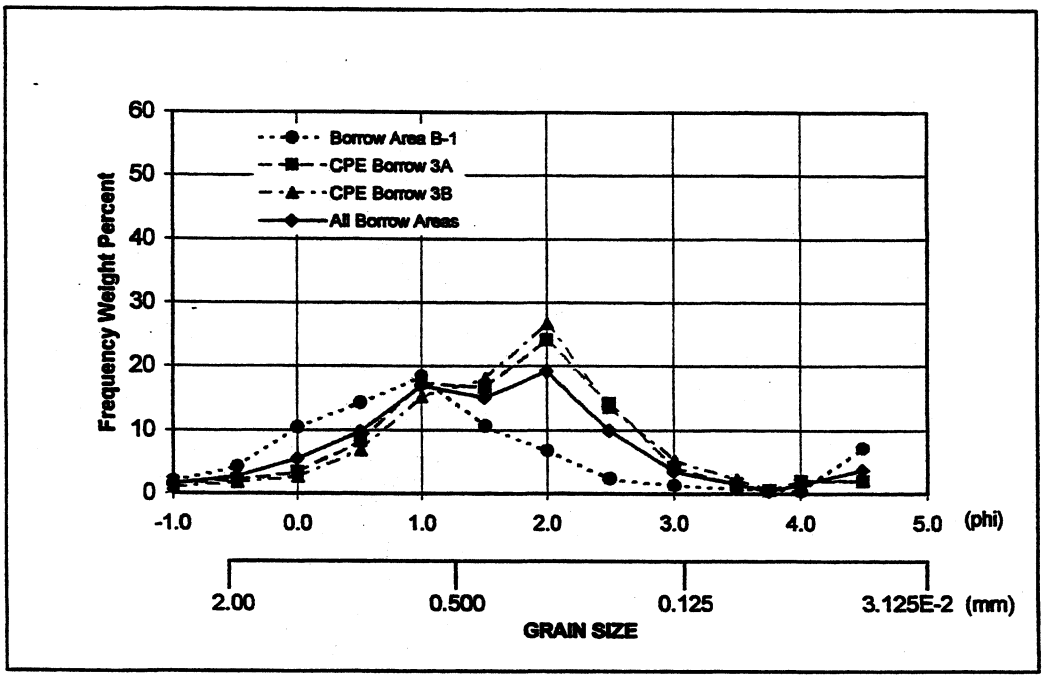


Figure 6a. Estero Borrow Areas Frequency Grain Size Distribution Curves

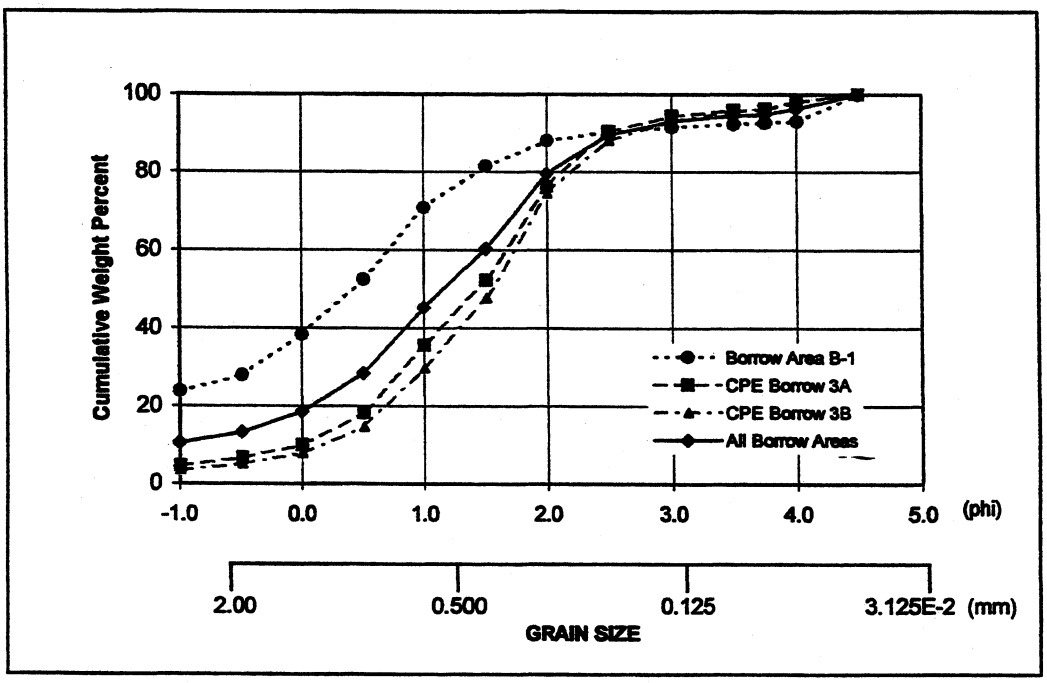


Figure 6b. Estero Borrow Areas Cumulative Grain Size Distributions

Figure B-6. Offshore Estero Borrow Areas Grain Size Distributions

B-31. Gasparilla Island Borrow Area. Ten cores obtained in 1996 by the Jacksonville District were provided to develop borrow areas for Gasparilla Island. Two borrow areas are defined.

B-32. Gasparilla Borrow Area 1 lies approximately 3,000 feet offshore of the south end of Gasparilla Island in water depths of 10 to 18 feet MLW. Borrow Area 1 is defined by five cores (1-5). Depths of clean sand usable for borrow material ranges from 4.5 feet at core CB-BG-3 to 8.2 feet at core CB-BG-4. Figure B-7 shows the borrow area's vibracore locations and an isopach developed from the cores showing clean sand available for dredging. A typical geologic cross-section through Borrow Area 1 is shown in Figure B-8. The composite mean grains size for the clean sand is 1.80 phi (0.29 mm) with a composite phi sorting of 0.96 or moderately sorted (Table B-2). Figure B-9 shows a graphic comparison of the grain size distribution for each of the Gasparilla borrow areas and the overall composite.

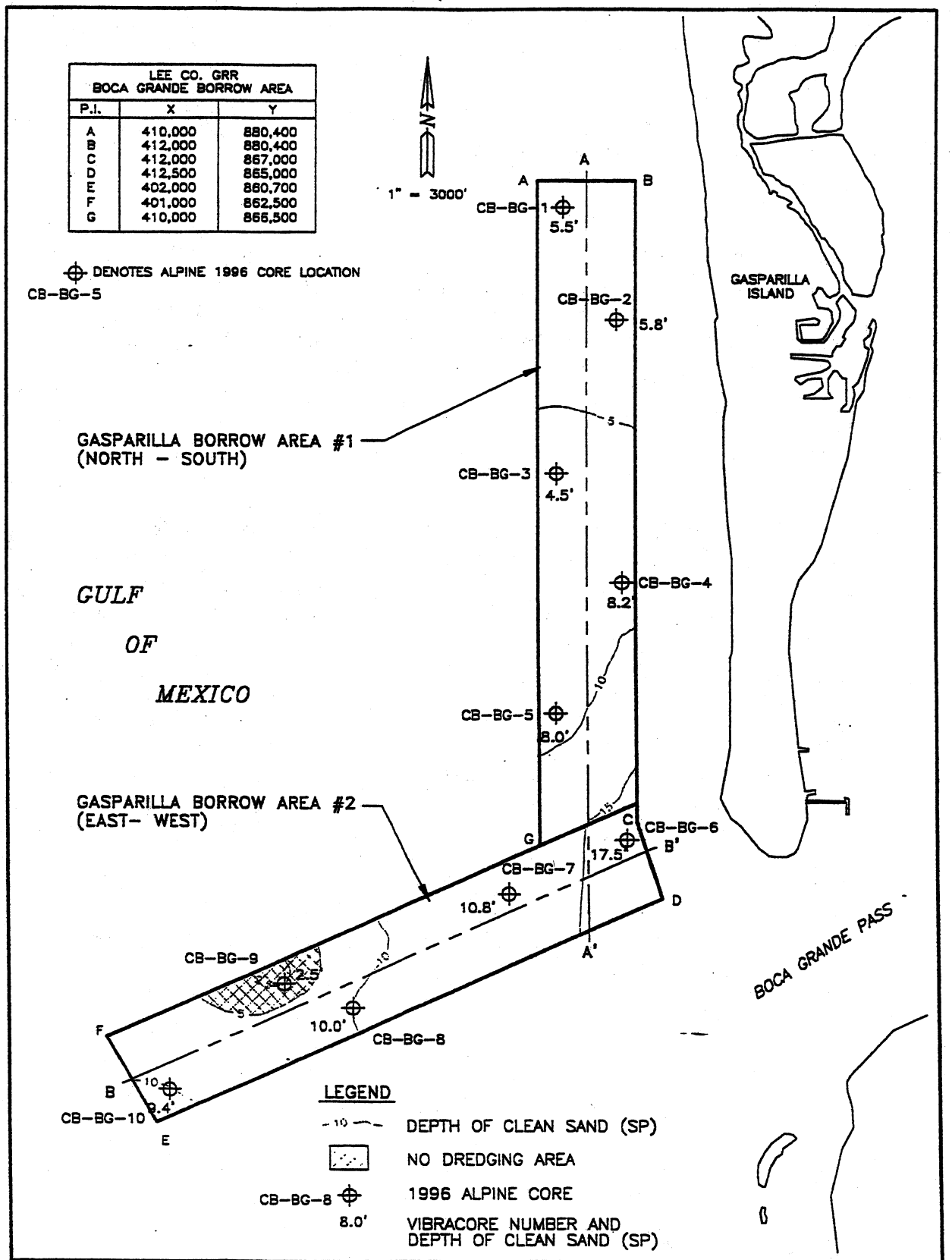
B-33. Gasparilla Borrow Area 2 lies on the shoal to the north of Boca Grande Pass navigation channel. Water depths range from 2 to 15 feet MLW. Cores CB-BG-5 through CB-BG-10 lie within Borrow Area 2. Suitable sediment ranges in thickness from 2.5 feet at core CB-BG-9 to 18.5 feet at core CB-BG-7. A typical geologic cross-section through Borrow Area 2 is shown in Figure B-10. The area adjacent to core CB-BG-9 has been designated as a "No Dredge Area" due to cut depths less than 4 feet (Figure B-7). The composite mean grain size for the clean sand is 1.25 phi (0.42 mm) with a composite phi sorting of 1.74 or poorly sorted.

B-34. Volume of Sand Estimate. The estimate of the total volume of sand available for beach nourishment in the Estero borrow area is 3,500,000 cubic yards (Table B-3). The total volume was calculated utilizing core CB-LC-19 which shows 4.2 feet of clean sand above the rock which underlies all of the offshore area. An average cut of 3.0 feet was assumed over the 6,000 square foot borrow area which equates to 4,000,000 cubic yards. An estimate of 500,000 cubic yards of sand was removed in 1997 to construct the Sanibel projects leaving an estimated 3,500,000 cubic yards. Additional vibracores are recommended to better define the sediment thickness and quality.

Table B-3

Offshore Borrow Area Sand Volumes

Borrow Area	Volume (cy)
Estero Borrow Area B-1	3,500,000
Captiva/Sanibel III-A	690,000
Captiva/Sanibel III-B	1,550,000
Gasparilla Borrow Area 1	6,100,000
Gasparilla Borrow Area 2	7,780,000
Total Volume All Areas	19,620,000

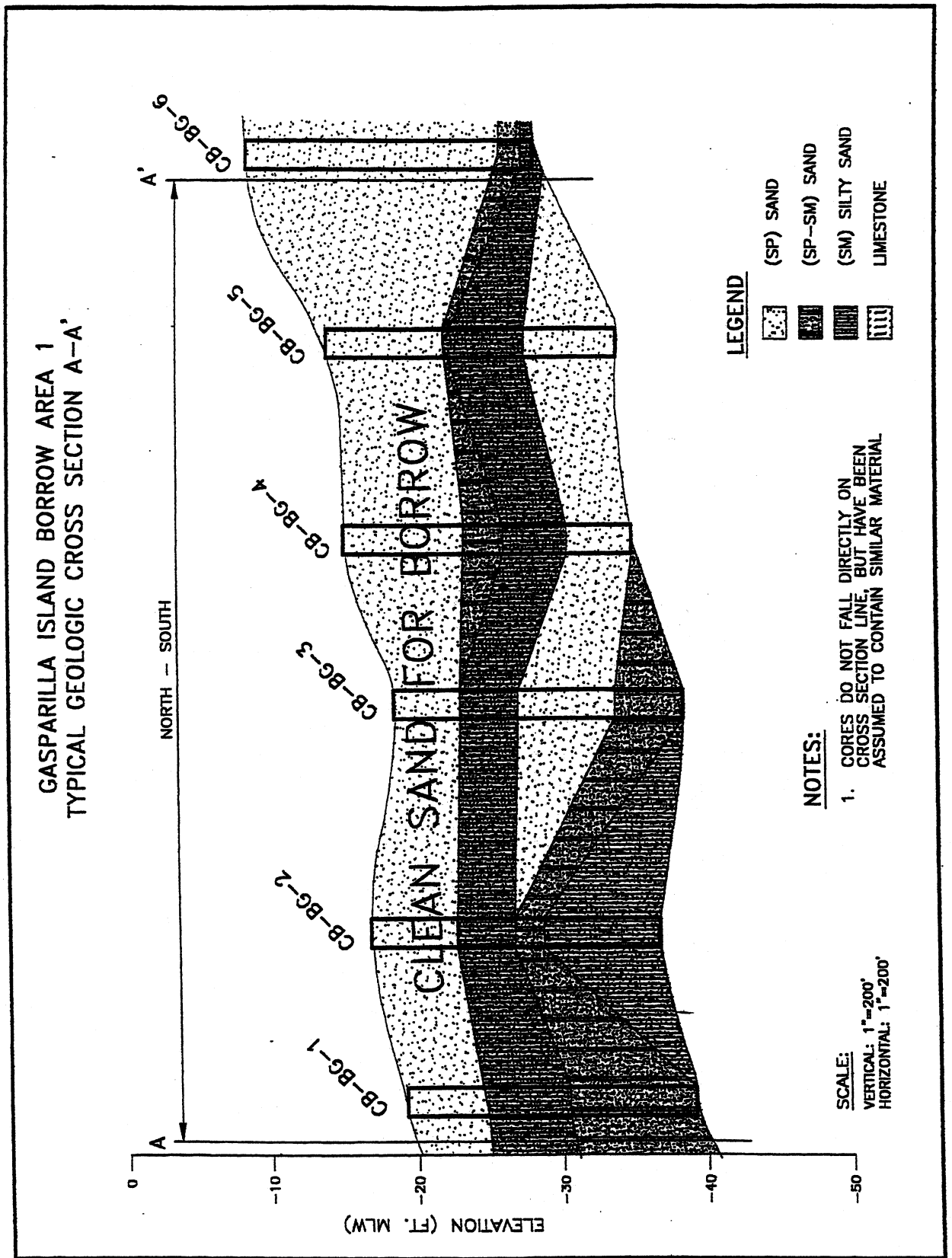


US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LEE COUNTY SPP
ISOPACH CONTOUR OF BEACH COMPATIBLE SAND
GASPARILLA BORROW AREA
BOCA GRANDE

DATE : 9/3/98

FIGURE NO. B-7



US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LEE COUNTY SPP
CROSS SECTION A–A'
GASPARILLA BARROW AREA 1

DATE : SEPT 1998

FIGURE NO. B–8

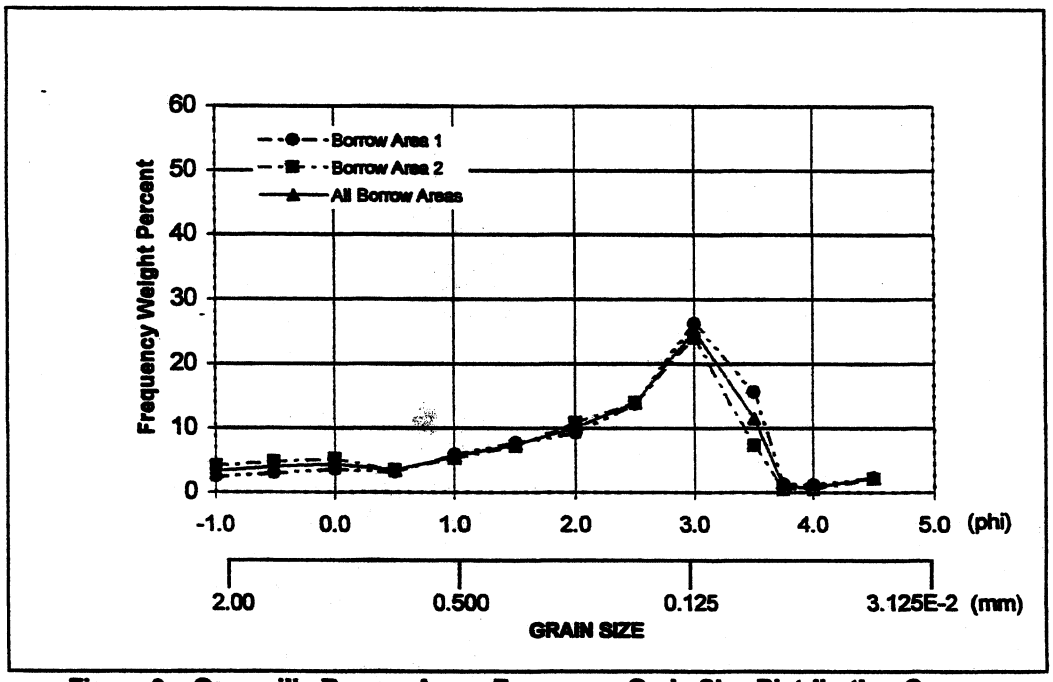


Figure 9a. Gasparilla Borrow Areas Frequency Grain Size Distribution Curves

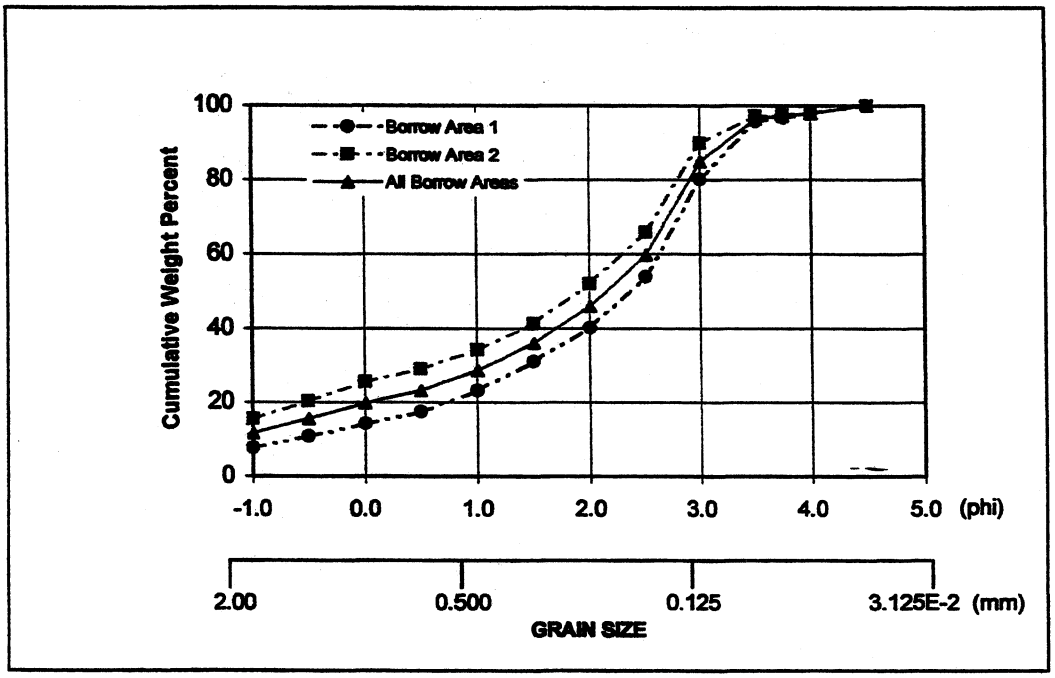
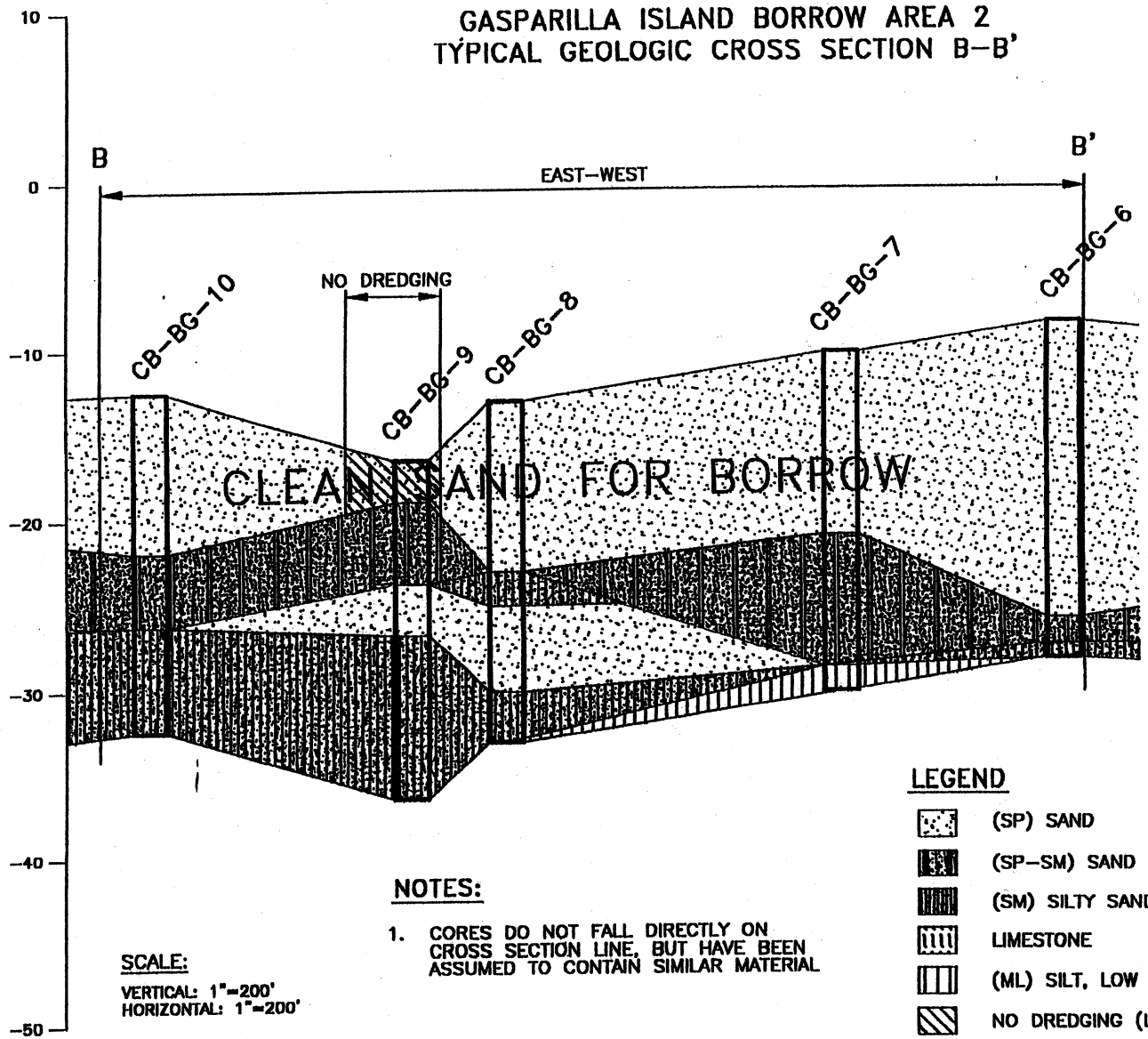


Figure 9b. Gasparilla Borrow Areas Cumulative Grain Size Distributions

Figure B-9. Offshore Gasparilla Island Borrow Areas Grain Size Distributions

GASPARILLA ISLAND BORROW AREA 2
TYPICAL GEOLOGIC CROSS SECTION B–B'



LEGEND

- (SP) SAND
- (SP–SM) SAND
- (SM) SILTY SAND
- LIMESTONE
- (ML) SILT, LOW PLASTICITY
- NO DREDGING (LESS THAN 4 FT. CUT)

NOTES:

1. CORES DO NOT FALL DIRECTLY ON CROSS SECTION LINE, BUT HAVE BEEN ASSUMED TO CONTAIN SIMILAR MATERIAL

SCALE:

VERTICAL: 1"=200'
HORIZONTAL: 1"=200'

US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LEE COUNTY SPP
CROSS SECTION B–B'
GASPARILLA BORROW AREA 2

DATE : SEPT 1998

FIGURE NO. B-10

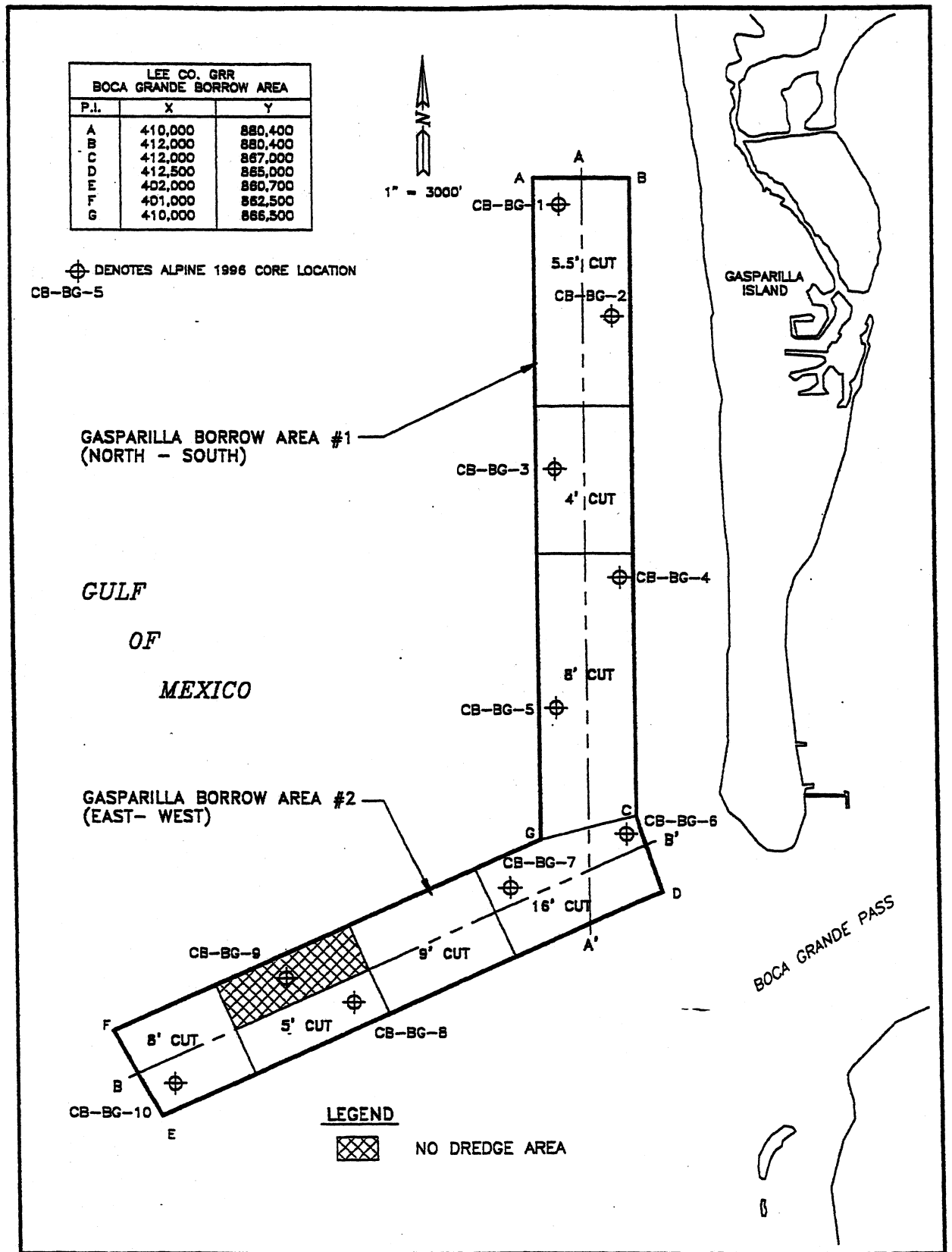
B-35. Gasparilla Borrow Areas. To estimate volumes of potential clean sand usable for beach fill Gasparilla's borrow areas were partitioned into sections. Each section was given an average dredge cut depth as determined from the cores within each partition. Figure B-11 shows each partition and estimated average cut. The estimated volume of sand available for Gasparilla Borrow Areas 1 and 2 are 6,100,000 cubic yards and 7,780,000 cubic yards, respectively (Table B-3).

B-36. Upland Sand Sources. Due to the diminishing offshore sand resources, upland sand sources are becoming an important source in supplying sand to the beaches in nourishment projects around the state of Florida. Many upland sources have been identified in prior reports, including the Dade County Alternate Sand Source Investigation (USACE, 1997). A list of the potential upland sand suppliers for Lee County is presented in Table B-4.

B-37. The potential upland sources can be classified into three categories based on their sedimentological characteristics. The first category includes pure quartz sand. This sand is mined from the Pleistocene shoreline forming the Lake Wales Ridge of the Central Highlands of Florida. Three upland suppliers produce this type of material. These include E.R. Jahna, Florida Sand and Silica Company, and Standard Sand & Silica. As indicated on Table B-4, E.R. Jahna is the closest upland sand supplier to Lee County. A second type of sand that is available for use on the Lee County Beaches is quartz sand that is a by-product of the USACE navigational channel dredging. It is stored in disposal areas located along navigational channels such as the Apalachicola River and the Chattahoochee River. The third type of sand is that which is mined from an ancient river bed deposit of sand and shell (quartz and calcium carbonate) on the west coast of Florida. Caloosa Shell Corporation (formally known as Leisley Shell Corporation) has produced a sand/shell mixture which met specifications in the past, however are not currently producing beach quality sand.

B-38. Upland sand sources for initial nourishment may not prove to be feasible due to quantity of fill needed for initial construction. Approximately 2 million cubic yards are needed. This amount of fill material trucked to the project site would require 104,000 loads or 578 trucks per day, 24 trucks per hour or one truck every two and half minutes for a six month period. Due to the logistics of Estero and Gasparilla Islands this would prove to be impracticable especially due to the availability of offshore sand sources. However, a lower volume of fill needed for subsequent renourishment could prove to be acceptable and should be considered in the future.

B-39. Suitability Analysis. The compatibility of the proposed borrow areas were evaluated to determine their suitability with the native beach sand. The Coastal Engineering Research Center (USACE, 1992) 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.



US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LEE COUNTY SPP
ESTIMATED DREDGE CUTS
GASPARILLA BORROW AREA
BOCA GRANDE

DATE : 9/3/98

FIGURE NO. B-11

Table B-4
Lee County Potential Upland Sand Source Providers
(Listed in order of Proximity From Lee County)

Supplier	Location	Mean Grain Size	Composition
E.R. Jahna	Ortona, Florida	0.39 mm	SiO_2
Florida Silica Sand Co.	Glades County, Florida	0.28 mm	SiO_2
Caloosa Shell Corporation	Sun City, Florida	NA	SiO_2, $CaCO_3$
Standard Sand & Silica	Lake Wales, Florida	0.36 mm	SiO_2
Northwest Florida Water Management District	Apalachicola River	0.49 mm	SiO_2
USACE, Mobile District	Chattahoochee River	0.46 mm	SiO_2

B-40. 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-41. The overfill ratios and renourishment factors for both the Estero and Gasparilla Island borrow areas were calculated. Table B-5 shows the results of the suitability analysis for the native beach and the potential borrow sources. These values should be used for planning and estimating purposes. Due to the compatibility of the offshore borrow sources, the upland sand sources were not included.

B-42. The offshore sand sources considered in this investigation exhibit overfill ratios ranging from 1.0 to 8.5 (Table B-5). 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 0.04 to 1.60. Grain size frequency distribution curve comparison for the native beach and the offshore borrow areas are shown in Figures B-12 and B-13.

Conclusions – Summary of Results

B-43. This geotechnical appendix is for the Lee County Shore Protection Project for Estero Island and Gasparilla Island segments only. All investigations conducted offshore and adjacent to the project areas were reviewed and summarized. Upland sand sources were reviewed for completeness but were not selected as a sand source for this project.

B-44. The borrow area selected for Estero Island potentially contains over 3,500,000 cubic yards of coarse sand (1.04 mm) with approximately 7% silt. Based on compatibility analysis, the borrow area is suitable as beach fill for Estero Island. This borrow area as defined contains the Captiva/Sanibel borrow area dredged in 1997. It is estimated that 500,000 cubic yards were removed at that time. It is recommended that thirty (30) additional cores be taken across the total extent of the proposed Estero borrow area B-1 to define the total sediment quantity and quality (Figure B-4). It is also recommended that side scan sonar be performed across the borrow area to define limits of hardbottom communities located adjacent to the Captiva/Sanibel borrow areas. A cultural resources study and magnetometer survey would also be required prior to dredging within this borrow area.

B-45. Two borrow areas were defined for the Gasparilla Island renourishment project area based on vibracores obtained in 1996. Borrow Area 1 lies approximately 3,000 feet offshore of the south end of Gasparilla Island. The borrow area contains 6,100,000 cubic yards of clean medium grain sand (0.29 mm) which is moderately sorted (0.96). Compatibility analysis of this borrow area with the Gasparilla Island Project area found the borrow area to be unsuitable.

B-46. Borrow Area 2 lies on the shoal to the north of Boca Grande Pass navigation channel. The borrow area contains 7,780,000 million cubic yards of beach quality fill material. The mean grain size is 1.25 phi (0.42 mm) with a sorting value of 1.74, or poorly sorted.

Table B-5
Suitability Analysis For Estero and Gasparilla Island Borrow Areas

Borrow Area	Overfill Ratio Ra	Renourishment Factor Rj
	Estero Island	
Borrow Area 1	1.00	0.04
CPE Borrow Area 3A	1.00	0.21
CPE Borrow Area 3B	1.00	0.25
All Estero Borrow Areas	1.00	0.10
	Gasparilla Island	
Borrow Area 1	8.50	1.60
Borrow Area 2	1.00	0.95
All Gasparilla Borrow Areas	1.09	1.12

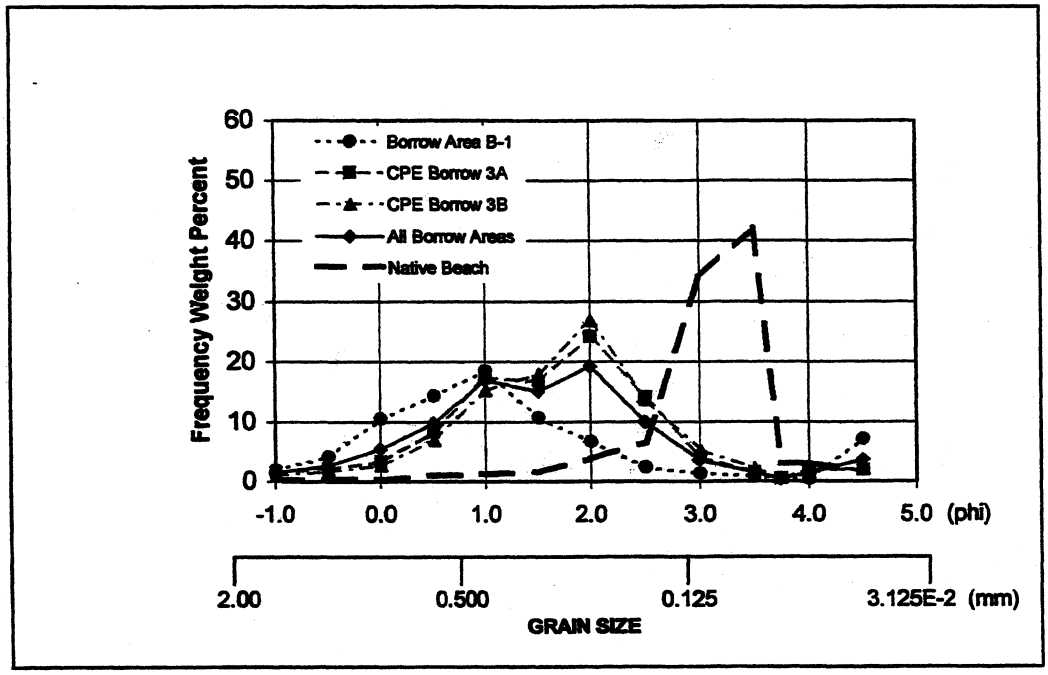


Figure 12a. Estero vs. Borrow Areas Frequency Grain Size Distribution Curves

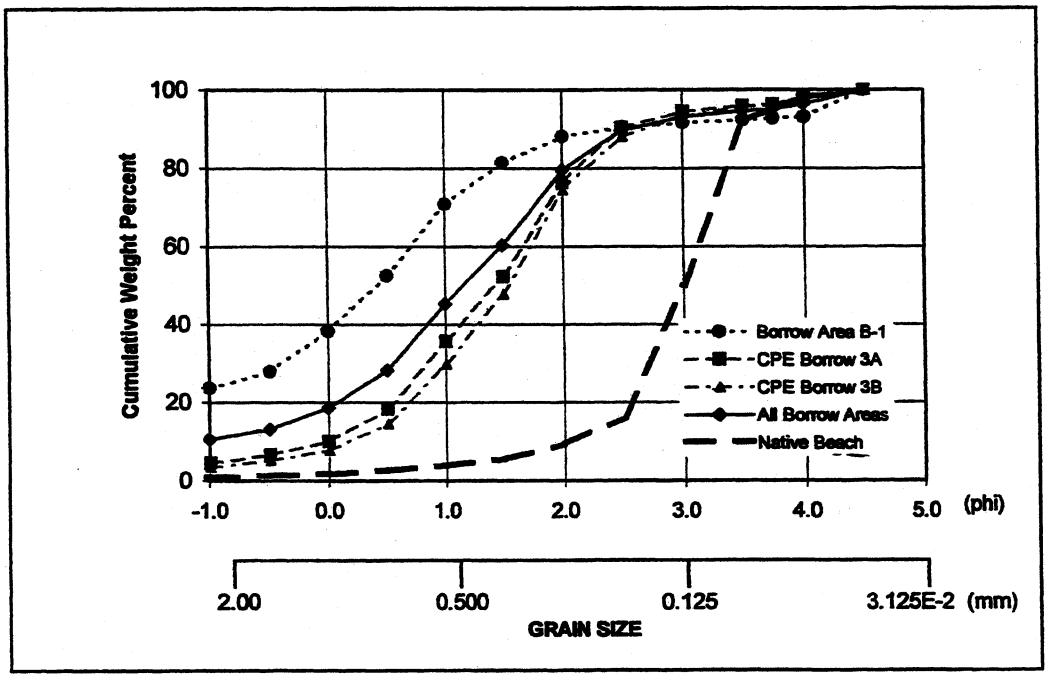


Figure 12b. Estero vs.Borrow Areas Cumulative Grain Size Distributions

Figure B-12. Suitability Analysis Grain Size Distributions For Estero Island

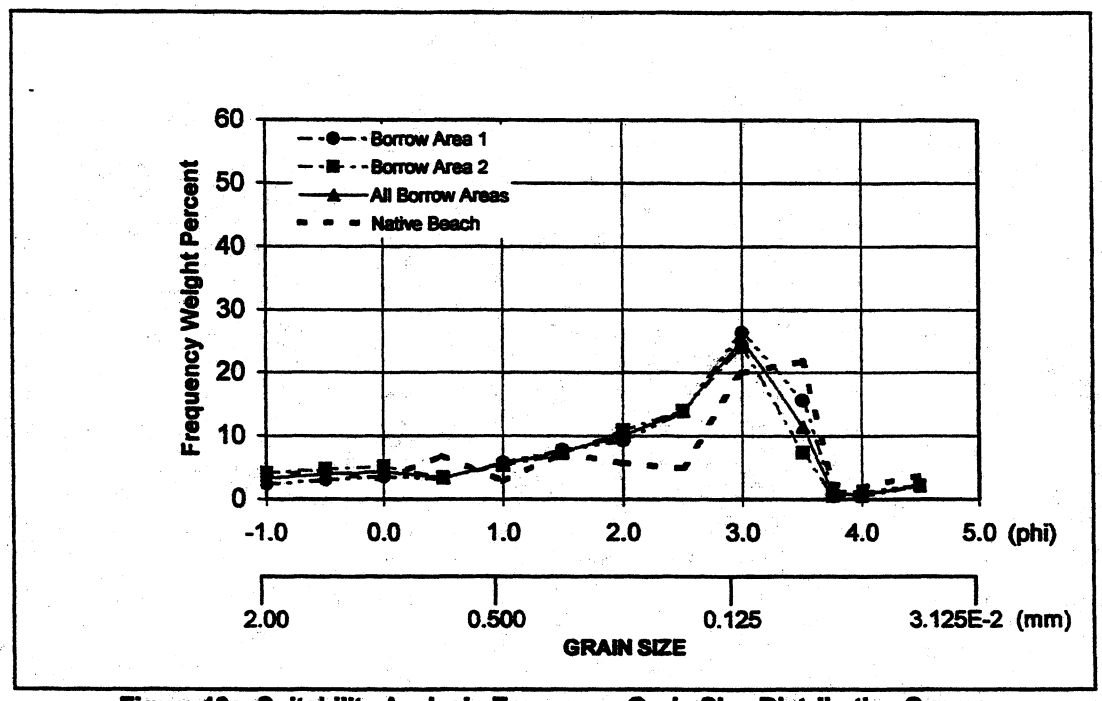


Figure 13a. Suitability Analysis Frequency Grain Size Distribution Curves

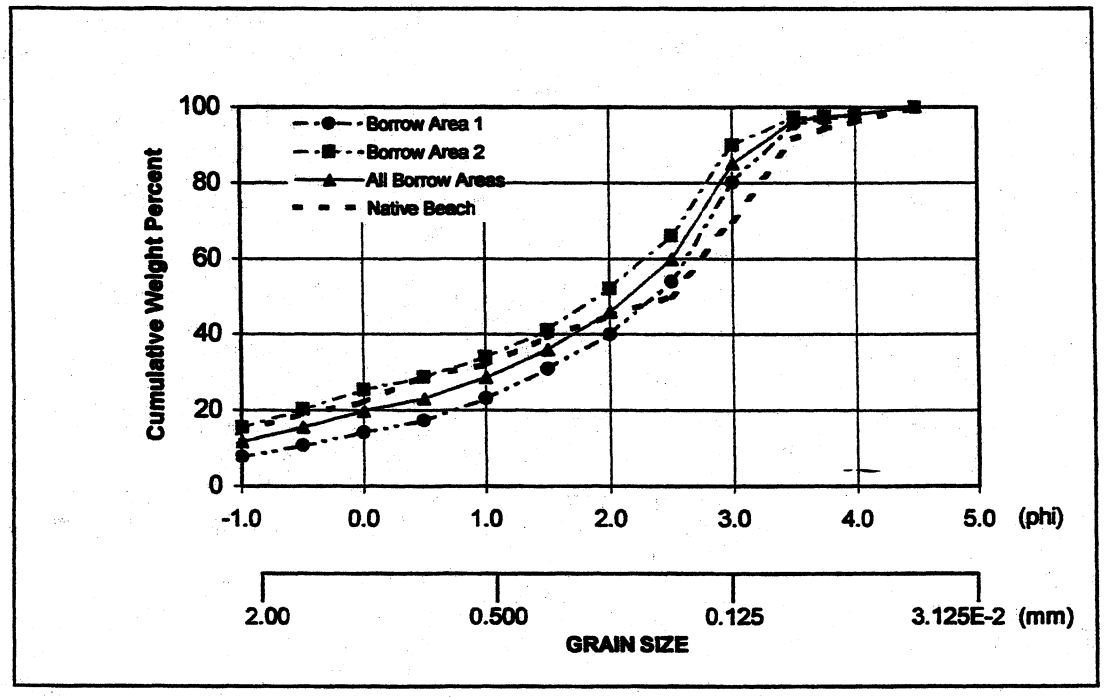


Figure 13b. Suitability Analysis Cumulative Grain Size Distributions

Figure B-13. Suitability Analysis Grain Size Distributions For Gasparilla Island

Compatibility analysis found the borrow area to be suitable for beach fill for the Gasparilla Island beach project. Additional studies recommended for the borrow area include a cultural resource study and magnetometer survey.

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SUB APPENDICES AVAILABLE UPON REQUEST FROM THE DISTRICT

APPENDIX C

PERTINENT CORRESPONDENCE

LEE COUNTY
SOUTHWEST FLORIDA

BOARD OF COUNTY COMMISSIONERS

Bob Janes
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Andrew W. Coy
District Four

John E. Albion
District Five

Donald D. Stilwell
County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

Writer's Direct Dial Number: (941) 479-8181

(VIA FACSIMILE AND FEDERAL EXPRESS DELIVERY)

June 27, 2001

NATURE SAVER™ FAX MEMO 01616	Date 6.29.01	# of pages ▶ 5
To Dan Haubner	From Amira	
Co./Dept. (904) 2323442	Co. Lee County	
Phone # 904 232 2798	Phone # 941 479 8131	
Fax #	Fax #	

Richard B. Bonner, P.E. Deputy District Engineer
Programs and Project Management Division
U.S. ARMY CORPS OF ENGINEERS
400 W. Bay Street
Jacksonville, Fl. 32202-4412

SUBJECT: GASPARILLA ISLAND AND ESTERO ISLAND BEACH RESTORATION PROJECTS

Dear Mr. Bonner:

We received notification from Ms. Claudia L. Tomblom, Deputy Assistant Secretary of the Army, through a letter dated May 31, 2001, that the Jacksonville, District should be able to review plans and specifications for the Gasparilla and Estero Island segments of the Lee County Shore Protection Project following the approval for the General Re-evaluation Report for the project.

Lee County desires to expedite the construction of the project because of the seriousness of ongoing beach erosion, the lack of storm protection to upland properties, and the threat to storm evacuation routes in the project areas. The attached project schedule reflects our urgency to construct and complete the projects before the next storm season. In light of our urgency, we request the Corps of Engineers to assist Lee County by expediting the processing and approval process of the GRR as much as possible to facilitate adherence to the revised construction schedules.

If you need additional information, please do not hesitate to contact my staff, or me. Thank you for your continued assistance and cooperation.

Sincerely,

LEE COUNTY NATURAL RESOURCES

Roland Ottolini, P.E.
Director

RO:AKM:sdg
Attachments
cc: Steve Boutelle, Project Manager (W/O Attachments)
Rajesh Srinivas, Taylor Engineering (W/O Attachments)
Ken Humiston, Humiston & Moore Engineering (W/O Attachments)
Stephen Keehn, Coastal Planning & Engineering (W/O Attachments)

S:\NATRES\MARINE\BEACH_MANAGEMENT\GASPARILLA\GASPARILLA & ESTERO ISLAND BEACH RESTORATION PROJECT-EXPEDITE.DOC

June 22, 2001

Mr. Steve Boutelle
Senior Environmental Planner
Lee County Natural Resources Division
1500 Monroe Street, 3rd Floor
Fort Myers, FL 33901

Re: Revised Estimated Construction Schedule, Gasparilla Island Beach Restoration Professional Services Agreement, H&M File No. 9061.

Dear Steve:

Based on our discussions with DEP regarding the recently submitted response to their request for information, if DEP staff deems the application complete we could receive a notice of intent to issue a permit within 60 days. We believe that we have addressed all DEP staff concerns, and based on this assumption we would expect that the project could be advertised for bids near the end of August, bids received near the end of September, and allowing two months for contract procedures and contractor mobilization, construction could begin near the end of November.

One unknown with regard to scheduling is the Corps of Engineers permit, which it is my understanding the only outstanding issue is the USF&WLS Biological Opinion. We requested review of this matter over a year ago and have had numerous discussions and correspondence with USF&WLS staff, and we are hopeful that this matter will be resolved soon.

Please call me to discuss this, particularly with regard to the time frame for the county administrative contracting procedures.

Sincerely yours,

HUMISTON & MOORE ENGINEERS

Kenneth K. Humiston, P.E.

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

REPLY TO
ATTENTION OF

31 MAY 2001

Mr. Douglas R. St. Cerny
Chairman
Lee County Board of County Commissioners
District Two
Post Office Box 398
Fort Myers, Florida 33902-0398

Dear Mr. St. Cerny:

This is in response to your letter dated February 7, 2001, regarding the Gasparilla and Estero Island segments of the Lee County Shore Protection project. Section 309 of the Water Resources Development Act (WRDA) of 2000 authorized Lee County to construct the project in accordance with Section 206 of WRDA 1992. Such authorization is conditioned upon the Secretary of the Army determining that the work is technically sound, environmentally acceptable, and economically justified.

In order to determine the project's compliance with the authorizing criteria, we must first approve the General Reevaluation Report (GRR) that addresses those criteria. The Army Corps of Engineers is currently reviewing that report and it should be submitted for approval shortly. If the report were approved, the Jacksonville District then would be able to review the plans and specifications being prepared by your office.

The execution of a Project Cooperation Agreement for non-Federal construction, and for later Federal reimbursement, will be contingent upon approval of the GRR and completion of the record of decision on the Environmental Impact Statement. Any reimbursement would be subject to the availability of funds and subject to the limitations of Section 102 of the Energy and Water Development Appropriations Act, 2000. The Jacksonville District will keep you informed of the progress of these efforts.

Sincerely,

Claudia L. Tomblom

Claudia L. Tomblom
Deputy Assistant Secretary of the Army
(Management and Budget)

Printed on Recycled Paper

File

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LEE COUNTY
SOUTHWEST FLORIDA

BOARD OF COUNTY COMMISSIONERS

Writer's Direct Dial Number: (941) 479-8181

Bob Janes
District One

Douglas R. St. Cerny
District Two

Ray Judah
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Andrew W. Coy
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John E. Albion
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Donald D. Stilwell
County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

March 28, 2001

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Subject: Financial Plan
Lee County Shore Protection Project
Gasparilla and Estero Segments

Dear Mr. Bonner:

This letter and enclosed documentation is provided at your request, and is the local sponsor's plan to finance our portion of the Lee County Shore Protection Project, Gasparilla and Estero Island segments.

It is anticipated that the project will be cost shared by the federal, state, and local government. The federal participation will be outlined in a Project Cooperation Agreement. Based on the draft GRR it is expected that the Gasparilla Segment will be federally funded at 61.1% of the eligible costs and the Estero Island Segment will be funded at 63.5% of the eligible costs. It is appropriate to reiterate our previous request that the Corps begins the process of drafting the PCA language.

Lee County has applied for funding from the State of Florida Department of Environmental Protection. The DEP has determined that it will pay 44.8% of the non-federal costs for Gasparilla and 45.7% for Estero Island. The funding has been budgeted and is currently available up to $3,408,681 for Gasparilla and $4,770,539 for Estero.

Lee County is authorized by Florida Statutes and Ordinance 96-16 to impose a 3% tourist development tax throughout Lee County. One third of this tax is dedicated by ordinance for beach and shoreline improvements. This tourist tax was established in 1982. Between fiscal years 1990 and 1999, Lee County collected $25,998,443 for beach and shoreline improvements. A portion of this funding has been deposited into a Beach Renourishment Trust Fund and capital improvement project accounts for the shore protection project, which presently contain nearly $3 million dollars. Based on the GRR, DEP cost sharing, and the supplemental engineering report for the Estero Island segment, the Lee County cost of the initial construction is estimated at approximately $2.5 million.

The GRR calculates a combined total annual cost of both segments at $3,093,600, approximately the same amount collected annually in the beach and shoreline portion of the tourist development tax. In consideration of federal and state funding, as well as the expected cost savings to the Estero segment based on the pending supplemental engineering report, Lee County is well positioned to provide the local funding not only for initial construction, but also for maintenance and periodic beach renourisment throughout the project life.

The attached excerpt from the Lee County Revenue Manual illustrates the projected tourist tax revenues through Fiscal Year 2003. It reinforces Lee County's financial capability in this project.

Should the costs be higher than anticipated, Lee County has the ability to borrow from internal sources or budget against future year tourist tax collections. Lee County will receive revenue from the Town of Fort Myers Beach in accordance with our Interlocal Agreement, and is evaluating the establishment of a special assessment district on Gasparilla. Lee County also has the ability to issue bonds and use short term financing such as commercial paper. Because we anticipate building the project locally and being reimbursed by the State and federal governments after the completion of audits, we will consider all these options as needed.

If you have any questions or need additional information, please contact me or Mr. Steve Boutelle at (941) 479-8181.

Sincerely,

PUBLIC WORKS DEPARTMENT

Roland Ottolini, P.E.
Director
Natural Resources Division

cc: Steve Boutelle

LEE COUNTY TOURIST TAX

REVENUE DESCRIPTION:	Revenue is derived from tax on Hotel/Motel/Apartment/Condominium/ Resort/Mobile Home Parks, etc. for occupancy less than six (6) months.
LEGAL AUTHORIZATION	1987 H.B. 453; Florida Statutes 125.0104
FOR COLLECTION:	Lee County Ordinances 82-33; 85-44; 88-1; and 88-2

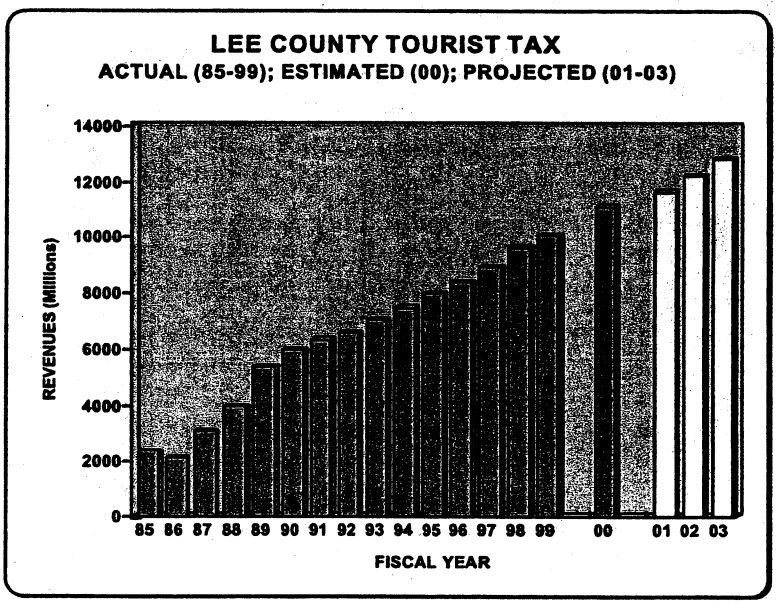
FUND:	Tourist Tax
ACCOUNT NUMBER:	GC5000017400.312100.9000

SOURCE:	Tax on hotel/motel/condominium accommodations
USE:	Monies are distributed as follows:

33.0% - Beach related improvements (Acct. #GC5810130100.38100.920760)
13.4% - Debt service payments to Lee County Stadium (Acct. #GC5810122660.381000.9174)
53.6% - Operation of the Visitor & Convention Bureau (Acct. #GC5000017400.312100.9000)

FEE SCHEDULE:	Rental fee of 3% assessed upon any living quarter for a period less than six (6) months.
METHOD OF PAYMENT:	Payment made directly by establishment to Tax Collector
FREQUENCY OF COLLECTION:	Monthly
EXEMPTIONS:	None
EXPIRATION:	None
SPECIAL REQUIRMENTS:	Percentage distribution des cribed above under "Use"
REVENUE COLLECTOR:	Enforcement is administered by Clerk of Circuit Court and Internal

FISCAL HISTORY AND REVENUE PROJECTIONS



Year	($000)	Percent Change
1985	2,313	
1986	2,066	-10.7
1987	2,994	44.9
1988	3,892	30.0
1989	5,345	37.3
1990	5,897	10.3
1991	6,300	6.8
1992	6,500	3.2
1993	7,011	7.9
1994	7,448	6.2
1995	7,914	6.3
1996	8,375	5.8
1997	8,909	6.4
1998	9,606	7.8
1999	10,055	4.7
2000	11,077	10.2
2001	11,631	5.0
2002	12,212	5.0
2003	12,823	5.0

LEE COUNTY TOURIST TAX

DISCUSSION

Tourist Tax is generated from a 3% charge on "room charges" within the broader base of taxable sales from transient rental facilities. Subject to these taxes are most rents, leases, or lets which have been contracted for periods of six months or less; or, living accommodations in hotels, motels, apartment houses, rooming houses, mobile home parks, etc. Statewide, the room charges have averaged 70% of taxable sales. However, Lee County has averaged a higher level due to the large number of persons who reside in the area for an extended period of time up to six months. An increased fee from 2% to 3% in May, 1988, along with local responsibility for collections, has resulted in higher revenues, beginning in 1989.

The 1990-1992 period was a difficult economic time for both Florida and the United States. The economic recession was especially difficult on the finance, real estate, and construction sectors of the economy. These sectors are very important factors in Florida's economy. However, the tourist industry, as reflected in tax monies, sustained itself well in Lee County during this time. Revenues increased 8.6% in 1990 over 1989, and at a similar level from 1990 to 1991. Revenues for 1992 grew only 3.2% over 1991; monies for 1993 grew by 7.9% over 1992 as the economy improved. This was followed by a sustained growth level of 6.2% in FY94 and FY95 and +5.8% in FY96 and FY97.

Based upon an examination of previous growth rates from FY93 and the current level of positive economic activity in the markets that traditionally provide tourists to this area (Midwest and Northeast), an assumption of 5.0% annual growth in revenues is used. This assumption must be closely monitored especially if major changes are noted in the economy.

The substantial revenue growth in tourist taxes has allowed a "surplus" to develop in the 13.3% allocation for debt service. This has resulted in an annual allocation of $480,000 that is used as follows; $80,000 for two maintenance positions at the Lee County Stadium, $100,000 for maintenance to the Stadium and $300,000 for an attractions marketing program for the facility. These funds have been available annually for several years.

LEE COUNTY
SOUTHWEST FLORIDA

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BOARD OF COUNTY COMMISSIONERS

Writer's Direct Dial Number: (941) 479-8128

John E. Manning
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Andrew W. Coy
District Four

John E. Albion
District Five

Donald D. Stilwell
County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

October 9, 2000

Mr. Richard Bonner, P.E.
Programs and Project Management Division
Project Management Branch
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Subject: Lee County, Florida Shore Protection Project
General Reevaluation Report
Gasparilla Segment

Dear Mr. Bonner:

It has come to our attention that an error may have been made in the calculation of the potential cost allocation of the referenced project segment.

Table 13, pages 59 – 61of the GRR lists the parcels in question. I have described two parcels below that I would like you to review and provide a clarification about the federal cost sharing. Additionally, I would like to know how and when any confirmed errors will be corrected.

Vacant R-17 This 700 foot parcel apparently corresponds to STRAP 234320-00-00007.0000 which lists the owner of record as the U.S. Fish and Wildlife Service. Please clarify the cost sharing for this Federal shoreline.

Vacant Lot R-22 This 2200 foot parcel apparently corresponds to STRAP 264320-00-00200.0000 and is owned by the State of Florida and is part of Barrier Island Geopark. Locally known as Seagrape Park, this recreational facility should qualify for 50% cost sharing.

At a minimum, we believe the GRR should show an additional 1100 feet of Federal Share and the cost sharing apportionment adjusted accordingly.

I look forward to your prompt reply on this matter and am available to provide more details if necessary.

Sincerely,

ENVIRONMENTAL SERVICES DEPARTMENT

Steve Boutelle
Natural Resources Manager
Natural Resources Division

cc: Roland Ottolini

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

15 SEP 2000

REPLY TO
ATTENTION OF

Honorable John E. Albion
Chairman
Lee County Board of Commissioners
District #5
Post Office Box 398
Fort Myers, Florida 33902-0398

Dear Mr. Chairman:

I apologize for the delay in responding to your letter of May 10, 2000, requesting my approval to construct the Gasparilla and Estero Island segments of the Lee County Florida Shore Protection Project, as reimbursable projects under Section 206 of the Water Resources Development Act of 1992.

Unfortunately, I am not in a position to transmit notification letters concerning Section 102 of the Fiscal Year (FY) 2000 Energy and Water Development Appropriations Act to Congress for the Lee County project for two reasons. First, there is clear policy that the Administration would not support construction of the Gasparilla and Estero Island segments in its budget. New investments in shore protection projects have low budget priority in areas that are recreation or tourist destinations, and/or which involve long term Federal investments for periodic nourishment beyond the initial construction of the project. Second, the Senate Appropriations Subcommittee on Energy and Water Development has indicated that it will review Section 102 reimbursement proposals only if the Administration intends to budget for such work.

The Army Corps of Engineers was on track to complete remaining work on the general reevaluation report, complete plans and specifications, and execute a project cooperation agreement using funds appropriated in FY 2000. However, now that Lee County desires to proceed with the plans and specifications and construct the project, the Corps will cease working on this effort after it has completed remaining work on the general reevaluation report. I understand that you have consultants preparing plans and specifications and intend to forward these to the Corps Jacksonville District shortly. However, the Jacksonville District will be unable to review these documents until there is some indication that Congress supports this reimbursement effort.

Under these circumstances, I empathize with your intent to obtain Congressional appropriations to reimburse Lee County for project construction costs. Nevertheless, for the Corps to reimburse Lee County for its expenditures prior to the execution of a project cooperation agreement, Congressional direction will be required.

Sincerely,

Joseph W. Westphal
Assistant Secretary of the Army
(Civil Works)

FAX HEADER

U.S. Army Corps of Engineers
HEADQUARTERS - Directorate of Civil Works
Planning Management Branch
441 G Street
Washington, D.C. 20314

TO: Frank McGovern – SAD; George Strain - SAJ
(904) 232-3976

FROM: Gary Hardesty

DATE: 8 September 2000

SUBJECT: Lee County, FL - Policy Review Comments.

Pages (incl. Header): 10

MESSAGE: My records and email folders indicate that I sent these comments to SAD back in April with a note to review the comments and discuss a course of follow-up action(s), i.e. tele-conference, meeting, etc. Oh well, here they are again. Lets see if we can discuss the comments next week. Jim Daniels will probably take over this project due to my heavy workload over the next month on MWD and the CSSS issues.

GARY
761-4552

Gary

Klein
Faxed to SAD
for follow-up, i.e.
Telecon/M

CECW-AR (1110-2-1150a) 15 March 2000

MEMORANDUM FOR CHIEF, PLANNING DIVISION, ATTN: CECW-PE

SUBJECT: Policy Compliance Review Comments-Lee County Florida, Shore Protection Project, Gasparilla and Estero Islands, General Reevaluation Report (GRR) and Environmental Impact Statement, January 2000

1. Reference memorandum, CESAJ-PD-PN, 4 February 2000, subject: Lee County Florida, Shore Protection Project, General Reevaluation Report with Environmental Impact Statement (EIS), dated January 2000, CWIS 74974, which transmitted the GRR for policy compliance review.

2. The principal review concerns relates to conflicting indications of who will be the implementing agency for the recommended project presented in the GRR. Generally, additional concerns involve clarifying information that should be included in the revised GRR.

3. Policy compliance review concerns are enclosed. Questions may be discussed with review manager, Jay Warren, at 703-428-6465.

Douglas W. Lamont

Encl
as

DOUGLAS W. LAMONT
Chief, Policy Review Branch
Policy Division
Directorate of Civil Works

CECW-AR (10-1-7a) 15 March 2000

POLICY COMPLIANCE REVIEW

LEE COUNTY FLORIDA, SHORE PROTECTION PROJECT GASPARILLA AND ESTERO ISLANDS

DRAFT GENERAL REEVALUATION REPORT AND ENVIRONMENTAL IMPACT STATEMENT

1. BACKGROUND

a. Location. Lee County is located on the lower Gulf Coast of Florida, about 90 miles south of the entrance to Tampa Bay and about 130 miles north of Key West. Gasparilla Island is a narrow coastal barrier island about 6.7 miles long bounded on the north by Gasparilla Pass and on the south by Boca Grande Pass. The town of Boca Grande, well known for sport fishing, is on Gasparilla Island, two miles north of Port Boca Grande. Shore front development is almost continuous along the town's one-mile gulf front. The gulf shoreline of Estero Island is about 7.0 miles long. The island varies in width from about 400 feet at the north end to about 3,800 feet near the south end. Natural ground elevations are between +5 and +10-feet, referenced to mean low water (MLW). The community of Ft. Myers Beach occupies the island. It too, is a highly developed resort and residential community.

b. Study Authority. The Lee County, Florida, Beach Erosion Control Project was authorized by House resolution dated December 15, 1970, and Senate resolution dated December 17, 1970 under the provisions of Section 201 of the 1915 Flood Control Act. The authorized project provides for Federal participation in beach erosion control measures for the gulf shoreline of Gasparilla Island, Captiva Island, and Estero Island, Lee County, Florida. The Captiva Island segment of the authorized project has been constructed. Land use and economic conditions are sufficiently changed to warrant reevaluation of the Federal project. The current study is a general reevaluation to characterize optimal hurricane and storm damage reduction features for the Gasparilla Island and Estero Island components of the authorized project.

c. Authorized Project. The authorized project for Gasparilla Island includes beach restoration along 2.7 miles of shore, revetment along 2,400 feet of shore, and a 500-foot-long terminal groin. The authorized project for Estero Island includes beach restoration along 4.6 miles of shore and a 600-foot-long terminal groin. The beaches at both locations are authorized for a 50-foot-wide berm at elevation +4 feet MLW. Both beaches would slope seaward from the berm crest at 1V:15H to MLW, and then 1V:35H to intersect the existing bottom offshore.

d. Problem. Beach erosion within the project area is a result of both long term recession of the dune line and general lowering of the nearshore beach profile. Long term erosion of the beach makes seawalls, buildings, and other structures vulnerable to damages during storms. There is a dramatic decrease in the width of protective beach during both the winter and early summer months. Lack of protective beach subjects structures and ocean front properties to

Enclosure

damage as a result of northeasters, tropical storms, and hurricanes. The report cites annualized expected hurricane and storm damages as $2,350,500 for the Gasparilla Island segment, $8,318,800 for the Estero Island segment, and $10,669,300 overall.

e. Report Finding and Recommendation. The GRR indicates there is Federal interest in modifying the authorized hurricane and storm damage reduction project for Gasparilla and Estero Islands, Lee County, Florida. The recommended project is a modification of the authorized project.

The plan for Gasparilla Island beach restoration provides for initial sand placement and periodic nourishment of 2.8-miles of shoreline. The beachfill would extend from Florida Department of Environmental Protection (FDEP) monument R-11 south to FDEP monument R-24. A 600-foot-long taper section would connect the proposed beachfill with the existing southern shoreline. On the northern end, a 1,200-foot-long taper section would connect the proposed beachfill with the existing shoreline. Renourishment accomplished at seven-year intervals would optimize net primary benefits over the 50-year period of Federal participation in the project (starting upon completion of initial construction). The recommended design template incorporates a 20-foot-wide berm at elevation +5-feet MLW, and a foreshore slope of 1V:15H to MLW, then transitioning to a nearshore slope of 1V:25H.

The plan for Estero Island beach restoration provides for initial sand placement and periodic nourishment of 4.7-miles of shoreline. The beachfill would extend from FDEP monument R-175 south to FDEP monument R-198. A 1,800-foot-long taper section would connect the proposed beach fill to the existing shoreline. Renourishment accomplished at three-year intervals would optimize net primary benefits over the 50-year period of Federal participation in the project. The recommended design template incorporates a 40-foot-wide berm at elevation +5-feet MLW and a foreshore slope of IV:25H to MLW, then transitioning to a nearshore slope of IV:35H. Additionally, this plan provides for construction of a 240-foot-long rubble mound terminal groin at the northern end of Estero Island. The crest elevation of the groin would be at +6-feet MLW over the entire length of the structure. The structure will include armor stone, bedding stone, and foundation stone founded on filter fabric.

The draft report indicates that the recommended plan would reduce expected annual hurricane and storm damages by about 85.4 percent on Gasparilla Island and by 71.3 percent on Estero Island. Overall, implementation of the recommended plan would reduce expected annual hurricane and storm damages in the project area by about 73.5 percent.

f. Project Costs. The recommended plan is the NED plan and has a first cost of $17,914,000 at October 1999 prices. This amount consists of $4,576,000 for the Gasparilla Island project segment and $13,338,000 for Estero Island. During the 50-year period of Federal participation,

seven beach nourishment cycles are expected to be required for Gasparilla Island at an average cost of $3,081,500. Similarly, sixteen nourishment cycles are expected to be required at Estero Island at an average cost of $4,694,400. Thus, total continuing construction costs for both the Gasparilla Island and Estero Island project segments are estimated as $96,681,000 at October 1999 prices. Consequently, the current estimate of the ultimate project cost is $114,594,900 at October 1999 prices.

Based on a 6.625 percent discount rate and a 50-year period of economic evaluation, total equivalent annual costs are $3,094,000 and equivalent annual benefits are $8,371,000. The indicated net benefit is $5,277,000 and the overall benefit-to-cost ratio is 2.7 to 1. Each project segment is individually justified with benefit-cost ratios of 3.3 to 1 for Gasparilla Island and 2.5 to 1 for Estero Island.

The document shows the initial construction costs apportioned as $10,701,000 Federal, and $7,213,000 non-Federal. The Lee County Board of Commissioners is the prospective non-Federal project sponsor. Lee County indicates in a letter dated 12 November 1999 that they will prepare plans and specifications and construct the project. They will act as the Non-Federal sponsor and seek reimbursement under Section 206 of their expenses prior to execution of a PCA.

2. **REVIEW SUMMARY**. The principal review concerns relates to conflicting indications of who will be the implementing agency for the recommended project presented in the GRR. Generally, additional concerns involve clarifying information that should be included in the revised GRR.

3. **PLAN IMPLEMENTATION**. The report states the laws and policies pertaining to implementation but fails to discuss the actual implementation. A 12 November 1999 letter from the project sponsor indicates that it intends to prepare plans and specifications and construct the recommended project. Further this letter states that the Non-Federal sponsor intends to seek reimbursement of the Federal share of construction costs pursuant to the authority under Section 206 of the Water Resources Development Act of 1992, as amended by Section 227 of the Water Resources Development Act of 1996. The GRR makes no mention of the intent to use Section 206 in implementing the project. It should be revised to explicitly acknowledge this important fact. Further, the GRR should be revised to state the requirements of Section 206 and explain how they will be satisfied. Additionally, the GRR should state that current policy requires notification of the Appropriation Committees of the Congress for certain reimbursement agreements, and explain how that policy will be complied with for the subject project. These revisions should be made to the plan implementation section of the report discussing the true nature of this project's implementation before the report is released to the public.

CECW-AR-M
Subject: Policy Compliance Review Comments--Lee County Florida, Shore Protection Project, Gasparilla and Estero Islands, General Reevaluation Report and Environmental Impact Statement, January 2000

4. **IMPLEMENTATION SCHEDULE**. Page 67, paragraph 174, of the report does not contain a complete schedule of implementation actions. Will real estate instruments be executed? When will this occur? A complete schedule of implementation actions should be shown in this section of the report.

5. **RECOMMENDATIONS**. The recommendation section of the report does not specifically state which plan is being recommended. The recommendations contained in a feasibility level report become the basis for proceeding with the project as a Federal undertaking. Since the provisions of the recommendation provide a legislative basis for further action, wording of recommendation requires special attention (ER 1105-2-100, section 2-12.j.(1)). The recommendation section of the report should be expanded to further clarify the plan being recommended. Also, a reference to the authorizing act should be incorporated into the recommendation.

6. **CURRENT AND FULLY FUNDED COSTS**. A fully funded cost estimate was not included in the main report. ER 1105-2-100, section 2-12.f.(2), requires that two project cost estimates be displayed in the feasibility report: one based on constant dollars and one based on projected inflation rates. ER 1105-2-100 page 2-17 states that for economic analysis, project first cost estimates are to be developed on a constant dollar basis. The fully funded cost estimate is necessary to properly inform the local sponsor of their responsibilities.

7. **COST SHARING**. The report does not provide a cost apportionment table based upon first costs. ER 1105-2-100, section 4-17.a.(4), states that construction costs are to be shared [in accordance with current laws]. The report should be revised to include a cost apportionment table based on first costs. The GRR should explain the change made to cost sharing requirements for shore protection projects by Section 215 of the Water Resources Development Act of 1999 and explain its impact upon the subject project.

8. **INTEREST-DURING-CONSTRUCTION (IDC)**. Computations for IDC were not found in the report. Although IDC figures are shown in Tables 9 and 10 there is no basis for these figures. Paragraph 144 of the main report states that IDC for "Estero Island was estimated at $372,200 based on one-half the interest that would accumulate during a 10 month construction period." This suggests that IDC has not been computed according to current standards. The report does not indicate that IDC accounts for the timing and amount of pre-construction engineering and design, as well as, expenditures for physical construction. Pre-base year expenditures will extend over a longer period than the 10-month physical construction period used for IDC computations in the report. IDC computations should be shown in the report and based on the schedule of expected expenditures from PED through the physical construction period (ER 1105-2-100, 6-14.j.).

CECW-AR-M
Subject: Policy Compliance Review Comments--Lee County Florida, Shore Protection Project, Gasparilla and Estero Islands, General Reevaluation Report and Environmental Impact Statement, January 2000

9. **FINANCIAL ASSESSMENT.** The report does not include the District's assessment of the sponsor's financial capability. This should be provided prior to ultimate approval of the report, as required by Section 905 of the Water Resources Development Act of 1986 ("[The report] shall demonstrate that States, other non-federal interests, and Federal agencies have been consulted in the development of the recommended plan . . .") and ER 1105-2-100 paragraphs 6-169 and 6-170.

10. **ITEMS OF LOCAL COOPERATION.** The "Recommendations" section on page 76 of the GRR contain incomplete descriptions of local cooperation requirements as required by Section 905 of the Water Resources Development Act of 1986 ("[The report] shall also include . . . a description of the Federal and non-Federal participation in such plan.") and ER 1105-2-100 paragraph 2-12.h.(1).(h). ("The report shall also include a discussion of LCA responsibilities."). See also EC 1165-2-204, dated 31 July 97, paragraph 7(c)(8) ("The decision document and decision document supplements, together, must identify the authority under which the project will be constructed, and: . . . (8) identify all project cooperation requirements for construction and OMRR&R."). The following sample list should be adapted to the needs of the subject project with the help of the District Office of Counsel:

a. Provide 35 percent of initial and periodic nourishment project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial and periodic nourishment project costs assigned to recreation, plus 100 percent of initial and periodic nourishment project 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 construction, 25 percent 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, 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 50 percent of initial and periodic nourishment 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;

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;

CECW-AR-M
Subject: Policy Compliance Review Comments--Lee County Florida, Shore Protection Project, Gasparilla and Estero Islands, General Reevaluation Report and Environmental Impact Statement, January 2000

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), 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 Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), requiring non-Federal preparation and implementation of flood plain management plans;

k. Provide 35 percent of initial and periodic nourishment project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial and periodic nourishment project costs assigned to recreation, plus 100 percent of initial and periodic nourishment project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits of that portion of total historic preservation mitigation and data recovery costs attributable to hurricane and storm damage reduction that are in excess of 1 percent of the total amount authorized to be appropriated for hurricane and storm damage reduction;

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;

CECW-AR-M
Subject: Policy Compliance Review Comments--Lee County Florida, Shore Protection Project, Gasparilla and Estero Islands, General Reevaluation Report and Environmental Impact Statement, January 2000

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.

11. **ENVIRONMENTAL POLICY REVIEW**. All environmental compliance requirements for a draft document have been satisfactorily addressed. The district's environmental analysis and evaluation team should be complimented for a good job on the environmental impact analysis and NEPA compliance documentation.

James E. Warren
JAMES E. WARREN, PE
Policy Compliance Review Manager

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
108 ARMY PENTAGON
WASHINGTON DC 20310-0108

29 AUG 2000

RECEIVED
SEP 05 2000
COMMISSIONER ALBION

REPLY TO
ATTENTION OF

Honorable John E. Albion
Chairman
Lee County Board of Commissioners
District #5
Post Office Box 398
Fort Myers, Florida 33902-0398

Dear Mr. Chairman:

This is an interim reply to your letter of May 10, 2000, requesting that I approve the construction of the Gasparilla and Estero Island segments of the Lee County Florida Shore Protection Project, as reimbursable projects, under Section 206 of the Water Resources Development Act of 1992. Section 206 authorizes, subject to certain requirements, non-Federal interests to undertake shoreline protection projects, and to request reimbursement of specified implementation costs. Section 102 of the Fiscal Year (FY) 2000 Energy and Water Development Act establishes per-project and annual limitations for reimbursements and credits provided under Section 206. In your letter, you also request that I formally notify Congress that the project reports meet all technical and engineering requirements.

Your request requires additional research and coordination which precludes my providing you with an immediate reply. Additionally, I have asked the Army Corps of Engineers Headquarters to provide me with a comprehensive briefing on this matter to assist me in determining the appropriate course of action. Let me assure you that this matter will be addressed properly and a final response provided to you at the earliest possible date.

In the interim, please do not hesitate to contact me if you have any questions.

Sincerely,

Joseph W. Westphal
Assistant Secretary of the Army
(Civil Works)

cc: Doc, Steve Boos

C: Marlowe 202-775-0214

LEE COUNTY
SOUTHWEST FLORIDA

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County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

Writer's Direct Dial Number: (941) 335-222

May 10, 2000

Dr. Joseph Westphal
Assistant Secretary of the Army – Civil Works
U.S. Army Corps of Engineers
The Pentagon – Room 2E570
Washington, D.C. 20310

Subject: Lee County, Florida
Shore Protection Project (Gasparilla and Estero Islands)

Dear Secretary Westphal:

Lee County, Florida has requested your approval to construct the Gasparilla and Estero Island segments of the Lee County Florida Shore Protection Project as reimbursable projects under Section 206 of the Water Resources Development Act of 1992. We understand our request is currently in your office for action. On behalf of Lee County, Florida, I urge you to act favorably on our request for status as a Section 206 project.

In addition, we respectfully request that you provide notice to Congress of our reimbursable status as required by Section 102 of the Energy and Water Development Act for Fiscal 2000. We are, of course, well aware of Administration policy not to budget for new starts. Nevertheless, we strongly urge that you forward our request directly to Congress, noting we have met all applicable requirements, but that our two projects will not be recommended for funding under the Administration's shore protection policy. In the case of Feasibility Studies and General Reevaluation Reports for new shore protection projects, it has been the practice of your office to issue a determination that these documents meet all technical and engineering requirements, but they cannot be recommended for funding because of current administration policy.

Section 102 was enacted to both advise Congress of upcoming reimbursable projects and to provide certain financial limits on those projects. Administration policy regarding shore protection projects should not be used to preclude the Lee County projects from being considered by Congress under the Section 102 process. We ask that you notify Congress of our request for reimbursable status as intended by Section 102. We intend to pursue a congressional appropriation to construct our project, but we may be harmed in this effort if you do not forward our request directly to Congress.

We appreciate your assistance in these matters and look forward to your reply.

Sincerely,

John E. Albion, Chairman
Lee County Board of Commissioners
District #5

CESAJ-PD-I

JVG

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

REPLY TO ATTENTION OF

CESAJ-DP-I (1110-2-1150a) 7 December 1999

MEMORANDUM THRU CDR, SOUTH ATLANTIC DIVISION, ATTN: (CESAD-PM)

FOR CDR, HQUSACE (CECW-BE), WASH DC 20314-1000

SUBJECT: Lee County, Florida, Shore Protection Project - Gasparilla and Estero Island Segments - Coordination of Sponsor's Request to Utilize Section 206 Authority

1. This is to provide the letter dated November 12, 1999 (copy enclosed) as requested by the sponsor.

2. The letter indicates Lee County's request for completion and approval of the General Reevaluation Report and execution of a Project Cooperation Agreement (PCA) prior to November 2000. The letter also indicates their intention to prepare plans and specifications and to construct the project. The sponsor will seek Congressional action to allow reimbursement of their expenses incurred prior to execution of a PCA.

3. Request your assistance in order to provide a response to the sponsor's letter.

4. Please refer any questions to Mr. Charles Stevens, CESAJ-DP-I, at 904-232-2113.

FOR THE COMMANDER:

Encl

RICHARD E. BONNER, P.E.
Deputy District Engineer
for Project Management

LEE COUNTY
SOUTHWEST FLORIDA

BOARD OF COUNTY COMMISSIONERS

Writer's Direct Dial Number: (941) 476 28

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County Attorney

Diana M. Parker
County Hearing Examiner

November 12, 1999

Mr. Richard Bonner, P.E.
Programs and Project Management Division
Project Management Branch
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Bonner:

This letter is to inform you of Lee County's intention to proceed with plans, specifications, and construction of the Gasparilla Island and Estero Island segments of the Lee County, Florida Shore Protection Project and seek federal reimbursement under Section 206 of the Water Resources Development Act of 1992.

We urge the Corps to proceed with rapid completion and approval of the GRR and Environmental Impact Statement, since they will be our basis for seeking Section 206 reimbursement appropriations and local permits.

We understand that eligibility for cost sharing will be subject to an executed Project Cooperation Agreement between the Corps and Lee County. We request that negotiation of the PCA begin immediately, so that it can be completed prior to construction, which is expected to begin in November 2000. It is also our intention to seek Congressional action which will allow for reimbursement of local expenses incurred prior to execution of the PCA.

We know that you can appreciate our desire to complete these segments as quickly and cost effectively as possible, and we look forward to continuing to work cooperatively with you as we complete this project.

Should you believe that it would be more appropriate to address this request to Corps Headquarters, I would appreciate your forwarding it to your higher authority as soon as possible.

Sincerely,

ENVIRONMENTAL SERVICES DEPARTMENT
Natural Resources Division

Roland Ottolini, P.E.
Director

cc: Steve Boutelle, Project Manager
Stephen Keehn, Coastal Planning & Engineering
Ken Humiston, Humiston & Moore
Howard Marlowe, American Coastal Coalition
Debbie Flack, Beachwatch

P.O. Box 398, Fort Myers, Florida 33902-0398 (941) 335-2111
Internet address http://www.lee-county.com
AN EQUAL OPPORTUNITY AFFIRMATIVE ACTION EMPLOYER

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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

December 2, 1999

George M. Strain
Acting Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

RE: DHR No. 997901
Request for Survey Review: *Archeological Diver Identification and Evaluation of Fourteen Potentially Significant Submerged Targets for the Lee County Shore Protection Project, Lee County, Florida.*
Submitted By: Mid-Atlantic Technology and Environmental Research, Inc.
441 Blossoms Ferry Road
Castle Hayne, North Carolina 28429

Dear Mr. Strain:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), as well as those contained in Chapter 267.061, *Florida Statutes*, as implemented through 1A-46 *Florida Administrative Code*, we have reviewed the results of the field survey of the referenced project and find them to be complete and sufficient.

Our office has received the draft report *Archeological Diver Identification and Evaluation of Fourteen Potentially Significant Submerged Targets for the Lee County Shore Protection Project, Lee County, Florida*. Based upon our careful review of the information provided in the report regarding the characteristics of the magnetic anomalies, we are making the following recommendations.

The conclusions of the report identify targets G-1, G-2/3, and G-5 as historic shipwrecks. However, only target G-2/3 was stated as having the potential to yield additional information about the shipwreck with which it is associated. It was also stated that treasure hunters have completely destroyed targets G-1 and G-5. After review of the magnetometer data, it is the opinion of this office that significant data may be present at all three anomaly sites and that they should, therefore, be avoided during project operations. A 'no-impact' buffer zone should be established around each of the three sites (G-1, G-2/3, and G-5, **see attached map**). These zones should extend to a radius of 200' from the center of the anomaly as identified by both Florida State Plane Coordinates and UTM Coordinates provided in the Archaeological Diver Identification report.

By establishing these buffer zones, the archaeological materials associated with these sites potentially eligible for listing in the National Register of Historic Places will be protected from possible adverse effect caused by the proposed offshore borrow project.

If you have any questions concerning our comments, please contact Brian Yates, Historic Sites Specialist at (850) 487-2333 or 1-800-847-7278. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

James A. Kammerer

for Janet Snyder Matthews, Ph.D., Director
Division of Historical Resources
State Historic Preservation Officer

JSM/Yby
Encl. (1)

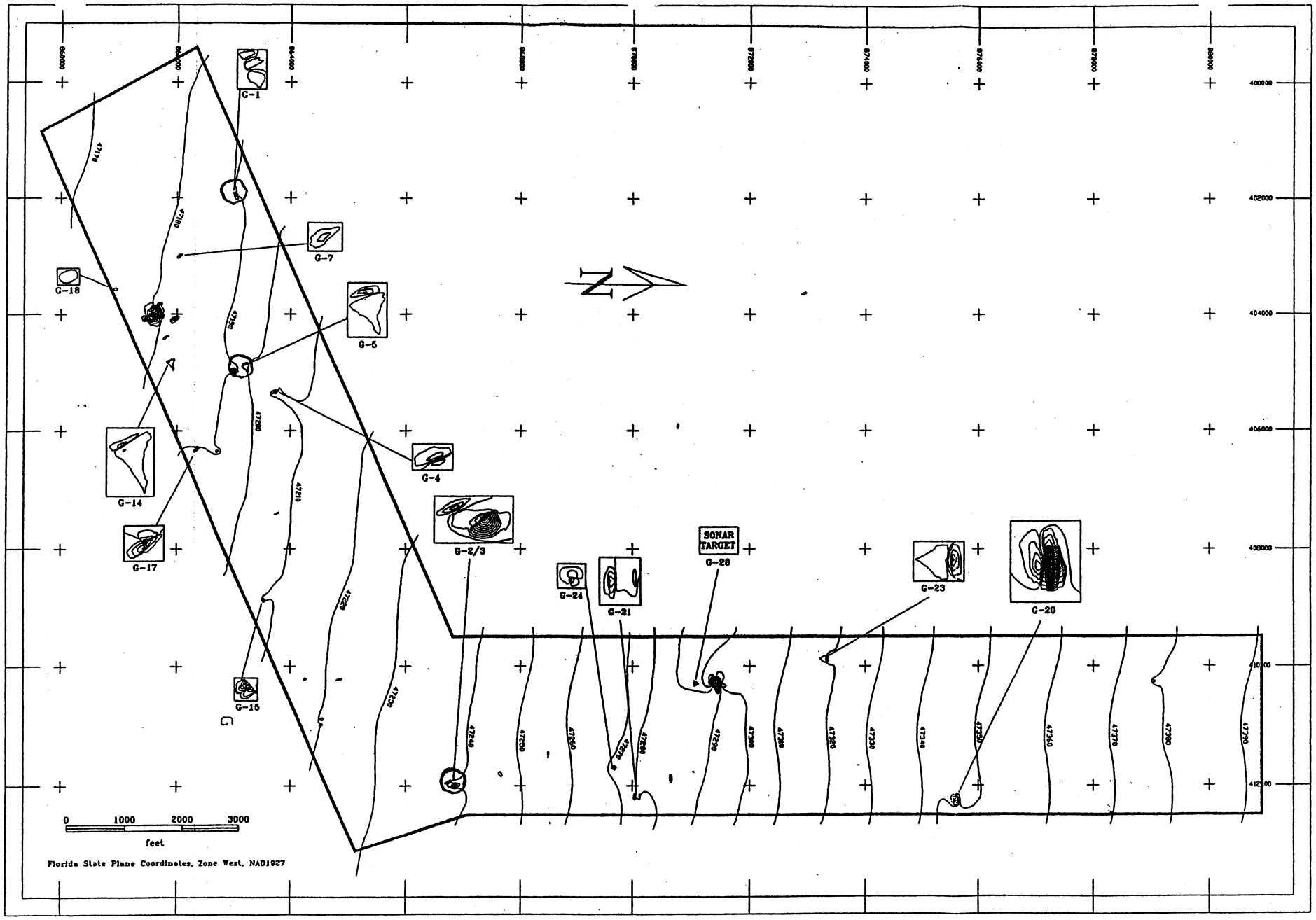

Figure 2. Target Location Map.

Planning Division
Environmental Branch

AUG 30 1999

U.S. Environmental Protection Agency
Office of Federal Activities
NEPA Compliance Division
EIS Filing Section
Mail Code 2252-A, Room 7241
Ariel Rios Building, South Oval Lobby
1200 Pennsylvania Avenue, NW
Washington, DC 20044

Dear Sir:

Pursuant to §1506.9 of Title 40 of the Code of Federal Regulations, I have enclosed five bound copies of the Draft Environmental Impact Statement (DEIS) for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands. Please announce the availability of this DEIS in the notice of weekly receipts in the Federal Register.

If you have any questions, contact Mr. Kenneth Dugger at 904-232-1686.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosures

bcc wo/encl:
✓CESAJ-PD-PN
CESAJ-DP-I

Planning Division
Environmental Branch

AUG 30 1999

TO WHOM IT MAY CONCERN:

Enclosed for your review and comment is the Draft Environmental Impact Statement (DEIS) for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands.

Please provide any comments you may have within 45 days of the date of publication of the Notice of Availability of the DEIS in the Federal Register. If no comments are received within that 45-day period, it will be assumed that you have none. After receipt of comments, we will incorporate any necessary changes, and prepare the Final EIS.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

bcc:
✓CESAJ-PD-PN
CESAJ-DP-I

Planning Division
Environmental Branch

AUG 30 1999

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 Draft Environmental Impact Statement (DEIS) for the Lee County Beach Erosion Control Project, Gasparilla and Estero Islands.

Any requests for copies should be directed to Ms. Yvonne Haberer at the letterhead address, or phone 904-232-1701, or fax 904-232-3442. The text of the DEIS can be found on our Environmental Documents web page at http://www.saj.usace.army.mil/pd/env-doc.htm. Copies of the DEIS are also available for public review at the following libraries: 1) Ft. Myers-Lee County Public Library, 2050 Lee Street, Ft. Myers, Florida 2) Johann Fust Community Library, Gasparilla Road & 10th Street, Boca Grande, Florida.

Sincerely,

James C. Duck
Chief, Planning Division

bcc:
✓CESAJ-PD-PN
CESAJ-DP-I

file

CESAJ-PD-PN (1110-2-1150a) 11 August 1999

MEMORANDUM FOR Commander, South Atlantic Division,
ATTN: CESAD-ET-PL (Meyer)

SUBJECT: Lee County, Florida Shore Protection Project, General Reevaluation Report, CWIS 74974

1. Transmitted with this memorandum are two copies of the subject report (Enclosure 1). These copies are being provided for your information. Currently, the report is being reproduced for coordination in accordance with the National Environmental Policy Act (NEPA). Independent Technical Review comments and responses have been included under the front cover of the report, certification of this review is pending completion of the above mentioned coordination.

2. If you need additional information, please contact Daniel R. Haubner at 904-232-2798, or the project manager, Charles F. Stevens at 904-232-2113.

FOR THE COMMANDER:

1 Encl

JAMES C. DUCK
Chief, Planning Division

bcc:
CESAJ-DP-I (Stevens)

Haubner\CESAJ-PD-PN
Schmidt\CESAJ-PD-PN
Strain\CESAJ-PD-P
Bonner\CESAJ-DP
Duck\CESAJ-PD

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LEE COUNTY
SOUTHWEST FLORIDA

(941) 335-2223
Writer's Direct Dial Number:

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Diana M. Parker
County Hearing Examiner

June 25, 1999

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

SUBJECT: LEE COUNTY SHORE PROTECTION PROJECT

Dear Mr. Bonner:

This letter is in reference to the Lee County, Florida, Shore Protection Project and reiterates a desire by the Lee County Board of County Commissioners to act as the non-Federal sponsor for the beach restoration project as described in the General Reevaluation Report (GRR) dated May, 1999.

We have reviewed the GRR and understand and intend to provide the items of project cooperation, including the provision of land easements, rights-of-way, relocations and the non-Federal share of project costs. We understand that the items of project cooperation will ultimately be specifically set forth in a Project Cooperation Agreement (PCA) to be executed at a future date.

Chapter 161 F.S. provides for State financial assistance in funding beach erosion control and shore preservation projects. The Lee County Shore Protection Project is included in the State's Long Range Plan for Beach Erosion Control for purposes of scheduling State fiscal participation required for construction. Presently, the State is authorized to fund up to 50% of the non-Federal construction and maintenance costs for this project, subject to certain restrictions.

We look forward to the District's support of this project and would request your assistance in having it included in the proposed upcoming Water Resource Development Act (WRDA). In that regard, we will similarly seek direct Congressional assistance for purposes of this project being addressed in said WRDA.

Sincerely,

Ray Judah

Ray Judah, Chairman
Lee County Board of County Commissioners

SB/lm
cc: Rep. Porter Goss
Sen. Bob Graham
Sen. Connie Mack

S:\WATRES\MARINE\GRR INTEREST.DOC

Lee County Shore Protection GRR
Technical Review Conference
2 April 1999

Minutes

ATTENDEES

Charlie Stevens	DP-I
Dan Haubner	PD-PN
Christine Bauer	PD-ES
Tommy Birchett	PD-ER
Cem Goral	RE
Joe Wilson	PD-D
Doug Rosen	EN-GG
Mike Jenkins	CP&E (AE)
Ed Hodgens	EN-HC
Barbara Cintron	PD-E (ITR)
Bruce Pastorini	CO-CQ (ITR)
Joseph Tavares	CO-CQ
Tom Arnold	PD-D
John Pax	OC
Jerry Anderson	DP-I
Rob Tucker	Intern

SPONSORS ON CONFERENCE LINE

Roland Ottolini	Lee County	(941) 479-8127
Steve Boutelle	Lee County	(941) 479-8128

MINUTES

Meeting started at approximately 9:45 am.
Charlie Stevens provided opening remarks:

- Delay in Divers report because of water visibility problems, thought to be attributable to weather and wind driven waves in shallow water. Delay is impacting milestones and much further delay may impact NEPA report. Bauer brought up later the problem divers were having and that the Contractor may request a 30-day extension to perform work
- Funds listed on marked-up e-mail copy presented are approved for usage.
- Coordinated with sponsor via conference call for duration of meeting. Sponsor advised of ITR process and invited to attend May 28, 1999 ITR completion meeting at CESAJ.

Dan Haubner provided a general description:

- Rosen asked if there had been any other shore protection projects on Gasparilla. Haubner replied none that he knew of.

- Question between Stevens, Counsel (Pax) and sponsor concerning authorization time frame was brought up. Authorization as told to the sponsors is currently 10 years and this document will seek 50 years. Funding, according to Pax, may be approved until the Federal portion is completed with no more funds allocated after that, regardless of time duration authorization. Pax did not want to give the sponsor undue expectations because the PCA may not be granted for 50 years. The PCA will not be granted till after Congressional authorization.

Christine Bauer provided environmental concerns:

- Haubner asked Bauer about another project maintenance disposal permit effecting our project. Also inquired about mitigation and what possible impact mitigation that the project may cause. Bauer replied that impact evidence will be gathered by divers with photo and video equipment. Further investigations and evaluation into impacts would be necessary for mitigation. (????project possibly impacting this one is Sanibel Island????)
- Sponsor inquired about concerns using the borrow area used for Captiva Island. Rosen replied that the offshore borrow area found for the two island projects should be enough without using Captiva's. Sponsor expressed a wish for a closer borrow area, like San Carlos Bay or Sanibel Island. Rosen replied that the north end of Estero was soft muddy sand because of the discharge of the Caloosahatchee River. The sponsor suggested maybe the Sanibel Shoal could be used on the western side, found to be 2'-3' mean sea level. Rosen suspects shoal to be too silty and clayish and expressed difficulty in finding suitable sands. Rosen remarked that he will look for more past core boring samples and investigate further. Additionally, Rosen can provide past core borings to the sponsor. Boutelle (sponsor) would like to speak further of this with Rosen later.

Tommy Birchett provided archaeological concerns:

- 13 anomalies were found within the Gasparilla borrow area. They will try to get divers in by the end of April to investigate. Sponsor mentioned that there is an artificial reef in the borrow area. Sponsor also voiced concerns about what happens if a find is within the borrow area. Birchett replied that divers will make physical contact with anomalies, and if necessary, the area can still be used with a buffered area around the anomaly for protection of find.
- Stevens remarked again about delays possibly affecting the NEPA document. May send preliminary NEPA with draft version of GRR Report.
- Stevens remarked that he would send interim reports and scopes of work to the sponsor so that they will know where and what is going on with project investigations.

Cem Goral provided real estate requirements:

- Goral remarked mainly about the large number of easements the sponsor will have to get and the difficulty that sometimes arises in acquiring all easements. Stevens commented that the sponsor may have to seek condemnation if

easements are refused and leaving out a portion of the beach fill adversely affects the purpose of the project. Sponsor replied that the Town of Ft. Myers Beach is suppose to help in this matter.

- Haubner remarked the importance of perpetual and public use on easements becoming more important for cost sharing projects. He also commented that material seaward and landward of the ECL can not be cost shared if perpetual/public easements aren't obtained.
- Sponsor asked that if easements were to be granted to the local sponsor? Stevens answered that that is correct. The sponsor provides land easements, rights-of-way and relocations necessary for construction.
- The subject of storm water outfalls was brought up. Stevens remarked that we need to know if any outfall locations are required to be relocated before plans and specifications are worked up (they will be located during the plans and spec survey). He also commented that impediments and outfalls that are strictly private
- Haubner told sponsor of the need for staging area for work and 1/2 mile separation for public access points for maximizing Federal cost sharing. He would also like copy from sponsor of the proposed public access points. Stevens remarked that appropriate spacing of public access points can maximize Federal and state cost sharing.

Doug Rosen provided geotechnical analysis:

- For Gasparilla, the Boca Grande area had plenty of sand. For Estero, Rosen commented on difficulty in finding sand. San Carlos Bay had mostly silty sands. An area designated as "B" was found and deemed suitable, although site is 16-18 miles from Estero. Site would be divided to save capacity for future renourishments.
- Sponsor was very concerned over distance from borrow area to beach site for Estero project. Rosen remarked that borings in 60's and 70's closer to Estero were fount to be too silty for suitable beach material. Stevens commented on a geotech appendix that the sponsor should have. Rosen replied that the sponsor should have it. Sponsor asked if volumes noted excluded those of Sanibel and Captiva? Rosen replied that they were excluded in volume calculations.
- Rosen remarked in answer to numerous comments by sponsor concerning sand location that if a location is found closer, we may use it instead, we are not locked into area B. Haubner mentioned that with area B, we still have a good B/C ratio and should get authorization as it is. Stevens voiced concern to sponsor that if there is a potential for a sand-war, he would like to know about it as soon as possible.
- Haubner asked sponsor about whether Lee County was going to GIS capability? Sponsor remarked that they were not fully capable, they need further input.

Mike Jenkins (AE) provided engineering analysis:

- Haubner mentioned to sponsor that we need to determine if recent erosion along the study areas needs to be evaluated also.

Gasparilla

- Jenkins remarked that Gasparilla is sediment starved and that high erosion impacts are included in volumes.
- Haubner remarked about elevation of berm, +4ft is authorized, but +5ft is more applicable.
- Jenkins brought up terminal groin on southern tip. Haubner remarked that the terminal groin had no effect, that it was filled to capacity. He also mentioned about reduction of fill into the inlet for O&M. Jenkins remarked that there are significant currents present that need to be taken into account for effects.
- Haubner asked Bauer if Gasparilla borrow area may effect environmental permitting? Bauer replied that it needs to be investigated for the Water Quality Certificate. Haubner also voiced a concern about wave with refraction from the borrow area.
- Stevens made a point on how problems need to be addressed as they appear if the entire island needs initial fill and/or periodic renourishment since this effects Coastal Zone Management Consistency.
- Jenkins brought up that authorized project has a revetment, but its not amenable to place a revetment there.
- Stevens asked about cost sharing of groin fill initially? Haubner replied that the Fed's can cost share up to the NED plan amount; however, more is considered 100% non-Federal, unless it is added as a project feature.
- Tavares asked about or questioned economic justification for project? Stevens and Haubner replied about storm damage in the well-developed area.
- Tavares also mentioned if the FPL terminal closing had an effect on the justification and if anyone was aware of it? Stevens replied, no, that shore protection benefits are being used for economic justification and the project is still justifiable.

Lunch

- Jenkins commented on the renourishment interval as being a 7-year interval. Stevens asked if he was confident with reach length of fill? This will be investigated by Engineering.
- Haubner brought up whether or not the Engineering appendix discusses reach lengths and Jenkins agreed to add paragraphs stating that analysis shows current reach is recommended. The Critical erosion areas shown by the state stop at R-8 as opposed to R-11 in the recommended project. Jenkins/Engineering will research this.
- Tavares mentioned operation and maintenance of channel now for FPL tankers, navigation, but plant closes in <18 months from now.

Estero

- Jenkins mentioned nodal points for the reversal of sand erosion or deposition midway to a north-south direction for the island. This effect was caused by shadowing by other land nearby. The island has a mean or max elevation of +7ft and has in the past, been completely inundated by hurricane strength storms. The island needs protection. Shoals connecting with land are outside

project area. Similar to Gasparilla, the berm authorized elevation is +4ft, but +5 is thought to be more applicable.

- Stevens asked about methodologies? Jenkins replied, GENESIS, historical profiles and longshore transport analyses were used to determine recommended beach fill cross sections.
- Stevens asked about if terminal groin fits in? Jenkins replied that it can be smaller than authorized, that smaller is optimal with rule of decreasing returns if longer.
- Sponsor asked about northern limit of fill, and its current accretion? They also noted about advance fill to taper at groin and that the state typically requires full fillet. Sponsor also asked about number of segments for state cost sharing and if it was included in authorization or reevaluation? Jenkins said design cross section at groin tapering of advanced nourishment to the south into full construction cross sections.
- Stevens asked sponsor if there were any concerns about bridge abutments at south end and other similar items? And that we are willing to develop solutions for problems that exist. The sponsor replied they were only concerned with shore protection. A conversation took place between Stevens, Haubner and sponsor about condominiums, emergency fill, evacuation roadway, structures. Hodges remarked some concerns are current related and not wave related.
- Sponsor expressed concern on berm build up (+4 to +5 MLW) and easements. Stevens and Jenkins replied by commenting on back sloping by filling back elevation to existing contour. Upland easements maybe required if fill does not match up with existing abutments. This is also less of a problem than the sponsor may think because of the difference of datums between NGVD and MLW being about 1ft.

Joe Wilson provided economic analysis:

- Wilson remarked that analysis was a monetary assessment between the "without" and "with project" conditions.
- Haubner asked about risk and uncertainty for GRR project and economic appendix? Tom Arnold mentioned that the latest guidance requires risk and uncertainty to be included and that our existing Storm Damage Model is about to be modified. Stevens replied about benefits effect reporting. Haubner remarked on the conservative nature of the District in estimations.

Dan Haubner provided plan formulation analysis:

- Haubner remarked that optimal renourishment intervals of 7 years for Gasparilla and 3 years for Estero. Sponsor remarked about wanting to be able to combine projects to save on perhaps mobilization costs and others. It was discussed by the team and sponsor about keeping the projects individually or combining them. It was strongly suggested to keep them separate for authorization purposes. Some of the reasons as given included:
  - ✓ Different distances between borrow areas for jobs probably required different equipment

- ✓ One project may fail authorization, or later be deauthorized if no construction funded.
- ✓ Important for state priority system needing separate billing.
- ✓ Endanger species window of operation, one project may take up full window, causing re-mobilization anyhow.

- Hodges remarked that if Jenkins reduced renourishment volume, Estero renourishment interval may change. Haubner replied that we will look into it more.
- Stevens remarked about turtle nest operating window length, being tight for one combined project and how it effects economic analysis. A combined project may require a 2nd mobilization based on monthly production rate to complete initial fill for both islands. Nobody is sure on whether or not current cost estimates are based on 24-hour work (PD-PN is to check with En-C).
- Sponsor inquired about possible effects on funding if they chose to do something that doesn't match the B/C ratio, does it effect Federal costs or approval? Haubner replied that the sponsor pays the difference between the NED plan and locally preferred costs.
- Sponsor asked if we included recreational benefits? Haubner replied, yes.
- Sponsor again remarked about wanting to combine one project or other with others if possible, such as Bonita, which is not a federal project. Stevens replied that this could be accomplished so long as the Federal project was completed first before the dredge was released to accomplish the non-Federal work.

Charlie Stevens provided question and answer period:

- Pastorini remarked about the possibilities of needing to get maintenance easements for the hardbottom and pipe corridors before hand. Haubner remarked that Gasparilla does have hardbottoms. Stevens remarked that we can work on that now with the environmental data being collected and verified by divers. Stevens told sponsor that the easements and right-of-way are the responsibilities of the sponsor, including the borrow area. They need to let the state know now what they want. The sponsor should try to get 2 or 3 pipe corridors for Estero.
- Stevens said team leaders invited to April 28th meeting and sponsor as well. Date and time are set and will be sent directly.
- Stevens told sponsors of 2 packets on environmental field work to be mailed to them today (Friday).
- Stevens remarked to sponsor about Flood Plan Management Plan being the responsibility of the sponsor. CESAJ-DP-I to check with PD-P to see if recent example of such report can be sent to the sponsor.

Meeting Adjourned

Minutes by Rob Tucker # 232-1698.

full

October 18, 1999

Planning Division
Plan Formulation Branch
Navigation Section

Mr. Reginald C. Norman, Park Manager
Barrier Islands Geographical Efficiency Operations
Recreation and Parks
Florida Department of Environmental Protection
P.O. Box 1150
Boca Grande, Florida 33921

Dear Mr. Norman:

Per the request of Ms. Karen Kirkland, of the Gasparilla Island State Park, a copy of the Lee County, Florida, Shore Protection Project, General Reevaluation Report with Draft Environmental Impact Statement is being furnished with this letter. Any questions concerning our study can be directed to Mr. Dan Haubner at 904-232-2798, or Mr. Charles Stevens at 904-232-2113.

Sincerely,

George M. Strain
Acting Chief, Planning Division

Enclosure

bcc:
CESAJ-DP-I
CESAJ-PD-E

DNH Haubner/CESAJ-PD-PN
Schmidt/CESAJ-PD-PN
for Strain/CESAJ-PD-P
Stevens/CESAJ-DP-I
Dunk/CESAJ-PD

L:\GROUP\PDP\DAN\REGION2\LEE\GASP_PARK.DOC

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

REPLY TO
ATTENTION OF

November 28, 1994

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Division of Natural Resources Management
Post Office Box 398
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in response to your October 17, 1994, letter and discussion with Mr. Charles Stevens of our office regarding the Gasparilla and Estero Island segments of the Lee County Shore Protection Project. This is to confirm that a coordination meeting will be held on December 6, 1994, at 2 pm at our Jacksonville District office, conference room 930. The purpose of the meeting is to discuss the economic update and the general reevaluation report (GRR).

We look forward to seeing you at this meeting. If you have any additional questions please contact Mr. Charles Stevens at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Copy Furnished:

Ms. Alison Hagerup, Administrator, Captiva Erosion Prevention District, Post Office Box 365, Captiva Island, Florida 33924

CESAJ-DP-I (1110-2-1150a) 3 May 1995

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Lee County, Florida, Shore Protection Project - General Reevaluation Report

1. A General Design Conference has been scheduled for the subject project, on 18 May 1995, in the video conference room (G-13) from 1300 to 1600 hours. The conference is to discuss the preparation of the General Reevaluation Report (GRR) segments of Gasparilla and Estero Island.

2. Request that you and/or designated representative(s) attend. If you require additional information or have any questions, please contact Mr. Charles Stevens at extension 2113.

RICHARD E. BONNER, P.E.
Deputy District Engineer
for Project Management

DISTRIBUTION:
Chief, Construction-Operations Division
Chief, Engineering Division
Chief, Planning Division
Chief, Office of Counsel
Chief, Contracting Division
Chief, Real Estate Division

CF:
CESAJ-CO-CE (Pettijohn)
CESAJ-CT-C (Hundley)
CESAJ-DP-I (McMillen, Dupes)
CESAJ-EN-C (Fletcher, Fore)
CESAJ-EN-D (Lockhart)
CESAJ-EN-G (Rosen, Holem)
CESAJ-EN-HC (Gurule)
CESAJ-PD-E (Smith)
CESAJ-PD-EE (McAdams, Miller)
CESAJ-PD-ER (Dugger, Dupes, Adams)
CESAJ-PD-PC (Schmidt, Simpkins)
CESAJ-RE-A (Bealyer)

GENERAL DESIGN CONFERENCE

AGENDA

LEE COUNTY SHORE PROTECTION PROJECT

Gasparilla and Estero Islands
18 May 1995

	OFFICE
OPENING REMARKS	DP
CECW	DP
CESAD	DP
STATUS OF PROJECT	DP
IMPLEMENTATION OF PED	DP
LETTER REQUEST FROM SPONSOR	DP
PRE CONSTRUCTION ENGINEERING AND DESIGN DOCUMENT	
PLANNING DIVISION	PD
ENGINEERING DIVISION	PD
ENVIROMENTAL DOCUMENT	PD-E
REAL ESTATE REQUIREMENTS	RE
PROJECT COOPERATION AGREEMENT	OC
STATE COORDINATION	DP
SCHEDULE FOR COMPLETION	DP
CONSTRUCTION	DP
PED ISSUES:	
PLANNING DIVISION	PD
ENGINEERING DIVISION	EN
REAL ESTATE DIVISION	RE
OFFICE OF COUNSEL	OC
PROJECT MANAGEMENT DIVISION	DP
CLOSING REMARKS	CECW CESAD CESAJ

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

REPLY TO
ATTENTION OF

June 27, 1995

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Division of Natural Resources Management
Post Office Box 398
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in regard to the May 18, 1995, telephone conference call discussion with Mr. Charles Stevens, of our office, concerning the Lee County General Reevaluation Report (GRR). As requested during the conference call, enclosed please find a draft copy of the Lee County Gasparilla and Estero Island network analyses for preparation of the GRR. Please provide any comments you may have concerning your review of the network analysis at your earliest convenience.

If you have any questions, or need any additional information, please do not hesitate to contact Mr. Charles Stevens at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

NOV 28 1994

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Division of Natural Resources Management
Post Office Box 398
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in response to your October 17, 1994, letter and discussion with Mr. Charles Stevens of our office regarding the Gasparilla and Estero Island segments of the Lee County Shore Protection Project. This is to confirm that a coordination meeting will be held on December 6, 1994, at 2 pm at our Jacksonville District office, conference room 930. The purpose of the meeting is to discuss the economic update and the general reevaluation report (GRR).

We look forward to seeing you at this meeting. If you have any additional questions please contact Mr. Charles Stevens at 904-232-2113.

Sincerely,

SIGNED: Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Copy Furnished:

Ms. Alison Hagerup, Administrator, Captiva Erosion Prevention District, Post Office Box 365, Captiva Island, Florida 33924

Koenig/CESAJ-DP-I
vlh/3137 11/28
McMIllen/CESAJ-DP-I
Stevens/CESAJ-DP-I
Duke/CESAJ-DP-I
Bonner/CESAJ-DP-I

DP→L:\WP51\OFFICE\DP-I\JB\LEE\LTR02OTT.LEE

LEE COUNTY

BOARD OF COUNTY COMMISSIONERS

P.O. Box 398
Fort Myers, Florida 33902-0398
(813) 335-2111

813/335-2791
Writer's Direct Dial No.

John E. Manning
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Franklin B. Mann
District Four

John E. Albion
District Five

Donald D. Stilwell
County Administrator

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

October 17, 1994

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Federal Shore Protection Project for Lee County
Estero and Gasparilla Islands

Dear Mr. Bonner:

Our office is pleased to hear that $500,000 has been appropriated to begin the preparation of a general reevaluation report (GRR) for the Lee County shore protection project.

We had the opportunity to discuss the project with Mr. Rick McMillen last week at the Florida Shore and Beach Preservation Association Conference and are anxious to begin immediately.

Please call so that we can arrange a meeting to further discuss outline of work and schedule.

Thank you for your continuous cooperation.

Sincerely,

DEPARTMENT OF COMMUNITY DEVELOPMENT
Division of Natural Resources Management

Roland E. Ottolini, P.E.
Professional Engineer III

REO: cwd

xc: Commissioner Manning, District #1
Commissioner Judah, District #3
Donald Stilwell, County Administrator
Mary Gibbs, Director, DCD
Walter Stephens, Director, DNRM
Chauncey Goss, GICIA
Roxeanne Smith, Ft. Myers Beach
File

(P033009)

Rich

Florida Power & Light Company, P.O. Box 088801, North Palm Beach, FL 33408-8801

FPL

October 16, 1995

Mr. Rick McMillen
Project Manager
U.S. Army Corps of Engineers
Jacksonville District
P.O. Box 4970
Jacksonville, Florida 32232-0019

RE: Florida Power & Light Company
Shoaling Information
Gasparilla Island

Dear Rick:

At our meeting on September 20, 1995 regarding our Boca Grande maintenance dredging permit application that we have recently filed with the Corp, FPL was made aware of an ongoing study that the Corp is conducting on shoaling along Gasparilla Island. Enclosed please find two studies that FPL has conducted that may be of benefit in assisting the Corp in its efforts.

If I can be of any further assistance, please don't hesitate to contact me at (407) 625-7640.

Sincerely,

Jim L. Brawner
Environmental Specialist II

Enclosures

HYDROGRAPHIC ASSESSMENT

Florida Power and Light
Fuel Oil Terminal
Boca Grande, Florida

January 25, 1988

Tackney and Associates, Inc.
Temple Terrace, Florida

SHOALING STUDY
BOCA GRANDE FUEL OIL TERMINAL

FOR

FLORIDA POWER AND LIGHT COMPANY

JOHNSON ENGINEERING, INC.
CIVIL ENGINEERS AND LAND SURVEYORS
FT. MYERS, FLORIDA

SUBOCEANIC CONSULTANTS, INC.
OCEAN, COASTAL ENGINEERS — DIVERS
NAPLES, FLORIDA

1/2 CALLED @ 1425
1/5 left message w/ Sect.
DW CS
13

P.O. Box 398
Fort Myers, Florida 33902-0398
(941) 335-2111
(941) 335-2791
Writer's Direct Dial Number

BOARD OF COUNTY COMMISSIONERS

John E. Manning
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Andrew W. Coy
District Four

John E. Albion
District Five

Donald D. Stilwell
County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

December 11, 1995

Mr. 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, FL 32232-0019

Re: Lee County Shore Protection Project

Dear Mr. Bonner:

Our office requests a status meeting regarding the Lee County Shore Protection Project. We would like to have it in Fort Myers so that our local officials can attend and possibly facilitate a site visit.

At this meeting, we would like to discuss progress made to date, schedule and funding. We also wish to bring you up-to-date on recent local efforts. This includes the preparation of a feasibility study for Estero Island and the Matanzas Pass Dredging Project.

If agreeable to you, please call so that a meeting can be scheduled.

Sincerely,

DEPARTMENT OF PUBLIC WORKS
Division of Natural Resources Management

Roland E. Ottolini, P.E.
Professional Engineer III

REO: cwd

xc: Board of County Commissioners
Don Stilwell, County Manager
J.W. French, P.E., Director, Public Works
Lee County Coastal Advisory Council
Lonnie Ryder, DEP
File

(F:\Surface\Document\Letter\Bonner.D07)

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

February 7, 1996

REPLY TO
ATTENTION OF
Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Lee County Division of Natural
Resources Management
Post Office Box 398
Fort Myers, Florida 33902-0398

Dear Mr. Ottolini:

This is to confirm the upcoming coordination meeting requested in your December 11, 1995, letter, will be held on February 22, 1996, at 1:30 p.m. in the Lee County Courthouse, Fort Myers.

It is currently anticipated that Mrs. Deborah Petersen and Mrs. Susan Lucas, from our Planning Division, and Mr. Charles Stevens, from our Project Management Division, will attend the meeting to discuss the status of the General Reevaluation Report for Gasparilla and Estero Islands. A representative from our Construction-Operations Division will be available during the meeting to discuss the status of the Matanzas Pass navigation project through a conference call, if needed.

Should you have any questions, please contact Mr. Charles Stevens at 904-232-2113.

Sincerely,

Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

C. S.

LEE COUNTY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF NATURAL RESOURCES MANAGEMENT

TO: Distribution

FROM: Roland Ottolini, P.E.

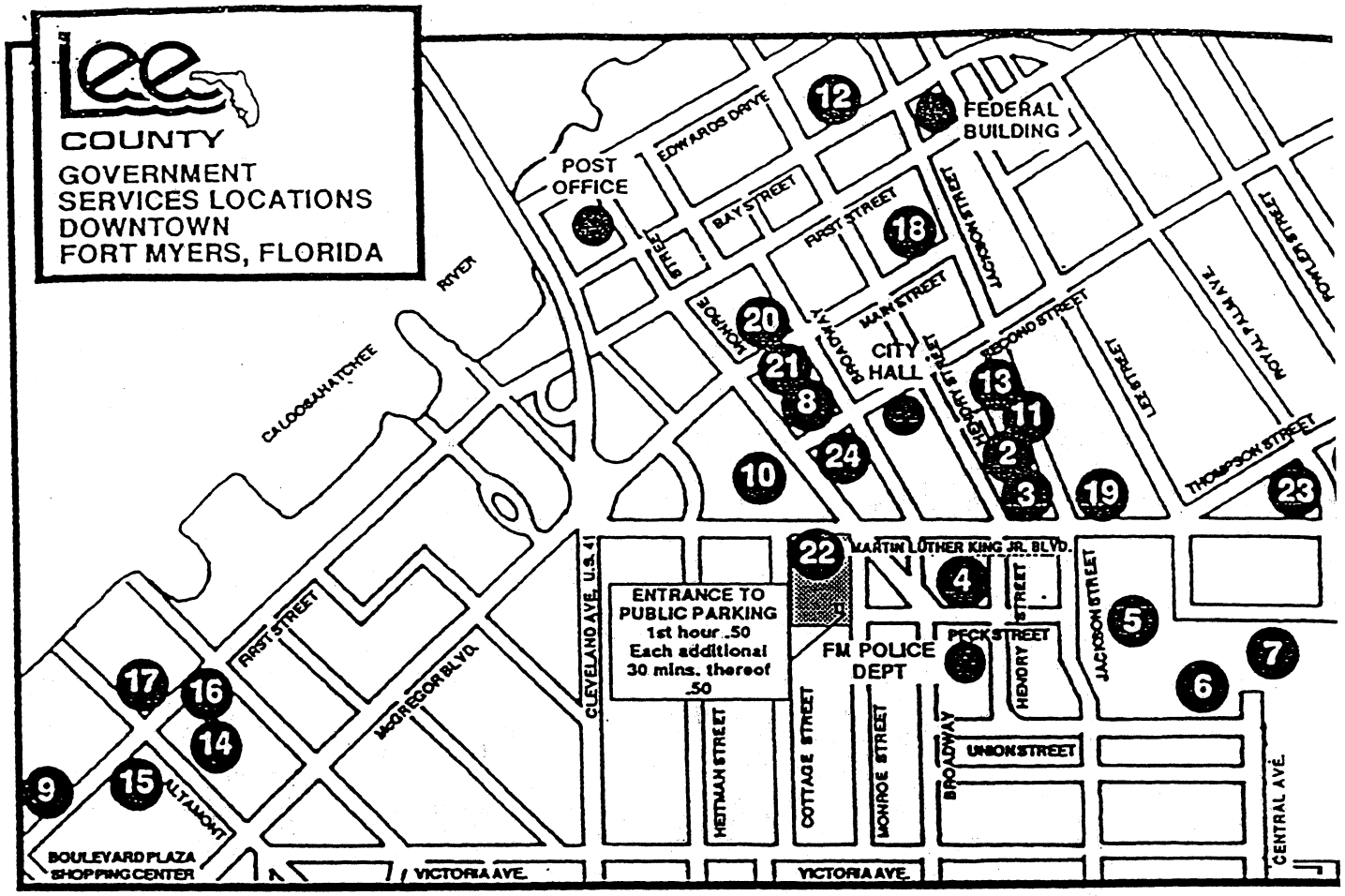
DATE: January 17th, 1996

RE: **Federal Shore Protection Project (Estero & Gasparilla Islands)**

A meeting will be held with staff of the Army Corps of Engineers (A.C.O.E.), Jacksonville District on Tuesday, February 22, 1996 at 1:30 PM in the East Room of the Old Courthouse, 2120 Main Street, Fort Myers, to discuss the Federal Shore Protection Project for Lee County. As you may be aware, the A.C.O.E. has been authorized to complete the general re-evaluation report for the Estero Island and Gasparilla Island segments of Lee County. This document is currently being prepared and includes the evaluation of the numerous technical and economic issues involved with beach renourishment. This meeting will give us the opportunity to ask questions about the report and the likelihood of future federal efforts in helping us protect our eroding beaches. Recognizing the competitive nature and limited supply of federal funds, your support and participation would be appreciated.

Distribution:

Board of County Commissioners
Don Stilwell, County Manager
J. W. French, P.E., Director, Public Works
Walter Stephens, P.E., Director, Division of Natural Resources Management
Elaine McLaughlin, Director, Visitor Convention Bureau
Steve Boutelle, Division of Natural Resources Management
Lee County Coastal Advisory Council
Garr Reynolds, Councilman, City of Ft Myers Beach
Brett Moore, P.E., Humiston & Moore
Lonnie Ryder, Dept. of Environmental Protection
Charlie Stevens, Army Corps of Engineers, Jacksonville District



MAP LEGEND

ADMINISTRATION BUILDING 2115 Second Street	8
CODES & BUILDING SERVICES 1735 Hendry Street	2
CODES INSPECTION SERVICES 1736 Jackson Street	11
COMMUNICATIONS (ADDRESSING) 2286 W. First Street	9
COMMUNITY DEVELOPMENT/ ZONING, DEVELOPMENT REVIEW 1831 Hendry Street	3
CONSTRUCTION SERVICES 2100 Second Street	24
COMMUNITY REDEVELOPMENT 1857 Jackson Street	19
COUNTY COMMISSIONERS/ STATE REPRESENTATIVES Old Courthouse 2120 Main Street	21
DEPARTMENT OF TRANSPORTATION 2022 Hendry Street	4
DEVELOPMENT REVIEW 1831 Hendry Street	3
ECONOMIC DEVELOPMENT 2180 W. First Street	17
ELECTIONS 2480 Thompson Street	1
EMPLOYEE HEALTH & SAFETY 2122 Dr. Martin Luther King, Jr. Blvd.	22
ENVIRONMENTAL SCIENCES 1857 Jackson Street	19
EQUAL OPPORTUNITY 2263 Main Street	18
HEARING EXAMINER 2269 Bay Street	12
JUSTICE CENTER 1700 Monroe Blvd.	10
LIBRARY 2050 Lee Street	5
NATURAL RESOURCES 2012 Altamont	15
OLD COURTHOUSE 2120 Main Street	21
PLANNING 2455 Dr. Martin Luther King, Jr. Blvd.	23
PRINT SHOP 1736 Jackson Street	13
PROPERTY APPRAISER/MAPPING 2480 Thompson Street	1
PURCHASING 2345 Union Street	6
SCHOOL BOARD ADMINISTRATION 2055 Central Avenue	7
SOIL & WATER CONSERVATION 2275 Bay Street	12
SOLID WASTE 2013 Altamont	16
TAX COLLECTOR 2480 Thompson Street	1
UTILITY ADMINISTRATION 2178 McGregor Blvd.	14
VISITOR & CONVENTION BUREAU 2180 W. First Street	17
ZONING 1831 Hendry Street	3

CALL PUBLIC RESOURCES, 332-2737 for more information

HUMISTON
& MOORE
ENGINEERS
COASTAL
ENGINEERING DESIGN
AND PERMITTING

10641 AIRPORT ROAD N., SUITE 29
NAPLES, FLORIDA 33942
FAX: 941 594 2025
PHONE: 941 594 2021

October 28, 1996

MEMO TO: Hank Rimmer, Jerry Birchfield
FROM: Ken Humiston
RE: Survey Data for Estero Island, Lee County, H&M File No. 5025

SENT VIA FAX 904-232-2369

As a follow up to our conversation this morning, we are assisting Lee County with evaluating various alternatives for addressing immediate erosion problems on Estero Island. This effort may result in implementation of interim erosion control measures in the most critical areas until such time as the Federal project may be completed. We would appreciate it if you could provide us with a listing of beach profile and nearshore data that may be available to Lee county for this purpose. The official request for data would come from lee County to Charlie Stevens.

The range of R-monuments on Estero Island is R-175 to R-210. We are interested in data on this range of monuments, as well as in the area of Matanzas Pass to the north and Big Carlos Pass to the south.

March 6, 1997

Programs and Project Management Division
Project Management Branch

Honorable Porter Goss
House of Representatives
Washington, DC 20515

Dear Mr. Goss:

This is in response to the request from Mr. Jim Boxold of your office on March 3, 1997, regarding preparation of the General Reevaluation Report (GRR) for the Gasparilla and Estero Island segments of the Lee County, Florida, Shore Protection project. The project was authorized by House Document 91-395 in October 1970.

Preparation of the GRR was initiated in February 1995. At the time, it was anticipated that the GRR could be completed by March 1998, if additional funds were provided each year. As you know, funds were provided in FY 95 and FY 96. Funds provided in FY 97 are only sufficient for the reimbursement of the Federal share of costs for renourishment of Captiva Island.

Funds for continuation of the GRR were not included in the President's FY 98 budget request. This is due to the Administration's policy of seeking a reduction in the budget deficit. Thus far during FY 97, the Jacksonville District has continued preparation of the GRR with limited carryover funds from FY 96. The main emphasis of this work in FY 97 is completion of a geotechnical report based upon field data that was recently collected.

The current schedule indicates that if funds were provided in FY 98 and FY 99, it is anticipated that the GRR could be completed by March 1999. One year delay in the schedule would be anticipated for each year that additional funds were not provided. It is currently estimated that a total of $500,000 in additional funds and 2 years will be required to complete the GRR if funds are provided by Congress in the FY 98 budget.

If any additional information or assistance is needed, please call me, or Mr. Joseph Burns, Congressional Liaison, at 904-232-2243.

Sincerely,

SIGNED: Dennis R. Duke

Terry L. Rice
Colonel, U.S. Army
District Engineer

DENNIS R. DUKE
Principal Assistant to
Deputy District Engineer
for Project Management

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)
Mr. Roland Ottolini, P.E., Lee County Division of Natural Resources Management, 2012 Altamont Avenue, Fort Myers, Florida 33902

CFS Stevens/DP-I
vlh/3137 5 Feb 97
DRD Duke/DP-A
PAB Bonner/DP
Burns/DX
LTC Connell/DD
COL Rice/DE

file: L:\user\k3dpicfs\winword\leecong1.doc

PORTER GOSS
14TH DISTRICT, FLORIDA

108 CANNON BUILDING
WASHINGTON, DC 20515-0913
(202) 225-2536

COMMITTEES:
CHAIRMAN
PERMANENT SELECT COMMITTEE
ON INTELLIGENCE

RULES
CHAIRMAN, SUBCOMMITTEE
ON LEGISLATIVE AND BUDGET PROCESS

Congress of the United States
House of Representatives
Washington, DC 20515–0914

DISTRICT OFFICES:
2000 MAIN STREET
SUITE 303
FT. MYERS, FL 33901
(941) 332-4677

3301 TAMIAMI TRAIL EAS
BUILDING F, SUITE 212
NAPLES, FL 34112
(941) 774-8060

PUNTA GORDA
(941) 639-0051

April 18, 1997

Lt. Gen. Joe N. Ballard
Commander
U.S. Army Corps of Engineers
Casimir Pulaski Building
20 Massachusetts Ave., NW
Washington, D.C. 20314-1000

Dear Lt. General Ballard:

I had the pleasure of speaking with your Executive Officer, Lt. Colonel Minehan during your absence today. We discussed the Army Corps' work on a General Re-evaluation Report for Lee County, Florida, part of Florida's 14th Congressional District, which I represent.

The Lee County Shore Protection Project, authorized by Congress in the early 1970's, a good example of a beneficial local-federal partnership, has helped to preserve and protect the fragile shoreline along Lee County's barrier islands. The GRR for Estero and Gasparilla Islands began in 1995. The Corps' Economic Update Report of February, 1995 cites a benefit to cost ratio of 3.9 to 1 for Gasparilla and 8.5 to 1 for Estero.

As you may recall from our discussion last November, the House version of the FY97 Energy and Water Appropriations bill contained $300,000 to continue work on the GRR. This amount was deleted during the conference committee after some confusion generated by a Corps memorandum. Following our discussion, you gave me your assurance that work would continue despite the conference committee's action. I communicated that assurance to the County and others in my district.

I was therefore deeply concerned to learn in recent months, that the Corps will not continue the GRR, citing lack of funds. This will delay completion of the project by at least a year. Such a delay would seriously endanger these two significant segments of critically eroded beaches. These two beaches, along with the adjacent structures and public infrastructure they protect, are currently extremely vulnerable even to a storm of relatively small magnitude. Already, there have been failures of seawalls due to erosion, parking areas and sidewalks were lost in October, 1993 and again in October, 1995. In other areas, the worsening erosion is exposing old groins.

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I am particularly concerned about the completion of this project given its importance and the work of the local sponsor, Lee County. I have always had a good working relationship with the Corps and the Jacksonville office in particular. I hope that we can resolve this matter and continue work on the Lee County GRR without delay.

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

Thank you for taking the time to review this matter. Given the fact that the appropriations process is continuing, a timely response regarding the Corps' intentions on the Lee County GRR would be helpful.

Kindest regards,

Porter Goss
Member of Congress

PG:jb

cc: H. Martin Lancaster,
Assistant Secretary for Civil Works

FAX COVER SHEET

U.S. Army Corps of Engineers
Directorate of Civil Works
Programs Management Division
Washington, D.C. 20314-1000
(202) 761-0191
FAX 761-5295

SEND TO	
Charlie	From Lindsay
	Date
	Office
	Phone number

☐ Urgent ☐ Reply ASAP ☐ Please comment ☐ Please review ☐ For your information

Total pages, including cover: 10

COMMENTS

Thx,

CECW-ZA
Staff Action Control 29-Apr-97 10:47 AM

To: CWB
USACE Control No: CS7042503
Original Susp Date: 01-May-97
Agency Control No: 18APR97
Flag: E
AO: Phone: ( )761-1723oq1@761
Original Assignee: CECW-ZA CWP
Subject: @LEE CO. SHORE PROTECTION PROJECT

Date: 25-Apr-97
USACE Suspense Date: 05-May-97
Times Changed: 01
Agency Suspense Date:
Originator: GOSS CONG
Assign Date: 28-Apr-9

Action
( ) Direct Reply
( ) Coordinate with:
(*) See Remarks
( ) Interim Reply Made:
( ) Completed Date:
( ) Info/Necessary Action
( ) Informal Reply
( ) Interim Reply Appropriate
( ) New Suspense Date:
( ) Office Recv Date:
(*) Prepare Reply for Signature of: CG (NOTE REMARKS BELOW)
( ) Copies of Action have been Furnished to:

Remarks: IF SUSPENSE CANNOT BE MET PLEASE PREPARE INTERIM FOR CG SIGNATURE
RODNEY METZER ACCEPTS

Sherell Lewis, Staff Action Control, CECW-M, 761-4884

SACW STAFF ACTIONS ONLY, AO CONTACT SACW AO UPON RECEIPT.
CONGRESSIONAL ONLY: PROVIDE DRAFT RESPONSE TO BE THOMPSON, CWM,
VIA E-MAIL & ON SAME DAY PROVIDE A HARD COPY. AO SUSPENSE:

To: cecwza

From: CWB

( ) Action Completed on: _____

( ) Interim Reply Provided on: _____

( ) New Suspense Date is: _____

( ) Transfer this Action to: _____

Remarks: _____

"DO NOT REMOVE THIS DOCUMENT UNTIL ACTION HAS BEEN COMPLETED."

HQUSACE
Staff Action Control 25-Apr-97 04:58 PM

To: CECW-ZA
USACE Control No: CS7042503
Original Susp Date:
Agency Control No: 18APR97
Flag: *
AO: Phone: ( ) -
Original Assignee:
Subject: @LEE CO. SHORE PROTECTION PROJECT

Date: 25-Apr-97
USACE Suspense Date: 01-May-97
Times Changed: 00
Agency Suspense Date:
Originator: GOSS CONG
Assign Date: 25-Apr-97

Action
(*) Direct Reply
( ) Coordinate with:
(*) See Remarks
( ) Interim Reply Made:
( ) Completed Date:
( ) Info/Necessary Action
( ) Informal Reply
( ) Interim Reply Appropriate
( ) New Suspense Date:
( ) Office Recv Date:
(*) Prepare Reply for Signature of: CG (NOTE REMARKS BELOW)
( ) Copies of Action have been Furnished to:

Remarks: IF SUSPENSE CANNOT BE MET PLEASE PREPARE INTERIM FOR CG SIGNATU

Richard Apple, Staff Action Control, CECS, 761-0727

To: cecs

From: CECW-ZA

( ) Action Completed on: _____

( ) Interim Reply Provided on: _____

( ) New Suspense Date is: _____

( ) Transfer this Action to: _____

Remarks: _____

"DO NOT REMOVE THIS DOCUMENT UNTIL ACTION HAS BEEN COMPLETED."

CWB

ASA
Staff Action Control 23-Apr-97 12:36 PM

To: CECW-ZA SMYTH
ASA Control No: SA7042202
Original Susp Date:
Agency Control No:
Flag:
AO: Phone: ( ) -
Original Assignee:
Subject: GENERAL RE-EVALUATION REPORT IN LEE COUNTY, FLORIDA

Date: 22-Apr-97
ASA Suspense Date: 09-May-97
Times Changed: 00
Agency Suspense Date:
Originator: FL-GOSS
Assign Date: 22-Apr-97

Action
( ) Direct Reply
( ) Coordinate with:
(*) See Remarks
( ) Interim Reply Made:
( ) Completed Date:
( ) Info/Necessary Action
( ) Informal Reply
( ) Interim Reply Appropriate
( ) New Suspense Date:
( ) Office Recv Date:
(*) Prepare Reply for Signature of: MR. LANCASTER
(*) Copies of Action have been Furnished to: JS, ML

Remarks: SACW AO: JIM SMYTH/703-697-7084.

Carolyn Contreras-Guzman, Staff Action Control Officer, SACW, 697-3365

HQUSACE ACTION OFFICER PLEASE CONTACT SACW ACTION OFFICER UPON RECEIPT.

To: sacw

From: CECW-ZA

( ) Action Completed on: _____

( ) Interim Reply Provided on: _____

( ) New Suspense Date is: _____

( ) Transfer this Action to: _____

Remarks: _____

"DO NOT REMOVE THIS DOCUMENT UNTIL ACTION HAS BEEN COMPLETED."
0%r?469 K7 I50 CmOy
SA7042202
SA7042202
0%r3y0 K120 COm

CECW-ZA
Staff Action Control 24-Apr-97 02:58 PM

To: CWB
ASA Control No: SA7042202
Original Susp Date:
Agency Control No:
Flag: E
AO: Phone: ( ) -
Original Assignee: CECW-ZA
Subject: GENERAL RE-EVALUATION REPORT IN LEE COUNTY, FLORIDA

Date: 22-Apr-97
ASA Suspense Date: 09-May-97
Times Changed: 00
Agency Suspense Date:
Originator: FL-GOSS
Assign Date: 24-Apr-97

Action
( ) Direct Reply
( ) Coordinate with:
(*) See Remarks
( ) Interim Reply Made:
( ) Completed Date:
( ) Info/Necessary Action
( ) Informal Reply
( ) Interim Reply Appropriate
( ) New Suspense Date:
( ) Office Recv Date:
(*) Prepare Reply for Signature of: MR. LANCASTER
(*) Copies of Action have been Furnished to: JS, ML

Remarks: SACW AO: JIM SMYTH/703-697-7084. – Called him on 25 April 97.

Sherell Lewis, Staff Action Control, CECW-M, 761-4884

SACW STAFF ACTIONS ONLY, AO CONTACT SACW AO UPON RECEIPT.
CONGRESSIONAL ONLY: PROVIDE DRAFT RESPONSE TO BE THOMPSON, CWM, VIA E-MAIL & ON SAME DAY PROVIDE A HARD COPY. AO SUSPENSE:

To: cecwza

From: CWB

( ) Action Completed on: _____

( ) Interim Reply Provided on: _____

( ) New Suspense Date is: _____

( ) Transfer this Action to: _____

Remarks: _____

"DO NOT REMOVE THIS DOCUMENT UNTIL ACTION HAS BEEN COMPLETED."

PORTER GOSS
14TH DISTRICT, FLORIDA

108 CANNON BUILDING
WASHINGTON, DC 20515-0913
(202) 225-2536

COMMITTEES:
CHAIRMAN
PERMANENT SELECT COMMITTEE
ON INTELLIGENCE

RULES
CHAIRMAN, SUBCOMMITTEE
ON LEGISLATIVE AND BUDGET PROCESS

Congress of the United States
House of Representatives
Washington, DC 20515–0914

DISTRICT OFFICES:
2000 MAIN STREET
SUITE 303
FT. MYERS, FL 33901
(941) 332-4677

3301 TAMIAMI TRAIL EAST
BUILDING F, SUITE 212
NAPLES, FL 34112
(941) 774-8060

PUNTA GORDA
(941) 639-0051

April 18, 1997

SA704 2202

The Honorable H. Martin Lancaster
Assistant Secretary For Civil Works
Department of the Army
The Pentagon
Washington, D.C. 20310

Dear Assistant Secretary Lancaster: Martin

I am enclosing a copy of a letter that I sent to General Ballard regarding the Corps work on a General Re-Evaluation Report in Lee County, Florida.

This is a critical project for Lee County and it is vital that it proceed as scheduled. I hope to receive a timely and satisfactory response given the appropriations cycle in the House.

Thank you for your attention to this matter.

Hope you can help!

Kindest regards,

Porter

Porter Goss
Member of Congress

PG:jb

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

PORTER GOSS
14TH DISTRICT, FLORIDA

108 CANNON BUILDING
WASHINGTON, DC 20515-0913
(202) 225-2536

COMMITTEES:
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3301 TAMIAMI TRAIL EAS
BUILDING F, SUITE 212
NAPLES, FL 34112
(941) 774-8060

PUNTA GORDA
(941) 639-0051

April 18, 1997

Lt. Gen. Joe N. Ballard
Commander
U.S. Army Corps of Engineers
Casimir Pulaski Building
20 Massachusetts Ave., NW
Washington, D.C. 20314-1000

Dear Lt. General Ballard:

I had the pleasure of speaking with your Executive Officer, Lt. Colonel Minehan during your absence today. We discussed the Army Corps' work on a General Re-evaluation Report for Lee County, Florida, part of Florida's 14th Congressional District, which I represent.

The Lee County Shore Protection Project, authorized by Congress in the early 1970's, a good example of a beneficial local-federal partnership, has helped to preserve and protect the fragile shoreline along Lee County's barrier islands. The GRR for Estero and Gasparilla Islands began in 1995. The Corps' Economic Update Report of February, 1995 cites a benefit to cost ratio of 3.9 to 1 for Gasparilla and 8.5 to 1 for Estero.

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Kindest regards,

Porter Goss
Member of Congress

PG:jb

cc: H. Martin Lancaster,
Assistant Secretary for Civil Works

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

February 20, 1998

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Honorable Connie Mack
United States Senate
Washington, DC 20510

Dear Senator Mack:

This is in regard to the January 30, 1998, letter to you from Ms. Marsha Segal-George concerning Fort Myers Beach on Estero Island. A fax copy of the letter was provided by Ms. Deidra Ciriello of your office on January 30, 1998.

Our office is currently preparing a General Reevaluation Report (GRR) for the Estero Island and Gasparilla Island segments of the Lee County Shore Protection project. The purpose of the GRR is to evaluate if the project authorized by House Document 91-395 in 1970 requires reformulation and to determine the National Economic Development Plan based upon current guidelines. Funds were provided by Congress in Fiscal Year (FY) 1998 for continuation of this GRR which was initiated in 1995. Approximately $200,000 in additional funds will be required to complete the GRR. However, no funds are included in the President's FY 99 budget for this project. If funds were provided in FY 99, it is anticipated that the GRR will be completed in March 1999.

Following completion of a GRR that recommended construction of a project at Estero Island, Congressional authorization of the project might be necessary if the project differs significantly from the project authorized in 1970.

In regard to the placement of maintenance dredging material from Federal navigation projects, it is our policy to place beach quality material onto adjacent beaches. Beach quality material from this project has been placed on Estero Island in the past. Fort Myers Beach (Estero Pass and Matanzas Pass) navigation project was not included in the President's budget for FY 99 and, therefore, will not be dredged.

The Coast of Florida Erosion and Storm Effects Study is currently underway along the Atlantic Coast of Florida. A feasibility report for Palm Beach, Broward, and Dade Counties was completed in 1996. Federal funding for the study has not been provided in either the FY 97 or FY 98 budgets. Carryover funds remaining from the FY 96 appropriation are being utilized and will be exhausted during FY 98. Continuation of the study to complete a feasibility report for the remainder of the Atlantic Coast is contingent upon the inclusion of the study in future budgets. Initiation of the feasibility report for the Gulf Coast would be contingent upon future appropriation of funds by Congress.

If you have any additional questions or need additional information, please call me or have your staff contact Mr. Joseph Burns, Congressional Liaison, at 904-232-2243.

Sincerely,

Joe R. Miller
Colonel, U.S. Army
District Engineer

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)

UNITED STATES SENATE

Office of Senator Connie Mack

Fax Cover Sheet

TO: Joe Burns
Thank you for your help with this.

FAX NO: _____

FROM: Deidra Ciriello

Office of U.S. Senator Connie Mack
517 Hart Senate Office Building
Washington, D.C. 20510
Office: (202) 224-5274
FAX: (202) 224-8022

Please Call me: ____
As we discussed: ____
URGENT: ____

Comment:

Date: ____

Pages (including this one) 2

In routing 2/11/98 002

Town of Fort Myers Beach

Anita Cereceda
Mayor

Ted FitzSimons
Vice-Mayor

Rusty Isler
Seat 1

Garr Reynolds
Seat 4

Ray Murphy
Seat 5

Jan 30, 1998

Senator Connie Mack
Suite 27
1342 Colonial Boulevard
Fort Myers, FL 33907

Dear Senator Mack:

This letter will attempt to bring your office up to date as to current issues facing the Town of Fort Myers Beach relating to beach renourishment and federal channel dredging. Within the confines of Lee County's beaches and shoreline project list, Estero Island is the next major renourishment project to be done. The Lee County Coastal Advisory Committee has been working very hard to push the Town's projects forward. Unfortunately, President Clinton has taken a negative position on the USCOE participation in beach renourishment projects both from a funding and participatory position. The result is that a Corps report was in the works for Estero Island but has never been completed because of this negative position. There is also a USCOE project, the Matanzas Pass dredging or Fort Myers Beach Channel dredging project, that supposedly will be done in the 1998-99 fiscal year. We have not received any current information as to whether this project is still surviving within the Corp's budget.

With all of this in mind, could you direct your staff to contact the Library of Congress Research Office, in order to identify all discrete beach and inlet budget subcategories for which we may be able to make application. We would also appreciate an update on the progress of the USCOE/FDEP Florida Coastal Study and a possible suggestion as to whom we should contact at the Corps to help us as we move forward. Your time and attention is much appreciated.

Sincerely yours,

Marsha Segal-George

Marsha Segal-George
Town Manager

CC: Chuck Listowski, WCIND
Kate Gooderham, Lee County Coastal Advisory Committee
Wayne Daltrey, SWRPC

2523 Estero Boulevard • Post Office Box 3077 • Fort Myers Beach, Florida 33932
Telephone 941-765-0202 • Facsimile 941-765-0909 • Direct Line 941-765-0919
Internet address: http://www.ci.fort-myers-beach.fl.us

DP-I MD
(Stevens)

City of Sanibel

800 Dunlop Road
Sanibel, Florida 33957-4096

AREA CODE - 941

ITY COUNCIL	472-4135
DMINISTRATIVE	472-3700
DING	472-4555
ENCY MANAGEMENT	472-3111
NCE	472-9615
EGAL	472-4359
ARKS & RECREATION	472-9075
LANNING	472-4136
OLICE	472-3111
BLIC WORKS	472-6397
ILITIES	472-1008

April 7, 1999

Mr. James C. Duck
Chief, Planning Division
Environmental Coordination Section
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Fl. 32232-0019

RE: Lee County Beach Erosion Control Project, Estero Island Proposed Borrow Site

Dear Mr. Duck:

Thank you for the opportunity to comment on the Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement for the Gasparilla and Estero Island erosion control projects (see attached letter of notification received March 15). The City of Sanibel has a major concern regarding the Estero Project that should be considered an official objection to proceeding as proposed. The location of the proposed borrow site for the Estero Island beach nourishment project is reported in the NOI as "an area of 1.59 square miles located in the Gulf approximately 1.5 miles southwest of Sanibel Island". A map of this borrow area was provided by the Jacksonville office (copy attached) and shows that this location includes an area of sand deposits currently authorized for use by the Captiva Erosion Prevention District for deposition on Captiva and Sanibel Island. This previously identified sand source has already been utilized by the CEPD for local nourishment projects on Sanibel and Captiva Islands within the past several years. The City's coastal engineering firm, Humiston and Moore Engineers of Naples, has reviewed this proposed dredge site (letter attached) and indicates that this sand source is the closest known suitable source for Sanibel Island and that use of this resource for Estero Island would result in increased costs for future nourishment projects for Sanibel.

Under the "Alternatives" section of the NOI, mention is made of the potential for use of alternative sand sources. The City strongly encourages the Corps to investigate alternative sand sources for use at the Estero Island project. Sites much closer to Estero Island have shown some potential in other studies based on core samples. A borrow site located closer to Estero Island would result in significant cost savings in sand transport and would eliminate the potential competition for sand from the islands of Captiva and Sanibel at this already established and recently utilized local borrow site.

The City hereby requests that the Corps abandon its intentions of utilizing the borrow site identified in the NOI and investigate alternatives that are closer to Estero Island. Please give this request serious consideration and please keep us

Recycled paper

notified of any decisions or public comment opportunities related to this project. If you have any questions concerning this request please don't hesitate to call me at #941-472-4359 or Rob Loflin, Natural Resources Director for the City at #941-472-3700.

Sincerely,

Robert D. Pritt

Robert D. Pritt
City Manager

K

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

REPLY TO
ATTENTION OF

August 4, 1994

Programs and Project Management Division
Project Management Branch

Mr. Chauncey P. Goss II
Gasparilla Island Conservation
and Improvement Association, Inc.
Post Office Box 446
Bica Grande, Florida 33921

Dear Mr. Goss:

This is in regard to your letter of July 15, 1994, in which you provided the Jacksonville District with a copy of the "Erosion Control Study" prepared by Humiston and Moore Engineers. The information contained in this study will be quite helpful in the preparation of a general reevaluation report (GRR) for the Gasparilla and Estero Island segments of the Lee County shore protection project.

For your information, the House and Senate Appropriations Committees have passed their fiscal year 1995 (FY95) appropriation bills, which includes $500,000 for the Lee County shore protection project. However, this is not the final appropriations bill. These funds, should they be included in the final appropriations bill, would be used by the District to initiate the preparation of the GRR in FY95. A schedule for the preparation of the GRR and subsequent construction has not been established as yet. A schedule will be provided to you and Lee County once it has been established.

Regarding your request for information pertaining to maintenance dredging of the Charlotte Harbor navigation project. A maintenance dredging operation is scheduled for the spring of 1995. Beach quality material is anticipated to be disposed of on the beaches of Gasparilla Island in approximately the same location and manner as the last maintenance dredging operation.

I hope this information is sufficient for your needs. Should you have any questions or need additional information, please do not hesitate to contact the project manager, Mr. Rick McMillen, at 904-232-1231.

Sincerely,

Dennis R Dube

for Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Copy Furnished:

Mr. Roland Ottolini, Division of Natural Resources,
Post Office Box 398, Ft. Myers, Florida 33902-0398

Gasparilla Island Conservation and Improvement Association, Inc. Post Office Box [illegible]

RMc
→
Rhm

G·I·C·I·A·

July 15, 1994

Mr. Richard McMillen
Program and Project Management Division
Jacksonville District Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232

Dear Rick:

We thought that you would be interested in having and reviewing the "Erosion Control Study" that we had produced for us by Humiston and Moore. If this study can be of any assistance to you or anyone else at the Corps, pleas do not hesitate to make use of it.

We have had a number of calls from people who say they have received easement requests from the County for the dredging project which is planned for this winter. We assume that all is in order for this project to proceed? We are also wondering what happened to the Administration's request to begin funding for Lee County's shoreline protection program. Did it survive mark-up?

Please let us know what you think of the Humiston and Moore report and let us know the status of the Corps plans for Gasparilla Island over the next year. We hope that all is well with you and look forward to hearing from you.

Sincerely,

Chauncey P. Goss II
Executive Director

CC: DRD

CS.C

M 12/13

F A X

LEE CO.
DIVISION
OF
NATURAL RESOURCES MGMT

FAX: 813/335-2792

DATE: 12/7/93

TO: RICK McMILLEN - USACE

FROM: ROLAND OTTOLINI

TELE/EXT. # (813) 335-2791

OF PAGES: 4
(Including Cover)

MESSAGE: RICK, I WOULD APPRECIATE IT IF YOU COULD REVIEW THIS FAX AND GIVE TO ME. THANK ROLAND

X(faks)n. short for facsimile. FACSIMILE (fak sim' e le)n. 1. exact reproduction or copy 2. the transmission and reproduction of graphic matter by electrical means, as by radio or wire. -SYN COPY FAX (

MEMORANDUM
DEPARTMENT OF COMMUNITY DEVELOPMENT
DIVISION OF NATURAL RESOURCES MANAGEMENT

TO: DISTRIBUTION

FROM: Roland Ottolini, P.E.
Professional Engineer III

DATE: December 3, 1993

MEMO #:P033005

RE: Federal Shore Protection Project
Gasparilla Island and Estero Island Segments

A meeting was held with representatives of the United States Army Corps of Engineers (USACE), Florida Department of Environmental Protection-Beaches and Shores (DEP), Gasparilla Island Conservation and Improvement Association (GICIA) and Lee County on December 1 in Jacksonville, to discuss the implementation of the Federal Shore Protection Project for the Gasparilla Island and Estero Island segments.

USACE briefly described the 1970 feasibility study that identified the severe beach erosion problems along these segments of shoreline as well as Captiva Island. And because of the age of this study, a General Re-evaluation Report (GRR) would have to be developed prior to any further action by USACE. This report would include intensive data collection to analyze real estate changes, geology of area, borrow sites, economics, etc... In addition, an Environmental Impact Study (EIS) would also be necessary. Upon completion of the above and internal reviews, they would then proceed with final design, plans and specifications, and permitting. After these are completed and all necessary easements are in place, construction of the beach improvements could begin.

Unfortunately, USACE indicated that these projects are no longer in the Federal budget and funds must be reappropriated by Congress.

Should the funds become available the following schedule would be likely:

OCT 94 - begin economic update
MAR 94 - approve economic update and begin data collection for GRR
OCT 94 - begin GRR and EIS
DEC 96 - complete GRR and EIS and submit to USACE - SAD and HQ review and approval process

JUNE 97 - complete internal review and finalize design documents

JUNE 98 - approve design documents and EIS (Key date critical to budget cycle), prepare plans and specifications, obtain water quality certification from State, obtain real estate requirements, negotiate construction contract

OCT 00 begin construction

Note: USACE is on a 2 year budget cycle and funds are available in allotments, not guaranteed year from year.

Another option would be for the local sponsor to do the work and seek reimbursement from the USACE. This is provided for under Section 206 of the 1992 Water Resources Development Act. However, there is no guarantee on availability of reimbursement funds or time of payment. They cited difficulties experienced by Manatee County and Captiva Island. This option is formalized in an agreement with the local sponsor and USACE. Unfortunately, there are currently no guidelines set for this approach.

Also discussed was the fact that the proposed improvements for Gasparilla Island would benefit the Federal dredging project of Boca Grande Pass by reducing the amount of sand drifting into the channel. USACE indicated that a study would have to be provided to "join" the two projects. This could be done internally depending on availability of staff time.

DEP indicated that a inlet management plan (IMP) for Boca Grande Pass was in the State budget and would begin July 1994. Upon completion of that study, they would then be able to review our previous request for State funds for the construction of the beach improvements for Gasparilla Island. Schedule through this route may be shorter than the USACE, Federal Shore Protection Project.

At the conclusion of the meeting, staff and GICIA reiterated the severity of the erosion problems along Gasparilla Island and Estero Island. Examples given were the failing seawall at the southern tip of Gasparilla Island and the destroyed parking area at Lynn Hall Park, Estero Island.

Recommendation:

Staff recommends pursuing the Federal Shore Protection Project as the long-term solution to the erosion problems. However, we will need an intensive lobbying effort to get these funds reappropriated. We request a follow-up meeting with those who can provide assistance in this effort.

Timing is important, USACE is on a 2 year budget cycle and therefore funds must be available at the start of FY 95.

DISTRIBUTION: Board of County Commissioners
Donald Stilwell, County Administrator
Bill Hammond, Deputy County Administrator
Mary Gibbs, Director, DCD
Walter Stephens, Director, DNRM
Elaine McLaughlin, Director, DED
Chauncey Goss, Exec. Director, GICIA
Bob Searles, GICIA
Don Petrocelli, FM Beach Chamber of Commerce
Richard McMillen, USACE
Lonnie Ryder, FDEP, Beaches and Shores
File

MAIL LISTING FOR Charles Stevens, DP-I November 26, 1993

- - Mail - -

November 24, 1993 8:03am MAIL IS - Private

FROM: DP-I CO-OP #1
TO: STAFF CHIEFS/COAST PROJ
SUBJECT: Lee County Meeting Reminder
COPY: COASTAL PROJECTS TEAM

Just a reminder-

1. A meeting with representatives from Lee County will be held on 1 December 1993 in conference room 930 from 1330-1530 to discuss the implementation of the Lee County Shore Protection Project - Gasparilla and Estero Island Segments.

2. Request that you and/or your designated representative attend this meeting. If you have any questions, please contact Rick McMillen at x1231.

3. HAPPY THANKSGIVING!!!!!!

Gasparilla Island Conservation and Improvement Association, Inc. / Post Office Box 446 / Boca Grande, Florida 33921 / Telephone: 81

G·I·C·I·A·

7 December, 1994

cfs - I
copies For
To District

Mr. Charlie Stevens
DP-1
US Army Corps of Engineers
Jacksonville District
P. O. Box 4970
Jacksonville, FL 32232-0019

Dear Charlie:

Thank you for arranging yesterday's meeting between your office and Lee County. We enjoyed meeting you and were quite impressed with the team that you have arranged to have address the Shore Protection Program. The residents of Gasparilla Island are looking forward to the implementation of the Lee County Shore Protection Program and appreciate the dedication and commitment of Corps' staff towards this project.

The Gasparilla Island Conservation and Improvement Association, Inc. (GICIA), as the local property owner's association on the island, would like to assist the Corps in any way possible, and we anticipate that we will be able to help you and Corps' staff in the establishment of an economic update for the Gasparilla Island segment of the program.

We look forward to working with you and Corps' staff in the future and encourage you to contact us if there is anything you should need. Best wishes for the holiday season.

Sincerely,

Chauncey P. Goss
Executive Director

Lee COUNTY
BOARD OF COUNTY COMMISSIONERS

P.O. Box 398
Fort Myers, Florida 3
(813) 335-2111

335-2224
Writer's Direct Dial Numbe

John E. Manning
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Andrew W. Coy
District Four

John E. Albion
District Five

Donald D. Stilwell
County Administrator

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

December 5, 1994

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Re: Federal Shore Protection Project

Dear Mr. Bonner:

I would like to take this opportunity to thank your office in expediting the Federal Shore Protection Project for Lee County. As you are well aware, our beaches are instrumental to our economy and protection of this valuable coastal resource is a County priority.

I regret I will be unable to attend the kick-off meeting December 6th, however, I would like to offer you the County's fullest cooperation in this much needed project.

Sincerely,

JEM:jm

John E. Manning, Commissioner
District #1
Board of County Commissioners
Lee County, Florida

cc: Chauncey Goss, GICIA
Alison Hagerup, CEPD
Roland Ottolini, DNRM
Roxanne Smith, Ft. Myers Beach

Florida Power & Light Company, P.O. Box 088801, North Palm Beach, FL 33408-880

FPL

October 26, 1995

Colonel Terry L. Rice
Colonel, U.S. Army Corps of Engineers
Department of the Army
Jacksonville District
P.O. Box 4970
Jacksonville, Florida 32232-0019

RE: Army Corps Maintenance Dredging
Boca Grande Pass
Lee County, Florida

Dear Colonel Rice:

As you may be aware, Florida Power & Light Company owns and operates a fuel oil terminal a the southern end of Gasparilla Island in Lee County, Florida. The terminal receives shipment of oil from vessels that constantly utilize the Boca Grande Pass Channel.

Recently, Florida Power & Light Company has learned the Army Corp will not conduc maintenance dredging of the Boca Grande Pass Channel in 1995. In addition, it is unclear as t when the Army Corp will be dredging in the future. Since the last dredging operation,conducte by the Corp in 1992, the channel has developed shoaling in areas that is causing the vessel delivering fuel to the terminal to experience some navigation difficulties.

As a result of this condition in the channel, Florida Power & Light Company is concerned tha an improperly maintained channel will negatively impact safety and the environment. For safet reasons the crew of the vessels and all other water craft in the area of the channel are of concer should the vessel run aground due to shoaling in the channel.

Secondly of concern there is a potential for environmental damage should the vessel be damage as a result of running aground and discharging its cargo into the waters of Charlotte Harbor, Boc Grande Pass or the adjacent beaches.

In conclusion, based on the above information, Florida Power & Light Company respectfull requests the Army Corp to consider: 1.) that the Boca Grande Pass Channel, periodicall maintenance dredged by the Corp, be dredged immediately and 2.) begin scheduling regula periodic maintenance dredging operations based on need as verified via the survey dat collected.

Your cooperation in this matter would be greatly appreciated and should you have questions please don't hesitate to contact Jim Brawner at (407) 625-7640.

Sincerely,

Nancy Roen
Director, Environmental Affairs Department
Florida Power & Light Company

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

March 20, 1995

REPLY TO
ATTENTION OF
Programs and Project Management Division
Project Management Branch

Alison Hagerup, Administrator
Captiva Erosion Presentation District
Post Office Box 365
Captiva Island, Florida 33924

Dear Ms. Hagerup:

This is in regard to the Lee County shore protection project for Captiva Island. Our office has completed a review of the design memorandum (DM) for the first periodic nourishment of the project. Enclosed are comments for your consideration in revising the report. Following revision of the DM, our office will forward 20 copies to our higher authority for review and approval. The revised Section 215 agreement is under review and will be forwarded to you for execution in the near future.

As you know, a general reevaluation report is currently bein prepared for Gasparilla and Estero Islands. If the Captiva Erosion Presentation District desires that the project segment a Captiva Island be included in the analyses, please confirm this by coordinating with Lee County Board of County Commissioners an forwarding a letter to our office.

Please call Mr. Charles Stevens, at 904-232-2113, if you nee any assistance.

Sincerely,

Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

CESAJ-DP-I

SUBJECT: Lee County, Florida, Shore Protection Project - Captive Island Segment, Design Memorandum Comments

The following are the Jacksonville District comments for review of the DM:

1. PUBLIC NOTICE DOCUMENT and DESIGN MEMORANDUM CORE LOGS: In the public notice, there is a difference in the style of drawings 6, 7, 8, 9, 10, 11, and 12. In the later drawings there is gap between the proposed dredged material and the "hard substrate". This difference may result in questions that could be hard to resolve. The apparent cause for this difference is that there are two series of core borings drilled at different times and logged differently. This creates an apparent conflict between the two series of core borings that should be resolved.

This issue comes about because vibracore recovered samples typically do not recover all the material they penetrate. The unrecovered material results in an uncertainty in the contact elevations including the top of rock. For example, if a vibracore penetrates 20-feet, but only recovers 16-feet of sediment, there is a potential uncertainty of up to 4-feet as to where any given contact should be established.

Since permits and contracts are in part based on reported material contacts, it is prudent to have a responsible party establish these contacts as accurately as possible. This issue is best be resolved by the people who drilled the core borings.

2. CORE LOGS: The general geology of the area appears to be clean sand over rock. The core logs should clearly indicate the elevation of the top of rock wherever possible. Presently the core logs appear to strictly represent the material recovered and make no allowances for the material not recovered.

3. CLASSIFICATIONS: The unified soil classification of materials (SP, SC, SM, SP-SM, etc.) should be included on the core logs (enclosure 1).

4. ELEVATIONS: On page B-10, it states that core boring elevations are based on tide tables. This introduces some uncertainty in the reported elevations that appear on the core logs, as tide tables are predicted elevations that do not fully account for local weather conditions.

5. QUANTITIES: Page B-13, top of page indicates that quantities are based on the elevation of top of rock and the ability of a contractor to excavate to within one foot of the top of rock. Even if a contractor can excavate to within one foot of the top of rock, there may be a problem with the location of the top of rock as previously discussed. In addition it would be difficult

for a contractor to conform to an undulating top of rock even if it could be delineated.

The quantities should be re-evaluated to insure their reasonability as to quantity and dredgeability of the sand. It is prudent at this time to proceed on the basis that more than one borrow area may be required.

6. PAGE B-21: Table B-11 shows a required fill of 840,000 cy with a borrow area of 1,200,000 cy. Considering potential losse and dredging uncertainties, this is marginally enough material t proceed into a contract.

7. PAGE B-12, Paragraph B-49. There are references to narrow erosional channels within the borrow area. If the sand in these channels is included in the 1,200,000 cy of sand reported in Table B-11, it would be problematical whether a contractor could excavate the sand in these narrow channels.

8. FIGURE B-1: Please show borrow area "IV-C".

9. The design memorandum does not have the required real estate appendix. Enclosure 2 contains a copy of an earlier completed real estate appendix for another shore protection project (Marti County) that may be used as an example.

10. ENVIRONMENTAL ASSESSMENT (EA). Request a copy of the cultural resource magnetometer survey report that was conducted for the proposed borrow area and copies of all correspondence between the State Historic Preservation Officer (SHPO) and the project sponsor or their consultant. This is needed for coordination between SHPO and USACE.

11. EA-1, section 1.03. The concerns regarding the borrow area should be stated and addressed. Structural alternatives should be addressed separately and in more detail.

12. EA-3, section 2.02. "Beach" should be removed because ridley and hawksbill turtles are unlikely to use this beach but may be found offshore. Since sea turtles are discussed, this section is more appropriately included in section 2.04 Threatene and Endangered Species. A discussion on turtle nesting using current nesting data should be included.

13. EA-6, section 2.04. It should be stated whether the threatened and endangered species are on the Fish and Wildlife Service list, National Marine Fisheries Service list, or state list. "Six species of" should be deleted from the second sentence of this section. The scientific name (*Genus species*) should be given in parentheses after the common name of each species.

14. EA-6, section 2.05. The borrow areas should be described in more detail, including composition and affected biota. This section should also reference the location map of the borrow areas (figure EA-2).

15. EA-6, section 2.07. Elaborate on existing water quality conditions.

16. EA-7, section 2.10. This section should be entitled Hazardous, Toxic, and Radioactive Wastes. This section should reference data or a source of information.

17. EA-7, section 2.11. This section should state whether existing conditions and aesthetics are positive or negative.

18. EA-8, section 3.03. In the last sentence, "turtle nest program" should be changed to "turtle nest monitoring and relocation program."

19. EA-9, section 3.05. Elaborate on existing water quality conditions.

20. EA-9, section 3.07. "The Florida Department of Environmental Regulation" should be changed to "The Florida Department of Environmental Protection."

21. EA-10, section 3.12. The reference to Section 404(R) of the Clean Water Act should be deleted. This project is not eligible for exemption from the water quality certification requirements.

22. Five sections should be added:

a. A Project Location section should be added at the beginning of the EA to sufficiently describe the project area.

b. An Environmental Commitments section should be added to sum up all measures to be taken to minimize adverse effects to the environment and its flora and fauna.

c. A Compliance With Environmental Requirements section should be added to show compliance with the environmental and cultural resource laws and regulations.

d. A Coordination section is needed to state what agencies have been consulted and coordinated with.

e. A Public Involvement section should state what effort was made to inform interested parties regarding the project. All letters of coordination should be included in an appendix of the Environmental Assessment (EA) and entitled Pertinent Correspondence.

23. The Section 404(b) Evaluation does not follow the correct format and does not cover all aspects necessary to follow curren requirements.

24. A Florida Coastal Zone Management Program Consistency Determination will have to be added as an appendix to the EA.

25. Endangered species have not been adequately covered throughout the EA. Endangered species that utilize the project area should be addressed in detail. Coordination and consultation with the Fish and Wildlife Service and the National Marine Fisheries Service should be addressed and documented. Letters of coordination should be included in the Pertinent Correspondence appendix.

26. A reference section should be included to list all references used in preparation of the EA.

27. Hardgrounds were not mentioned in the EA. Evidence of presence or absence of hardgrounds in the project area and/or borrow areas should be addressed (aerial photography or side sca sonar).

28. This is a planning document that will eventually result in Federal reimbursement for a shore protection project. Since thi is a planning document, preparation and coordination of the EA should follow Corps of Engineers Planning Guidelines. The local sponsor can prepare the document, however, coordination under Section 7 of the Endangered Species Act and the Fish and Wildlif Coordination Act and with the SHPO's office should be performed by the Jacksonville Districts' Environmental Resources Branch. Transfer funding to the Fish and Wildlife Service will be needed for a Coordination Act Report. If a permit is being pursued wit the Jacksonville Districts' Regulatory Division and with the State of Florida for this work, the GDM and EA should be completed and fully coordinated before a permit is issued for this project.

CFS

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

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Lee County Division of Natural
Resources Management
2012 Altamont Avenue
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in regard to further coordination on the Lee County Shore Protection Project. As part of the preparation of the General Reevaluation Report (GRR), our office has completed an economic update of the project prior to initiating the field work for the GRR. Enclosed is a copy of the economic update for your information.

You are invited to attend the General Design Conference to be held in our office on May 18, 1995. The meeting is scheduled from 1:00 to 4:30 P.M. in the video conference room (G-13). The purpose of the meeting will be to discuss preparation of the GRR, including field investigations, plan formulation, environmental coordination, modeling and the schedule.

Should you have any questions, please contact the project manager, Mr. Charles Stevens at 904-232-2113.

Sincerely,

Richard E. Bonner

RICHARD E. BONNER, P.E.
Deputy District Engineer
for Project Management

Encl

LEE COUNTY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF NATURAL RESOURCES MANAGEMENT

TO: Distribution

FROM: Roland Ottolini, P.E.

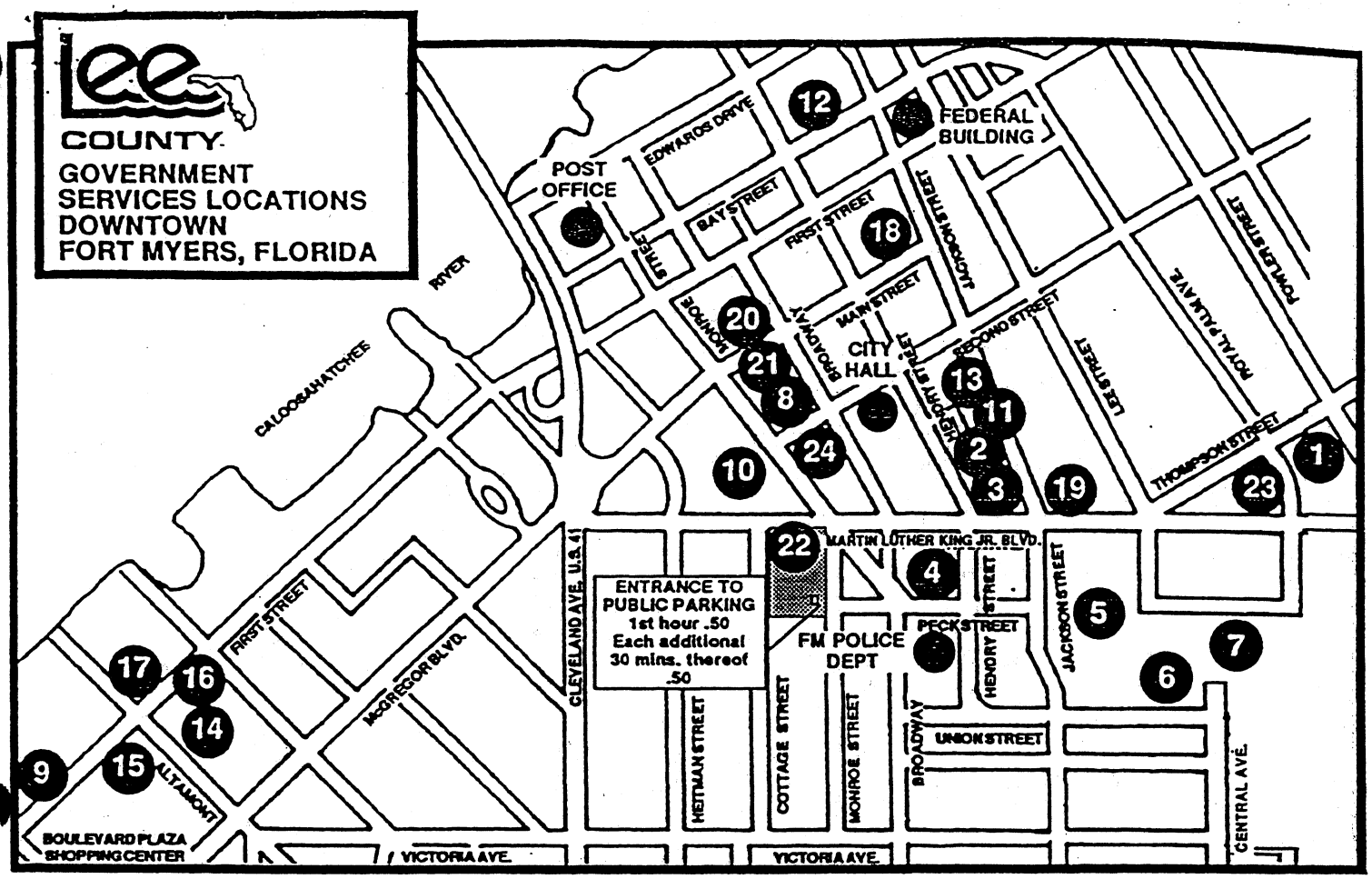
DATE: January 17th, 1996

RE: **Federal Shore Protection Project (Estero & Gasparilla Islands)**

A meeting will be held with staff of the Army Corps of Engineers (A.C.O.E.), Jacksonville District on Tuesday, February 22, 1996 at 1:30 PM in the East Room of the Old Courthouse, 2120 Main Street, Fort Myers, to discuss the Federal Shore Protection Project for Lee County. As you may be aware, the A.C.O.E. has been authorized to complete the general re-evaluation report for the Estero Island and Gasparilla Island segments of Lee County. This document is currently being prepared and includes the evaluation of the numerous technical and economic issues involved with beach renourishment. This meeting will give us the opportunity to ask questions about the report and the likelihood of future federal efforts in helping us protect our eroding beaches. Recognizing the competitive nature and limited supply of federal funds, your support and participation would be appreciated.

Distribution:

Board of County Commissioners
Don Stilwell, County Manager
J. W. French, P.E., Director, Public Works
Walter Stephens, P.E., Director, Division of Natural Resources Management
Elaine McLaughlin, Director, Visitor Convention Bureau
Steve Boutelle, Division of Natural Resources Management
Lee County Coastal Advisory Council
Garr Reynolds, Councilman, City of Ft Myers Beach
Brett Moore, P.E., Humiston & Moore
Lonnie Ryder, Dept. of Environmental Protection
Charlie Stevens, Army Corps of Engineers, Jacksonville District



MAP LEGEND

ADMINISTRATION BUILDING 2115 Second Street	8
CODES & BUILDING SERVICES 1735 Hendry Street	2
CODES INSPECTION SERVICES 1736 Jackson Street	11
COMMUNICATIONS (ADDRESSING) 2286 W. First Street	9
COMMUNITY DEVELOPMENT/ ZONING, DEVELOPMENT REVIEW 1831 Hendry Street	3
CONSTRUCTION SERVICES 2100 Second Street	24
COMMUNITY REDEVELOPMENT 1857 Jackson Street	19
COUNTY COMMISSIONERS/ STATE REPRESENTATIVES Old Courthouse 2120 Main Street	21
DEPARTMENT OF TRANSPORTATION 2022 Hendry Street	4
DEVELOPMENT REVIEW 1831 Hendry Street	3
ECONOMIC DEVELOPMENT 2180 W. First Street	17
ELECTIONS 2480 Thompson Street	1
EMPLOYEE HEALTH & SAFETY 2122 Dr. Martin Luther King, Jr. Blvd.	22
ENVIRONMENTAL SCIENCES 1857 Jackson Street	19
EQUAL OPPORTUNITY 2263 Main Street	18
HEARING EXAMINER 2269 Bay Street	12
JUSTICE CENTER 1700 Monroe Blvd.	10
LIBRARY 2050 Lee Street	5
NATURAL RESOURCES 2012 Altamont	15
OLD COURTHOUSE 2120 Main Street	21
PLANNING 2455 Dr. Martin Luther King, Jr. Blvd.	23
PRINT SHOP 1736 Jackson Street	13
PROPERTY APPRAISER/MAPPING 2480 Thompson Street	1
PURCHASING 2345 Union Street	6
SCHOOL BOARD ADMINISTRATION 2055 Central Avenue	7
SOIL & WATER CONSERVATION 2275 Bay Street	12
SOLID WASTE 2013 Altamont	16
TAX COLLECTOR 2480 Thompson Street	1
UTILITY ADMINISTRATION 2178 McGregor Blvd.	14
VISITOR & CONVENTION BUREAU 2180 W. First Street	17
ZONING 1831 Hendry Street	3

2nd CSV

September 11, 1996

Planning Division
Environmental Branch

Honorable Porter Goss
Representative in Congress
ATTN: Ms. Christy Hahn
2000 Main Street, Suite 303
Fort Myers, Florida 33901

Dear Mr. Goss:

I am responding to your August 29, 1996, letter regarding the concerns of Mr. Gary Price, City Manager of the City of Sanibel. In response to Mr. Price's request, we have extended the comment period to October 15, 1996, for the Lee County Shore Protection Project, Gasparilla and Estero Islands.

If you have any additional questions or need information, please call me or have your staff contact Mr. Joe Burns, Congressional Liaison, at 904-232-2243.

Sincerely,

SIGNED: James A. Connell

Terry L. Rice
Colonel, U.S. Army
District Engineer
James A. Connell
Lieutenant Colonel, U.S. Army
Deputy District Engineer

Copies Furnished:

Honorable Porter Goss, House of Representatives, Washington, DC 20515-0914
Commander, U.S. Army Corps of Engineers, ATTN: CECW-PE
Commander, South Atlantic Division, ATTN: CESAD-PD

✓bcc: CESAJ-DP-I (Stevens)

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

REPLY TO
ATTENTION OF

January 21, 1997

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Lee County Division of Natural
Resources Management
2012 Altamont Avenue
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in regard to your letter dated October 30, 1996, concerning beach profile survey data and geotechnical information for Estero Island in Lee County. Survey data and geotechnical information that is available from our office, which is listed on the enclosure, has been sent to Mr. Ken Humiston of Humiston and Moore Engineers, as you requested. Our office sent available survey data to Mr. Humiston in December 1996. Geotechnical information available from our office was reproduced and forwarded to Mr. Humiston on January 15, 1997.

As recently discussed with Mr. Charles Stevens, of our office, Federal funding was not provided in the work allowance for fiscal year (FY) 1997 for continuation of the General Reevaluation Report (GRR) for Estero and Gasparilla Islands. Our office is utilizing carryover FY 1996 funds to complete the geotechnical investigations that were underway. Initiation of the other tasks required to complete the GRR will have to wait until additional funds are provided. Funding may not be included in the President's FY 1998 budget to continue the GRR. Whether or not funds are included in the President's budget will depend upon budget priorities and national policy at that time.

Should you have any questions, please contact the project manager, Mr. Charles Stevens, at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

Copy Furnished (w/Enclosure):

Mr. Ken Humiston, P.E., Humiston and Moore Engineers,
10641 Airport Road N, Suite 29, Naples, Florida 33942

Lee County (Estero Island) - List of Survey Data

LEGEND
Survey # = survey year - survey number

1. Lee County (Estero Island)
   a. Survey# 95-135 (conducted August 1995)
      Lee Co. Shore Protection GRR-Lidar and Conventional Survey
      Dgn and XYZ files available. D.O. #

   b. Survey# 96-120 (conducted April 1996)
      Lee Co. Shore Protection GRR-Conventional Survey
      Dgn and XYZ files available. D.O. #58-37, 179

1. Lee County (Estero Island) - List of Geotechnical Data
   a. Lee County Survey Report (August 1969)
      1. Table of Contents
      2. Appendix B - Geotechnical Data

   b. Vibracore Sampling and Laboratory Testing for
      Lee County Shore Protection Project (July 1996)
      Ardamon & Associates, Inc.

ENCL

Lee County - Estero Island
Survey Data and Geotechnical Information

1. Lee County (Estero Island) - List of Survey Data
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      Lee Co. Shore Protection GRR-Lidar and Conventional Survey
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      Lee Co. Shore Protection GRR-Conventional Survey
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LEGEND
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   a. Lee County Survey Report (August 1969) -Table of Contents

   b. Lee County Survey Report Appendix B - Geotechnical Information

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      Lee County Shore Protection Project (July 1996)
      Ardamon & Associates, Inc.

ENCL

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Lee County Division of Natural
Resources Management
2012 Altamont Avenue
Fort Myers, Florida 33902

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Should you have any questions, please contact the project manager, Mr. Charles Stevens at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

Copy Furnished (w/Enclosure)

Mr. Ken Humiston, P.E., Humiston and Moore Engineers,
10641 Airport Road N, Suite 29, Naples, Florida 33942

Stevens/CESAJ-DP-I
vlh/3137/15 Jan 97

Duke/CESAJ-DP-A

Middleton/CESAJ-EN

Bonner/CESAJ-DP

File: L:\user\k3dpicfs\winword\LEECOLTR.01

Lee County - Estero Island
Survey Data and Geotechnical Information

1. Lee County (Estero Island) - List of Survey Data
   a. Survey# 95-135 (conducted August 1995)
      Lee Co. Shore Protection GRR-Lidar and Conventional Survey
      Dgn and XYZ files available.

   b. Survey# 96-120 (conducted April 1996)
      Lee Co. Shore Protection GRR-Conventional Survey
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      Lee County Shore Protection Project (July 1996)
      Ardamon & Associates, Inc.

ENCL

asparilla Island Conservation and Improvement Association, Inc. / Post Office Box 446 / Boca Grande, Florida 33921 / Telephone: 941 964-2667

G·I·C·I·A·

Dee
CF: Cordon..
Tim M

April 3, 1997

Colonel Terry L. Rice
District Engineer
Jacksonville District Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

Dear Colonel Rice:

This letter is about the current dredging of the Charlotte Harbor navigation channel and the placement of the dredged material at the south end of Gasparilla Island. It is not only placed at the south end of the permitted disposal site but also extended around the Belcher Road seawall where tide and wave action are the most active erosion forces on the shore. Our concern is that the sand placed this close to the Pass will be back in the Pass in a very short period of time.

This not only means an accelerated shoaling of the navigation channel as the sand returns to the dredge point, it also means mounting costs to the Corps to redredge the channel in very short order to avoid future grounding of oil barges.

We are proposing that the Corps can control this very erosive situation by moving promptly ahead to place a terminal groin in this location. Plans for this have been discussed for several years, the GICIA has had two studies made focusing on Gasparilla Island Erosion Control (Humiston & Moore - 1993/1994), the Corps held a very detailed meeting on this subject several years ago. We are very fortunate to have an offer from CSX of a large amount of concrete material that could be used for groin construction purposes, very possibly adjacent to and on the north side of the structure of the old fishing pier. A copy of their offer is enclosed.

There are several advantages involved in this possible move to place a terminal groin:

1. Retention of sand on the shore
2. Avoidance of rapid return of the sand into the ship channel
3. Savings to Corps in avoiding the need to redredge in a short period of time
4. Retention of sand at the base of the Belcher Road seawall (thus avoiding a predictable collapse of this old wall)
5. State Park Beach is stabilized.

We would very much appreciate the Corps seriously considering this proposal and look forward to hearing from the Corps.

Sincerely,

Robert L. Searles

Robert L. Searles
Erosion Control Chairman

PS: Pictures and supporting documents

BOCA BAY

April 1, 1997

Mr. Robert L. Searles
Chairman, Beach Erosion Committee
Gasparilla Island Conservation and Improvement Association
PO Box 446
Boca Grande FL 33921

Dear Bob,

We support the beach stabilization program that you propose at the south end of Gasparilla Island and stand ready to assist in any way we can.

Per our earlier discussions, CSX Realty Development Corporation, owners and developers of Boca Bay, and CSX Transportation can make available in Tampa about 6000 tons of concrete material. We believe the material, consisting primarily of concrete railroad ties and Jersey barriers, would be suitable for construction of a rip-rap groin at the south end of the island. Suitability of material would, of course, have to be confirmed by permitting agencies.

Please call me should you need further information.

Sincerely,

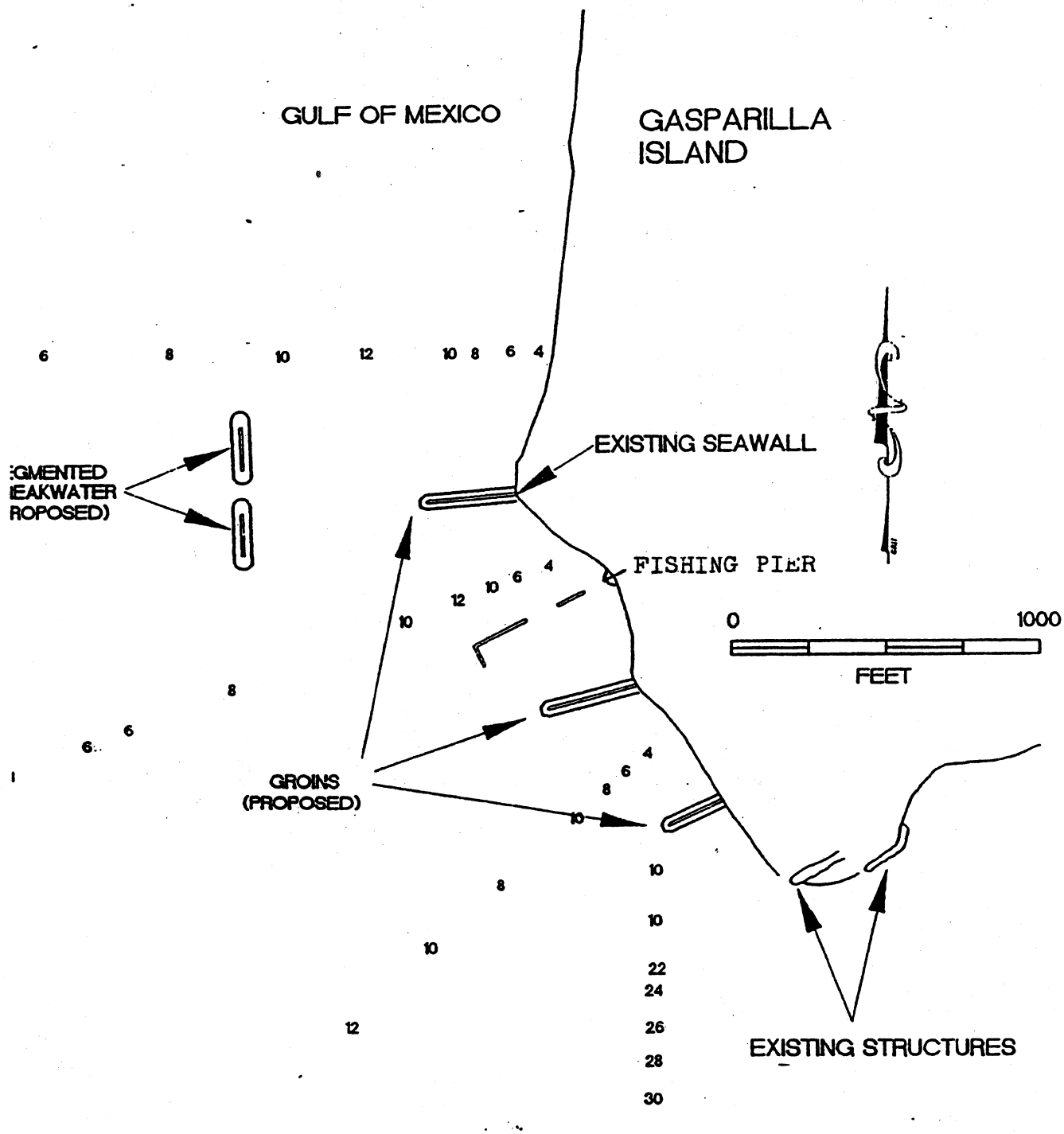
Peter McKinney

PM:bd

searles.concrete

Post Office Box 1370 • Boca Grande, Florida 33921 • (941) 964-0800 • Fax (941) 964-2249

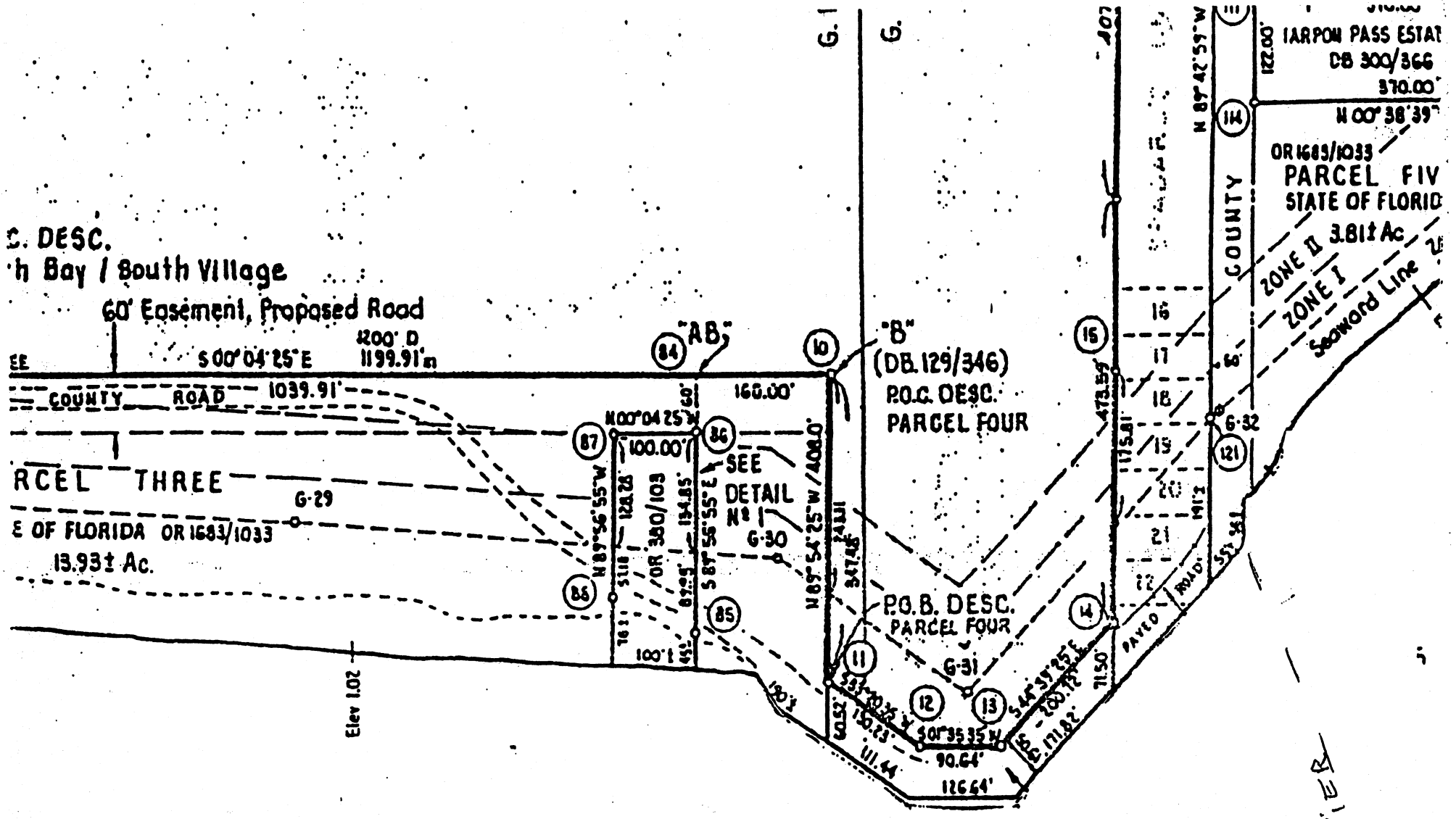
Humiston & Moore Study
1993



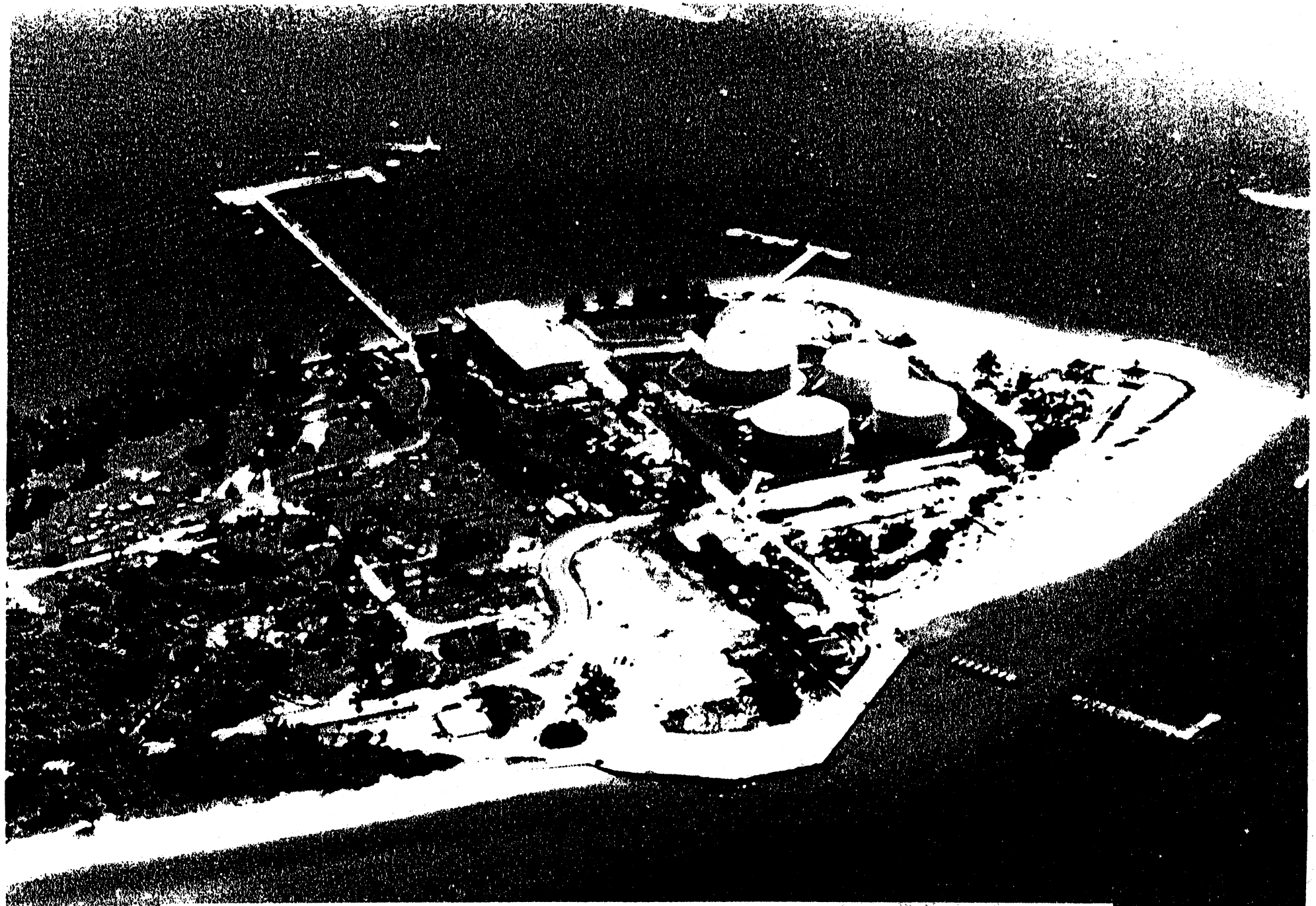
APRIL 1993 EROSION CONTROL FEASIBILITY STUDY
PREPARED FOR: GICIA
BY: HUMISTON & MOORE ENGINEERS

FIGURE 15
PILOT PROJECT
CONCEPTUAL PLAN

SOURCE OF DEPTH DATA: FLORIDA DEPARTMENT OF NATURAL RESOURCES
DATUM: NGVD


C. DESC.
h Bay / South Village
60' Easement, Proposed Road
S 00°04'25"E
1200' D
1199.91'm
COUNTY ROAD
1039.91'
RCEL THREE
G-29
E OF FLORIDA OR 1683/1033
13.93± Ac.
Elev 1.02
N 00°04'25"W
100.00'
160.00'
"AB"
SEE DETAIL Nº 1
G-30
N 89°54'25"W / 400.0'
"B"
(DB.129/346)
P.O.C. DESC.
PARCEL FOUR
P.O.B. DESC.
PARCEL FOUR
G-31
S 00°35'35"W
90.64'
126.64'
111.44
473.59'
115.81'
71.50'
PAVED ROAD
COUNTY
G-32
ZONE II
ZONE I
Seaward Line
TARPON PASS ESTAT
DB 300/366
370.00'
N 00°38'39"
OR 1683/1033
PARCEL FIV
STATE OF FLORID
3.81± Ac.

C O

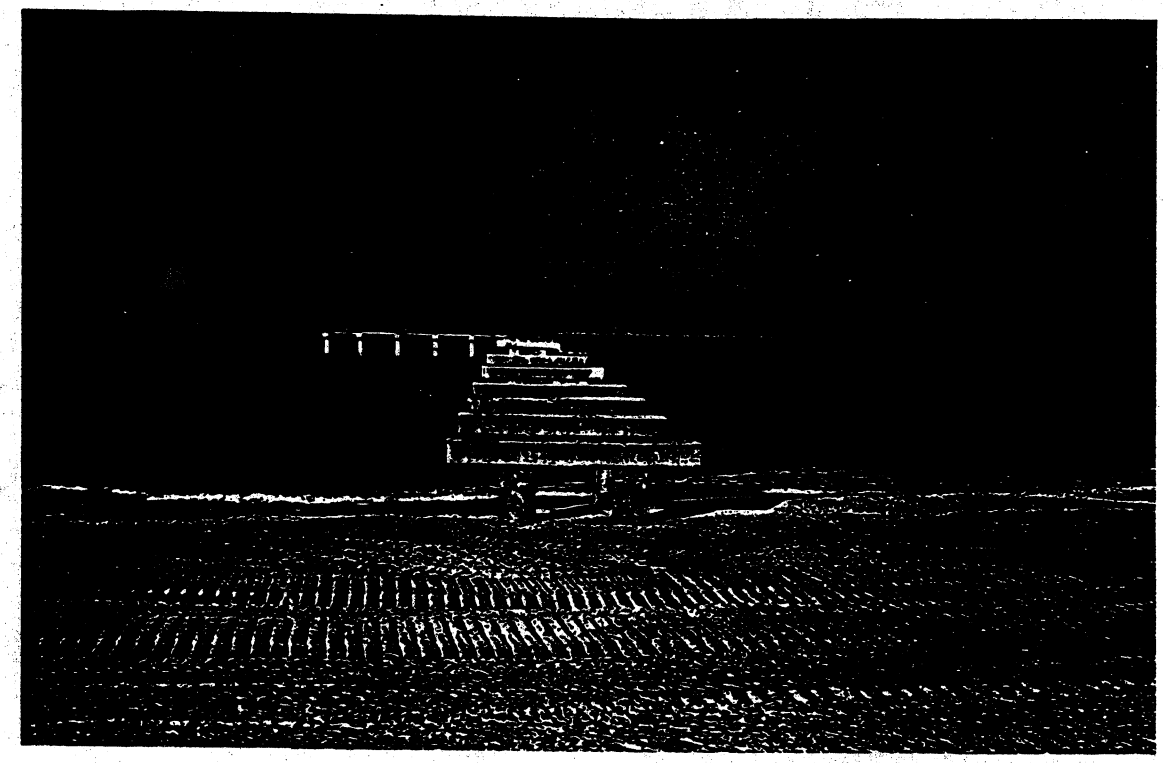


Looking south-east across south end of Gasparilla Island

Belcher Rd. Seawall and abandoned Fishing Pier in the foreground

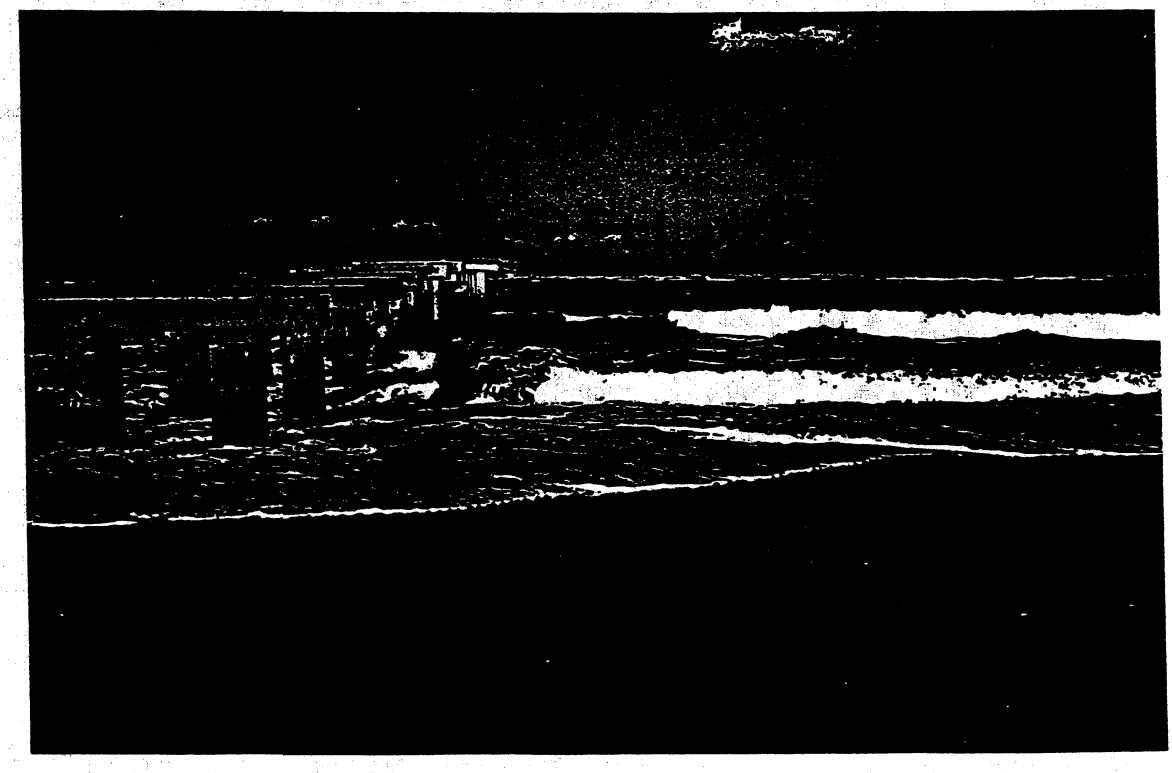
Looking north from the south end of Gasparilla Island

Abandoned Fishing Pier and Belcher Rd. seawall
in the left foreground



Old Fishing Pier

(extends seaward from
south end of seawall)
Mar. 97



Steve ✓ Thanks. Dennis: Info. OPS
LEE Co. GRR
PB-ER sent a ltr. to FWLS on Coastal Barrier Units for an alt.

LEE COUNTY
SOUTHWEST FLORIDA

BOARD OF COUNTY COMMISSIONERS

Writer's Direct Dial Number: (941) 479-8128

Borrow area at San Carlos Bay Ebb Shoal. Awaiting FWLS response but not changing our NED plan in the draft GRR for this concern.

John E. Manning
District One

Douglas R. St. Cerny
District Two

Ray Judah
District Three

Andrew W. Coy
District Four

John E. Albion
District Five

Donald D. Stilwell
County Manager

James G. Yaeger
County Attorney

Diana M. Parker
County Hearing Examiner

May 24, 1999

Mr James Duck, Chief
Planning Division - Environmental Coordination Section
Jacksonville District - Army Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

RE: Lee County Beach Erosion Control Projects

Dear Mr. Duck,

On behalf of the Lee County Coastal Advisory Council we support the Corps work in moving forward towards an erosion solution for Estero Island. In providing you with our support we also wish to recommend furthering the assessment of sand sources other than the Proposed Borrow Site identified in the Draft Environmental Impact Statement for the Estero Island project. This site, in part, has already been identified and permitted as a sand source for Captiva and Sanibel Islands.

To assist the Corps, both Lee County and the Captiva Erosion Prevention District will be teaming up to further analyze alternative sites that may be more suitable and cost effective for the Estero Island project. This should in no way alter the Corps progress in developing the Estero Island project, which is critically needed for this developed barrier island. The county work will serve to enhance the project once options are pursued in the design and construction phase.

For your information, the Lee County Coastal Advisory Council consists of representatives from each of the developed barrier islands and three members representing the county at large. This membership includes the Captiva Erosion Prevention District and the City of Sanibel, who have responded in writing regarding their concerns over the use of the borrow site previously mentioned.

Again, we wish to thank you for moving forward on these projects, and we can be of further assistance please let us know.

Regards,

Hans Wilson

Hans Wilson, Chairman
Lee County Coastal Advisory Council

cc: Steve Boutelle - Lee County
John Gucciardo - Town of Ft. Myers Beach
Alison Hagerup - Captiva Erosion Prevention District

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

REPLY TO
ATTENTION OF

October 29, 1993

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Division of Natural Resources Management
Post Office Box 398
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in response to your October 19, 1993, letter requesting a meeting to discuss the implementation of the Lee County Shore Protection Project - Gasparilla and Estero Island Segments. The U.S Army Corps of Engineers (USACE) is well aware of the erosion problem that the beaches of Gasparilla and Estero Island are currently experiencing and understand the owners/residents' concern in providing storm damage protection to the upland development.

A meeting has been scheduled for December 1, 1993, at 1:30 p.m. to discuss the scope of work, permitting, and schedules. This meeting will be held in our Jacksonville District office, conference room 930.

USACE appreciates your interest in the Lee County Shore Protection Project. Please contact Mr. Rick McMillen at 904-232-1231 if you need additional information.

Sincerely,

Dennis R Dale
for Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Copies Furnished:

Mr. Chauncey Goss, Executive Director, Gasparilla Island Conservation and Improvement Association, Post Office Box 446, Boca Grande, FL 33921
Mr. Donald Stilwell, County Administrator, Post Office Box 398, Fort Myers, FL 33902-0398
Mr. Walter Stephens, Director, Division of Natural Resources Management, Post Office Box 398, Fort Myers, FL 33902-0398

Mr. Lonnie Ryder, Environmental Administrator, Department of Environmental Protection, 39090 Commonwealth Boulevard, Tallahassee, FL 32399
Mr. Kirby Green, Director, Division of Beaches and Shores, Florida Department of Natural Resources, 3900 Commonwealth Boulevard, Tallahassee, FL 32399

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

REPLY TO
ATTENTION OF

February 15, 1995

Programs and Project Management Division
Project Management Branch

Mr. Kenneth C. Alvarez, Environmental Specialist III
Department of Environmental Protection
District 4 Administration
1843 S. Tamiami Trail
Osprey, Florida 34229

Dear Mr. Alvarez:

This is in response to your December 21, 1994 letter to Mr. Charles Stevens inquiring about plans for the construction of a large groin at Boca Grande Pass in Lee County. A search of our records in the Regulatory Division found no application for permitting of this project by any private or other government agency. If an application is filed with this district office the State of Florida Department of Environmental Protection will be made aware of all construction details along with any possible environmental impacts that the Corps of Engineers can identify.

At present, however, there is a Federal shore protection project authorized for Gasparilla Island. The project consists of initial beach fill and periodic nourishment along the southern 2.7 miles of shoreline. In addition, a revetment and a terminal groin are authorized at the southern end of the island.

Currently, our office is preparing an Economic Update for Gasparilla and Estero Islands. Following completion of the Economic Update, a General Reevaluation Report is scheduled to be prepared to update the project and prepare for construction. If it is found that construction of the groin is warranted, it is not anticipated that construction of the groin would commence before 1998 subject to the completion of engineering and design, execution of a cost sharing agreement with the project sponsor, state permits and availability of funds.

If the Corps of Engineers can be of additional assistance in this matter please contact Mr. Charles Stevens at 904-232-2113.

Sincerely,

Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Copy Furnished:

Mr. Roland E. Ottolini, P.E., Division of Natural Resources Management, Post Office Box 398, Fort Myers, Florida 33902
Park Manager, Gasparilla Island State Recreation Area, Post Office Box 1150, Boca Grande, Florida 33921

Florida Department of
Environmental Protection

Lawton Chiles
Governor

Virginia B. Wetherell
Secretary

November 22, 1993

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management
Jacksonville District
Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Sir:

I am writing to express an interest in the proposal to place a rock grain at the southern end of Gasparilla Island, on the Gulf side of the island. My primary concern is that capturing sand at this locale not pose a threat to state property at the southern terminus of the island, where the historic lighthouse is situated.

Please copy me with any correspondence, reports or other pertinent documents as this project evolves.

Very Sincerely,

Ken Alvarez

Kenneth C. Alvarez
Environmental Specialist III

cc: Mike Murphy
Reggie Norman
Mark Glisson
Kirby Green

Printed on recycled paper.

Gasparilla Island Conservation and Improvement Association, Inc. / Post Office Box 446 / Boca Grande, Florida 33921 / Telephone: 813 964-266

Rick M

G·I·C·I·A·

November 8, 1993

Mr. Richard McMillen
US Army Corps of Engineers
CESAJ-DP-I
P. O. Box 4970
Jacksonville, FL 32232

Dear Rick:

Thank you for arranging the meeting we had last Thursday (December 1) to discuss the Lee County Shore Protection Project. I know that Bob Searles, Roland Ottolini, and myself benefited greatly from our meeting as we found both the format and the content very informative. Any degree of frustration you or your colleagues may have sensed from us was not with you, but with the inability of the Corps to react to a situation in a manner whereby the timeline of the project suggests a correlation to the timeliness of the problem. In other words, there are a number of areas on the island which simply will not survive the Corps' anticipated timeline.

We left our meeting with you feeling both encouraged that there is a process through which we can involve the Corps with this project and dedicated to pursuing that process. To that end, we look forward to working with you if, and when, we are successful in establishing a further commitment from Congress. You have been quite helpful in offering us guidance as to how the system works, and now it looks as though it is up to us to make the system work.

We will be in contact with your office as this process proceeds to ensure that you are informed of our actions. Again, we thank you for your hospitality and your helpfulness. We wish you a most happy holiday season.

Sincerely,

Chauncey P. Goss
Executive Director

cc: Honorable Porter J. Goss
Mr. Richard Bonner, USACE
Mr. Robert Searles, GICIA
Mr. Roland Ottolini, Lee County DNRM

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

REPLY TO
ATTENTION OF

November 4, 1993

Programs and Project Management Division
Project Management Branch

Honorable Porter Goss
Representative in Congress
ATTN: Ms. Christy Hahn
2000 Main Street, Suite 303
Fort Myers, Florida 33901

Dear Mr. Goss:

This is in response to your October 25, 1993, letter regarding the Lee County Shore Protection Project - Gasparilla and Estero Island Segments. The U.S. Army Corps of Engineers has coordinated a meeting with representatives from Lee County, Gasparilla Island Conservation and Improvement Association, the State and our office to discuss the implementation of this project. Enclosed is the letter to Mr. Roland Ottolini, Division of Natural Resources Management, Lee County, dated October 29, 1993, confirming this meeting.

I hope this information is sufficient for your needs. If any additional information or assistance is required, please call me or my Deputy District Engineer for Project Management, Mr. Richard Bonner, at 904-232-2586.

Sincerely,

Terrence C. Salt
Colonel, U.S. Army
District Engineer

Enclosure

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)
Mr. Chauncey Goss, Executive Director, Gasparilla Island Conservation and Improvement Association, Post Office Box 446, Boca Grande, Florida 33921

rim

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

REPLY TO
ATTENTION OF

October 29, 1993

Programs and Project Management Division
Project Management Branch

Mr. Roland E. Ottolini, P.E.
Division of Natural Resources Management
Post Office Box 398
Fort Myers, Florida 33902

Dear Mr. Ottolini:

This is in response to your October 19, 1993, letter requesting a meeting to discuss the implementation of the Lee County Shore Protection Project - Gasparilla and Estero Island Segments. The U.S Army Corps of Engineers (USACE) is well aware of the erosion problem that the beaches of Gasparilla and Estero Island are currently experiencing and understand the owners/residents' concern in providing storm damage protection to the upland development.

A meeting has been scheduled for December 1, 1993, at 1:30 p.m. to discuss the scope of work, permitting, and schedules. This meeting will be held in our Jacksonville District office, conference room 930.

USACE appreciates your interest in the Lee County Shore Protection Project. Please contact Mr. Rick McMillen at 904-232-1231 if you need additional information.

Sincerely,

Dennis R Dale
for Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Copies Furnished:

Mr. Chauncey Goss, Executive Director, Gasparilla Island Conservation and Improvement Association, Post Office Box 446, Boca Grande, FL 33921
Mr. Donald Stilwell, County Administrator, Post Office Box 398, Fort Myers, FL 33902-0398
Mr. Walter Stephens, Director, Division of Natural Resources Management, Post Office Box 398, Fort Myers, FL 33902-0398

Mr. Lonnie Ryder, Environmental Administrator, Department of Environmental Protection, 39090 Commonwealth Boulevard, Tallahassee, FL 32399
Mr. Kirby Green, Director, Division of Beaches and Shores, Florida Department of Natural Resources, 3900 Commonwealth Boulevard, Tallahassee, FL 32399

JACKSONVILLE DISTRICT
ROUTING SLIP

FROM: _____ DATE: 10/28 SUSPENSE: _____

COMMANDER	DE	EEO OFC	EE	PLANNING	PD
DEP COMMANDER	DD	ENGINEERING	EN	ASST CHIEF	PD-A
DEP CDR, ANTILLES	DS	ASST CHIEF	EN-A	SOCIO-ECONOMICS	PD-D
CONSTRUCTION OFC	DS-A	PROGRAMS COORD	EN-B	ENVIRONMENTAL	PD-E
PONCE RES OFC	DS-AP	COST ENGINEERING	EN-C	PROGRAMS COORD	PD-M
PROJ/PROGRAMS OFC	DS-PP	DESIGN	EN-D	PLAN FORMULATION	PD-P
DEP DIST ENGR(PM)		GEOTECHNICAL	EN-G	P.R. COORD	PD-PB
ASST	DP-A	H & H	EN-H	PUBLIC AFFAIRS	PA
PROGRAMS MGMT	DP-B	SURVEY	EN-S	REAL ESTATE	RE
PROJECT MGMT	DP-I	INFORMATION MGMT	IM	ACQUISITION	RE-A
EXEC ASST	DX	ASST CHIEF	IM-A	MGMT & DISPOSAL	RE-M
CON-OPS	CO	CUST ASST CENTER	IM-C	PLANNING & CONTOL	RE-P
ASST CHIEF	CO-A	TECHNICAL LIBRARY	IM-CL	APPRAISAL	RE-S
CONSTRUCTION	CO-C	III BRANCH	IM-I	REGULATORY	RD
EMER MGMT	CO-M	REQ & PLANNING	IM-P	ENFORCEMENT	RD-E
OPERATIONS	CO-O	ANALYSIS & CONTROL	IM-PA	CENTRAL PERMITS	RD-C
PALATKA	CO-OR-K	REPROGRAPHICS	IM-PR	NO. PERMITS	RD-N
CLEWISTON	CO-OR-C	INTERNAL REVIEW	IR	SO. PERMITS	RD-S
GULF COAST AO	CO-G	LOGISTICS	LM	RESOURCE MGMT	RM
ATL COAST AO	CO-P	FACILITIES	LM-F	BUDGET	RM-B
SO. FL AO	CO-S	MAINTENANCE	LM-M	F & A	RM-F
NO. FL PROJ OFC	CO-N	SUPPLY	LM-S	MGMT/MANPOWER	RM-M
CONTRACTING	CT	TRANSPORTATION	LM-T	SADBU	DB
A-E & CONST	CT-C	COUNSEL	OC	SAFETY OFFICE	SO
SUPPLIES & SVCS	CT-S			HEALTH UNIT	SO-H
				SECURITY	PM
				VALUE ENGR	VE
				AUDIT CESAD	AO-KJ
				PERSONNEL CESAD	HR-J
				MAIL ROOM	

SEE ME	SIGNATURE	NECESSARY ACTION
FILE	COMMENT	AS REQUESTED
RETAIN	INFORMATION	
RETURN	PREPARE REPLY	
COPIES REQUIRED	ACTION TAKEN BY: ___ DATE: ___	

ATTENTION: Rick M -

REMARKS:

Rick - Short ltr ending our response place is all that is needed.

JAX DISTRICT OCT 2 '93 1000

DO NOT USE FOR APPROVALS, DISAPPROVALS, CONCURRENCES OR SIMILAR ACTION

CESAJ FORM 551
MAY 92

PREVIOUS EDITION IS OBSOLETE

PORTER GOSS
14TH DISTRICT, FLORIDA

330 CANNON BUILDING
WASHINGTON, DC 20515-0913
(202) 225-2536

COMMITTEES:
RULES
ANDARDS OF OFFICIAL CONDUCT

Congress of the United States
House of Representatives
Washington, DC 20515-0914

DISTRICT OFFICES:
2000 MAIN STREET
SUITE 303
FT. MYERS, FL 33901
(813) 332-4677

3301 TAMIAMI TRAIL EAST
BUILDING F, SUITE 212
NAPLES, FL 33962
(813) 774-8060

PUNTA GORDA
(813) 639-0051

October 25, 1993

Colonel Terrence C. "Rock" Salt
P.O. Box 4970
US Army Corps Of Engineers
Jacksonville, Florida 32232-0019

Dear Rock:

Enclosed please find correspondence from the Gasparilla Island Conservation and Improvement Association, Inc. regarding the Lee County Shore Protection Project.

I would appreciate your review of the concerns regarding the timetable for this project and whether there is anything I can do to assist in shortening the timeframe.

As I would like to respond to the Association as soon as possible, my thanks in advance for your prompt attention to this matter.

Please reply to Christy Hahn in my Fort Myers District office at the above address.

Kindest regards,

Porter Goss
Member of Congress

PG:ch

JAX DISTRICT OCT 2 '93 1000

THIS STATIONERY PRINTED ON PAPER MADE OF RECYCLED FIBERS

sparilla Island Conservation and Improvement Association, Inc. / Post Office Box 446 / Boca Grande, Florida 33921 / Telephone: 813 964-2(

G·I·C·I·A·

October 11, 1993

Mr. Richard Bonner
Deputy District Engineer
Program Project Management
Jacksonville District Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232

Dear Mr. Bonner:

We are writing you on behalf of the membership of the Gasparilla Island Conservation and Improvement Association, Inc. (GICIA) to ask for your assistance in implementing the Lee County Shore Protection Project - Gasparilla Island Segment in the near future. Authorized in 1970, this project's merit has grown considerably during the last twenty-three years as erosion rates on southern Gasparilla Island have increased alarmingly. Many of our upland structures are now in jeopardy. Although the March 1993 maintenance dredging of the Boca Grade Pass and resulting spoil disposal onto Gasparilla Island's shores provided a welcome addition of roughly 450,000 cubic yards of material, the erosion problem on Gasparilla Island is far from being solved.

We understand that a terminal structure had been proposed as a result of preliminary research prior to the 1970 authorization. We hired an independent coastal engineer to perform a feasibility study of our shoreline to examine our overall erosion problem. He also recommends the installation of a terminal structure to reduce both erosion rates on the island as well as the frequency of maintenance dredging required to keep the Pass navigable by slowing the flow of our sand into the Boca Grande Pass.

Our Association has had an excellent working relationship with Mr. Richard McMillen over the years and would hope that he would be the staff person assigned to this project by your office. He will certainly hit the ground running as he has an existing knowledge of our shores and the problems that confront them as well as a proven record of working well with the membership of this Association.

If possible, we would like to host a meeting with your staff, Lee County staff, DEP staff, and our engineer to discuss how best to achieve the installation of a terminal structure in a timely manner. Please let me know what dates will be convenient for you or your staff. We understand that further research will be required prior to implementing the construction of any structure and we understand that Florida's Department of Environmental Protection's Division of Beaches and Shores has recommended an inlet management plan be performed on Boca Grande Pass in FY 94-95. Hopefully this Association, with Lee County as a local sponsor, can help to coordinate and expedite these studies by having our engineer provide any initial research that will be necessary.

We look forward to working with the Corps again on what we believe to be a project which will benefit both the residents of Gasparilla Island, the Corps of Engineers, and all of the users of the Boca Grande Pass.

Sincerely,

Chauncey P. Goss II
Executive Director

cc: Colonel Terrence C. Salt
Honorable Porter J. Goss
Donald Stillwell, Lee County Administrator

CC: DKD

F A X

LEE Co.
DIVISION
OF
NATURAL RESOURCES MGMT

FAX: 813/335-2792

DATE: 12/7/93

TO: RICK McMILLEN - USACE

FROM: ROLAND OTTOLINI

TELE/EXT. # (813) 335-2791

OF PAGES: 4
(Including Cover)

MESSAGE: RICK, I WOULD APPRECIATE IT IF YOU COULD REVIEW THIS [illegible] TO ME. THANK ROLAND

Recommendation:

Staff recommends pursuing the Federal Shore Protection Project as the long-term solution to the erosion problems. However, we will need an intensive lobbying effort to get these funds reappropriated. We request a follow-up meeting with those who can provide assistance in this effort.

Timing is important, USACE is on a 2 year budget cycle and therefore funds must be available at the start of FY 95.

DISTRIBUTION: Board of County Commissioners
Donald Stilwell, County Administrator
Bill Hammond, Deputy County Administrator
Mary Gibbs, Director, DCD
Walter Stephens, Director, DNRM
Elaine McLaughlin, Director, DED
Chauncey Goss, Exec. Director, GICIA
Bob Searles, GICIA
Don Petrocelli, FM Beach Chamber of Commerce
Richard McMillen, USACE
Lonnie Ryder, FDEP, Beaches and Shores
File

MEMORANDUM
DEPARTMENT OF COMMUNITY DEVELOPMENT
DIVISION OF NATURAL RESOURCES MANAGEMENT

TO: DISTRIBUTION

FROM: Roland Ottolini, P.E.
Professional Engineer III

DATE: December 3, 1993

MEMO #:P033005

RE: Federal Shore Protection Project
Gasparilla Island and Estero Island Segments

A meeting was held with representatives of the United States Army Corps of Engineers (USACE), Florida Department of Environmental Protection-Beaches and Shores (DEP), Gasparilla Island Conservation and Improvement Association (GICIA) and Lee County on December 1 in Jacksonville, to discuss the implementation of the Federal Shore Protection Project for the Gasparilla Island and Estero Island segments.

USACE briefly described the 1970 feasibility study that identified the severe beach erosion problems along these segments of shoreline as well as Captiva Island. And because of the age of this study, a General Re-evaluation Report (GRR) would have to be developed prior to any further action by USACE. This report would include intensive data collection to analyze real estate changes, geology of area, borrow sites, economics, etc... In addition, an Environmental Impact Study (EIS) would also be necessary. Upon completion of the above and internal reviews, they would then proceed with final design, plans and specifications, and permitting. After these are completed and all necessary easements are in place, construction of the beach improvements could begin.

Unfortunately, USACE indicated that these projects are no longer in the Federal budget and funds must be reappropriated by Congress.

Should the funds become available the following schedule would be likely:

OCT 94 - begin economic update
MAR 94 - approve economic update and begin data collection for GRR
OCT 94 - begin GRR and EIS
DEC 96 - complete GRR and EIS and submit to USACE - SAD and HQ review and approval process

JUNE 97- complete internal review and finalize design documents

JUNE 98 - approve design documents and EIS (Key date critical to budget cycle), prepare plans and specifications, obtain water quality certification from State, obtain real estate requirements, negotiate construction contract

OCT 00 begin construction

Note: USACE is on a 2 year budget cycle and funds are available in allotments, not guaranteed year from year.

Another option would be for the local sponsor to do the work and seek reimbursement from the USACE. This is provided for under Section 206 of the 1992 Water Resources Development Act. However, there is no guarantee on availability of reimbursement funds or time of payment. They cited difficulties experienced by Manatee County and Captiva Island. This option is formalized in an agreement with the local sponsor and USACE. Unfortunately, there are currently no guidelines set for this approach.

Also discussed was the fact that the proposed improvements for Gasparilla Island would benefit the Federal dredging project of Boca Grande Pass by reducing the amount of sand drifting into the channel. USACE indicated that a study would have to be provided to "join" the two projects. This could be done internally depending on availability of staff time.

DEP indicated that a inlet management plan (IMP) for Boca Grande Pass was in the State budget and would begin July 1994. Upon completion of that study, they would then be able to review our previous request for State funds for the construction of the beach improvements for Gasparilla Island. Schedule through this route may be shorter than the USACE, Federal Shore Protection Project.

At the conclusion of the meeting, staff and GICIA reiterated the severity of the erosion problems along Gasparilla Island and Estero Island. Examples given were the failing seawall at the southern tip of Gasparilla Island and the destroyed parking area at Lynn Hall Park, Estero Island.

CC Dir/Pro Rid

HUMISTON & MOORE ENGINEERS
COASTAL ENVIRONMENTAL DESIGN AND PERMITTING

5051 CASTELLO DR., SUITE 240
NAPLES, FLORIDA 33940
FAX: 813 261 5297
PHONE: 813 261 8160

TELECOPIER COVER SHEET
FOR IMMEDIATE DELIVERY

DATE: 12/10/93

FILE NO: 3025

TO: Rick McMillan FAX NO: 904-232-1213

FIRM NAME: Corps of Engineers

FROM: Ken Humiston

MESSAGE:

TOTAL NUMBER OF PAGES INCLUDING THIS PAGE: 3

The information contained in this facsimile message is privileged and confidential information intended for the use of the individual or entity named above. If you have received this information in error, please notify us immediately by telephone and return the original message to us at the address listed above via U.S. Postal Service. Thank you.

HUMISTON
& MOORE
ENGINEERS
COASTAL
ENVIRONMENTAL
DESIGN AND
PERMITTING

5051 CASTELLO DR., SUITE 240
NAPLES, FLORIDA 33940
FAX: 813 261 5297
PHONE: 813 261 8160

December 10, 1993

SENT VIA FAX

Mr. Rick McMillan
U.S. Army Corps of Engineers
400 West Bay Street
Jacksonville, Florida 32232-0019

Re: Gasparilla Island Erosion Control Project.
H&M File No. 3025.

Dear Rick:

As I discussed with you this morning, we are preparing to do a survey of Boca Grande Pass and the beach on Gasparilla Island, and to measure tidal current velocities around the southern tip of the Island. The purpose of this is to assemble data and develop design criteria for the erosion control project recommended in the feasibility study which I recently sent to you.

Our client, the Gasparilla Island Conservation and Improvement Association (GICIA), is interested in coordinating with you and with the State of Florida so that data collected under this initial project effort will additionally be useful for the purposes of all agencies. In your case, this would be for the purpose of the General Reevaluation of the Federal Erosion Control Project.

Enclosed is a copy of our survey plan. We would appreciate it if you would review this with your staff and let us know if collection of this data will further the cause of completing the General Reevaluation. Please note that the beach profiles will be collected at DEP R-monuments to facilitate comparison with previous surveys done by DNR. If there are any general requirements for Federal Surveys we should fulfil, please let me know.

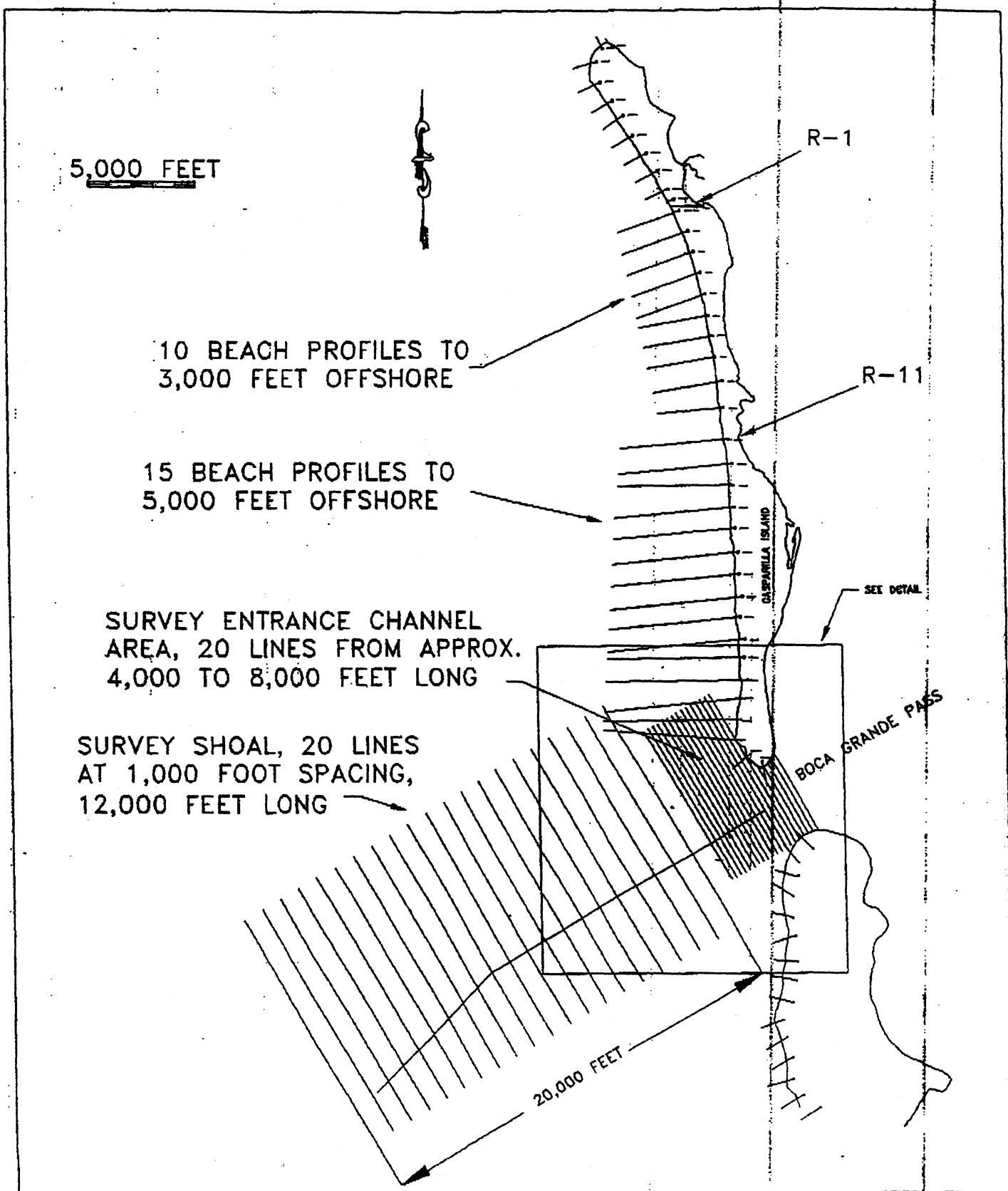
There is some urgency to this request because we would like to take advantage of good weather expected over the next several days to get started with this field work. We would, therefore, appreciate it if you would give us a call after you have had a chance to review the attached plan.

Sincerely yours,

HUMISTON & MOORE ENGINEERS

Kenneth K. Humiston, P.E.

Copy to Chauncey Goss



HUMISTON & MOORE ENGINEERS COASTAL ENVIRONMENTAL DESIGN AND PERMITTING 5051 CASTELLO DR. SUITE 240, NAPLES, FLORIDA 33942	EROSION CONTROL HYDROGRAPHIC SURVEY PLAN FOR GASPARILLA ISLAND CONSERVATION AND IMPROVEMENT ASSOCIATION	DATE: 7/19/93	FILE: HM 3-025	SCALE: AS SHOWN
		DRAWN: KH	DATUM:	SHEET: 1 OF 1

RIM

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

REPLY TO
ATTENTION OF

November 30, 1993

Programs and Project Management Division
Project Management Branch

Mr. J.B. Baldwin
Parsley-Baldwin Reality
Post Office Box 605
Boca Grande, Florida 33921-0605

Dear Mr. Baldwin:

This is in response to your November 17, 1993, letter regarding the Lee County Shore Protection Project - Gasparilla and Estero Island Segments.

The U.S. Army Corps of Engineers, Jacksonville District, has coordinated a meeting on December 1, 1993, with representatives from Lee County, Gasparilla Island Conservation and Improvement Association, the State, and our office to discuss the implementation of this project.

Thank you for your interest in the Lee County Shore Protection Project. If any additional information or assistance is required, please contact the project manager, Mr. Richard McMillen, at 904-232-1231.

Sincerely,

Dennis R Dube

for Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Rhu

RUSSO & RUSSO Route Five Barrington Hills, Illinois 60010

FAX MEMO

DATE: 3/18/94

To: Charlie Stevens FAX (904) 232-1213

From: David Russo Phone \ Fax Illinois (708) 426-5222
Florida (813) 992-1964

MESSAGE

Mr. Stevens:

Attached is a copy of the letter by Richard Bonner responding to the Lee County resolution.

I appreciate your patience with me on this subject. As we have discussed it is a very confusing process.

Thank You!

Sincerely,

David Russo, Bonita Beach Club, Fax #(813) 992-9417

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

November 6, 1990

NOV 1 8 1990

REPLY TO
ATTENTION OF

Planning Division
Plan Formulation Branch
Coastal Section

Mr. Chuck Listowski
Marine Sciences Division
3410 Palm Beach Blvd
Fort Myers, Florida 33916

Dear Mr. Listowski:

I was pleased to receive the Lee County Resolution 90-05-41, dated May 23, 1990, which indicates the County's desire to be the local sponsor for the Gasparilla and Estero Island segments of the Federal Shore Protection Project for Lee County. Initiation of planning, engineering, and design for the Gasparilla and Estero Island segments will be subject to Congressional appropriation of project funds. The 1991 fiscal year budget does not include funds for the Lee County project. We will give consideration in future budget requests for funding of a general design memorandum to reevaluate and reformulate the authorized project.

In regard to your request for a Section 103 continuing authority study for Little Hickory Island/Bonita Beach, we estimate that it would cost approximately $4.5 million to restore the 3.0 miles of eroded shoreline at Bonita Beach. This estimate is based on unit prices contained in the cost estimates provided to you in a letter dated February 28, 1990 for the Gasparilla Island segment of the Federal project.

Under Section 103, we are limited to $2.0 million total Federal participation. This includes the cost for the feasibility study, planning, engineering and design, initial construction, and all future nourishment. The Federal share of projects such as this can be as much as 65 percent depending on project outputs and shore ownership. Due to the anticipated scope of the project, it would appear that the possible Federal share of initial construction alone would be greater than $2.0 million. Therefore, we recommend that you pursue a Congressionally authorized shore protection study for Little Hickory Island/Bonita Beach. Enclosed is a Water Resources Assistance pamphlet which describes the various study authorities by which the Corps of Engineers is able to perform work. The procedure for requesting a Congressionally authorized study is described in item 2 on page 12. Regardless of the authority, the study would be accomplished in two phases. The first phase is the reconnaissance phase which requires approximately one year to complete and is 100 percent Federally funded. The second phase is the feasibility phase and is cost shared 50/50 with the local study sponsor.

Please let me know if I can help or provide additional clarification.

Sincerely,

Richard E. Bonner

Encl

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

CESAJ-DP-I (1110-2-1150a) 31 July 1995

MEMORANDUM FOR Commander, South Atlantic Division,
ATTN: CESAD-PM-C

SUBJECT: Lee County, Florida, Shore Protection Project - General Design Conference on Preparation of the General Reevaluation Report

1. Enclosed is the memorandum for the record, 24 July 1995, for the subject conference.

2. Please contact Mr. Charles Stevens at 904-232-2113 for additional information.

FOR THE COMMANDER:

Encl

RICHARD E. BONNER, P.E.
Deputy District Engineer
for Project Management

CESAJ-DP-I 24 July 1995

MEMORANDUM FOR THE RECORD

Lee County, Florida, Shore Protection Project - General Design Conference (GDC), on 18 May 1995, for Preparation of the General Reevaluation Report (GRR) for Gasparilla and Estero Islands

1. The meeting was held via a video teleconference between CESAD & CESAJ on 18 May 1995. CECW was not represented. The non-Federal sponsor, Lee County government, communicated by telephone throughout the conference. The advance information provided CESAD consisted of the recently completed economic update and the draft agenda for the meeting.

2. The meeting was begun by CESAJ-DP-I with the current authorization and schedule for the overall project. The status of the Captiva Island segment was provided since it is not part of the current GRR, due to the desire of the Captiva Island Erosion Prevention District (CEPD). The CEPD currently has a DM with EA under review at CESAJ for the first renourishment which is anticipated by the CEPD in the fall and winter of 1995.

3. The discussion on the GRR preparation was initiated by mentioning the letter from Lee County requesting initiation of PED for Gasparilla and Estero Islands. The following items were the primary topics of discussion;

Planning Division:

4. The Section 933 report for Charlotte Harbor and Gasparilla Island contains recent economic analyses that should be utilized to the extent practicable.

5. CESAJ-PD-P requested that CESAD provide information on risk analysis if CESAD desired this to be included, since guidance on risk analysis did not exist at the time of the GDC. PD-P also requested that if risk analysis is not a requirement, that CESAJ be allowed to prepare only the traditional analyses. CESAD indicated that this would be evaluated and CESAJ would be advised by CESAD.

6. Aerial Photography: This will be needed to update shorefront development and assist in preparation of the real estate appendix.

7. A request was made of CESAD to provide information on what would be the extent of the quality assurance that CESAD would provide on preparation and review of the GRR, noting that the technical review would be done by the districts after October 1995.

Environmental Resources Branch:

8. Cultural resource evaluations will be needed for the new borrow area to be developed from ongoing geotechnical data collection. Sidescan data will also be needed.

9. The NEPA document to be prepared may be an EA. This will be the document that CESAJ will prepare initially, since there is no indication that the project is controversial. CESAD will leave the decision on whether to prepare an EA or an EIS to CESAJ. CESAD had no objection to CESAJ preparing an EIS if that was deemed necessary. The initial authorization for the project was in 1970 and no NEPA document was prepared.

Engineering Division:

10. Hydrology and Hydraulics Branch would be preparing the storm damage recession analysis, S-Beach and Genesis computer analyses. The sponsor mentioned that they were interested in an evaluation of the use of breakwaters.

11. Geotechnical Branch indicated that field work had been initiated in FY 95 and would be completed in FY 96.

Real Estate Division:

12. As part of the GRR a real estate appendix would be prepared including a real estate map.

Project Management Division:

13. The state WQC will be obtained by CESAJ, rather than the sponsor, after the GRR is approved, if this is consistent with the administration's policy at that time.

14. Based upon current information from the network analysis for the GRR, authorization in WRDA 1998 would be possible.

Charles F. Stevens

Charles F. Stevens
Project Management Branch

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

REPLY TO
ATTENTION OF

March 6, 1997

Programs and Project Management Division
Project Management Branch

Honorable Porter Goss
House of Representatives
Washington, DC 20515

Dear Mr. Goss:

This is in response to the request from Mr. Jim Boxold of your office on March 3, 1997, regarding preparation of the General Reevaluation Report (GRR) for the Gasparilla and Estero Island segments of the Lee County, Florida, Shore Protection project. The project was authorized by House Document 91-395 in October 1970.

Preparation of the GRR was initiated in February 1995. At the time, it was anticipated that the GRR could be completed by March 1998, if additional funds were provided each year. As you know, funds were provided in FY 95 and FY 96. Funds provided in FY 97 are only sufficient for the reimbursement of the Federal share of costs for renourishment of Captiva Island.

Funds for continuation of the GRR were not included in the President's FY 98 budget request. This is due to the Administration's policy of seeking a reduction in the budget deficit. Thus far during FY 97, the Jacksonville District has continued preparation of the GRR with limited carryover funds from FY 96. The main emphasis of this work in FY 97 is completion of a geotechnical report based upon field data that was recently collected.

The current schedule indicates that if funds were provided in FY 98 and FY 99, it is anticipated that the GRR could be completed by March 1999. One year delay in the schedule would be anticipated for each year that additional funds were not provided. It is currently estimated that a total of $500,000 in additional funds and 2 years will be required to complete the GRR if funds are provided by Congress in the FY 98 budget.

If any additional information or assistance is needed, please call me, or Mr. Joseph Burns, Congressional Liaison, at 904-232-2243.

Sincerely,

Dennis R. Duke

for Terry L. Rice
Colonel, U.S. Army
District Engineer

DENNIS R. DUKE
Principal Assistant to
Deputy District Engineer
for Project Management

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)
Mr. Roland Ottolini, P.E., Lee County Division of Natural Resources Management, 2012 Altamont Avenue, Fort Myers, Florida 33902

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

March 24, 1997

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Honorable Porter Goss
House of Representatives
Washington, DC 20515

Dear Mr. Goss:

This is in response to your letter dated March 6, 1997, regarding preparation of the General Reevaluation Report (GRR) for the Gasparilla and Estero Island segments of the Lee County, Florida, Shore Protection project. The project was authorized by House Document 91-395 in October 1970.

As discussed in our March 6, 1997, letter to your office, funds for continuation of the GRR were not included in the President's Fiscal Year (FY) 98 budget request. Thus far during FY 97, our office has continued preparation of the GRR with limited carryover funds from FY 96. The main emphasis of this work in FY 97 is completion of a geotechnical report based upon field data that was recently collected. It is currently estimated that a total of $500,000 in additional funds and 2 years will be required to complete the GRR if funds are provided by Congress in the FY 98 budget. Our authority to reprogram funds is limited to $300,000 in additional funds. However, there are no surplus funds available within our office to reprogram for preparation of the GRR at this time.

If any additional information or assistance is needed, please call me, or Mr. Joseph Burns, Congressional Liaison, at 904-232-2243.

Sincerely,

Terry L. Rice
Colonel, U.S. Army
District Engineer

James A. Connell
Lieutenant Colonel, U.S. Army
Deputy District Engineer

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)
Mr. Roland Ottolini, P.E., Lee County Division of Natural Resources Management, 2012 Altamont Avenue, Fort Myers, Florida 33902

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

February 20, 1998

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Honorable Connie Mack
United States Senate
Washington, DC 20510

Dear Senator Mack:

This is in regard to the January 30, 1998, letter to you from Ms. Marsha Segal-George concerning Fort Myers Beach on Estero Island. A fax copy of the letter was provided by Ms. Deidra Ciriello of your office on January 30, 1998.

Our office is currently preparing a General Reevaluation Report (GRR) for the Estero Island and Gasparilla Island segments of the Lee County Shore Protection project. The purpose of the GRR is to evaluate if the project authorized by House Document 91-395 in 1970 requires reformulation and to determine the National Economic Development Plan based upon current guidelines. Funds were provided by Congress in Fiscal Year (FY) 1998 for continuation of this GRR which was initiated in 1995. Approximately $200,000 in additional funds will be required to complete the GRR. However, no funds are included in the President's FY 99 budget for this project. If funds were provided in FY 99, it is anticipated that the GRR will be completed in March 1999.

Following completion of a GRR that recommended construction of a project at Estero Island, Congressional authorization of the project might be necessary if the project differs significantly from the project authorized in 1970.

In regard to the placement of maintenance dredging material from Federal navigation projects, it is our policy to place beach quality material onto adjacent beaches. Beach quality material from this project has been placed on Estero Island in the past. Fort Myers Beach (Estero Pass and Matanzas Pass) navigation project was not included in the President's budget for FY 99 and, therefore, will not be dredged.

The Coast of Florida Erosion and Storm Effects Study is currently underway along the Atlantic Coast of Florida. A feasibility report for Palm Beach, Broward, and Dade Counties was completed in 1996. Federal funding for the study has not been provided in either the FY 97 or FY 98 budgets. Carryover funds remaining from the FY 96 appropriation are being utilized and will be exhausted during FY 98. Continuation of the study to complete a feasibility report for the remainder of the Atlantic Coast is contingent upon the inclusion of the study in future budgets. Initiation of the feasibility report for the Gulf Coast would be contingent upon future appropriation of funds by Congress.

If you have any additional questions or need additional information, please call me or have your staff contact Mr. Joseph Burns, Congressional Liaison, at 904-232-2243.

Sincerely,

Joe R. Miller
Colonel, U.S. Army
District Engineer

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)

APPENDIX D

REAL ESTATE

APPENDIX D
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SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT

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APPENDIX D

1. Statement of Purpose. This Real Estate Plan is for the General Reevaluation Report for the Federally authorized shore protection project for Lee County, Florida. This Real Estate Plan is only for planning purposes and both the final real property acquisition lines and estimates of value are subject to change even after approval of this report.

2. Project Authorization.

The Lee County portion of the Florida Shore Protection Project, as described in House Document (HD) 91-395, was authorized by House resolution dated December 15, 1970, and Senate Resolution dated December 17, 1970. The authorized project includes shore protection features on Gasparilla, Captiva and Estero Islands. The Captiva Island segment of the authorized project has been constructed, and this appendix only deals with the remaining two islands.

3. Project Location and Description.

a. Lee County is located on the lower gulf coast of Florida, about 90 miles south of the entrance to Tampa Bay and 130 miles north of Key West. The 44 mile coastline consists of coastal barrier islands separated from the mainland by shallow tidal lagoons and, north of Fort Myers Beach, by the Intracoastal Waterway. The barrier islands range in width from 200 feet to about 2.5 miles. Natural ground elevations are generally less than ten feet above Mean Low Water (MLW).

b. This segment of the authorized project is for Shore Protection for Lee County, Florida, specifically Estero and Gasparilla Islands. The first 0.7 miles are authorized for renourishment only, while the remaining 3.6 miles of the study limits are authorized for a 20 ft berm at elevation 13.0 feet above MLW. Current plans for both these islands call for partial renourishments of each islands' western shoreline.

1. Estero Island -- The renourishment of Estero Island will begin at the north end of the island and proceed southward 4.7 miles, using 791,000 cubic yards of fill.

2. Gasparilla Island -- For Gasparilla Island, the current plan is to begin at the southern tip of the island and

renourish a stretch of beach for a distance of 2.8 miles northward, utilizing 786,000 cubic yards of fill.

4. Government-Owned Land.

a. Both Gasparilla and Estero Islands contain numerous parcels owned by the Federal government, the State of Florida and the Local Sponsor. The Local Sponsor has identified various parcels which may be used for access as well as staging areas, such parcels being in the ownership of the federal, state or local governments as well as privately-owned vacant properties. The local sponsor for this project is Lee County.

b. Currently, an erosion control line (ECL) has not been designated for the project; however, an ECL will be established prior to construction. The MHW is an estimate of where the ECL will be set. The State of Florida owns the submerged lands seaward of the proposed ECL (MHW), for the benefit of the people of the State.

5. Real Estate Requirements.

a. Material placed upon public lands seaward of the proposed ECL will require a Consent of Use from the State of Florida. The Consent of Use basically grants the rights to place material on state-owned submerged lands in accordance with the beach nourishment plans submitted with the application for an erosion control line. Also included in this document is the use of any submerged borrow areas and/or pipeline corridors. This document must be renewed with each renourishment contract.

b. Easements are needed for approximately 350 parcels on Estero Island and approximately 150 parcels on Gasparilla Island located landward of the proposed ECL. It is recommended that the local sponsors acquire the standard perpetual beach storm reduction easement estate. In the event the local sponsor encounters difficulties in acquiring this perpetual estate and so notifies the Corps of Engineers, it is recommended that approval be granted for the local sponsors to acquire a temporary beach storm reduction easement for a fifty-year term concurrent with the duration of the project.

c. The Appraiser has determined that the value of the lands needed for easement purposes are assessed at zero. Erodable land that is to be protected by the Federal project is valued at zero as it will be enhanced post-project. Federal regulations state that "shore protection projects will generally be treated in a manner as to not allow credit for lands when the project provides direct benefits such as prevention of erosion or re-establishment of beaches".

d. The borrow area for Estero Island is located approximately 16 miles west of the island and designated as Estero Borrow Area B. For Gasparilla Island, the borrow area is directly offshore of the southwestern portion of the island and designated as the Gasparilla Borrow Area - Boca Grande. A Consent of Use will be obtained from the State of Florida for each of these borrow areas.

e. Access will be by public access routes located throughout the project area. Such access routes have been identified by the Local Sponsor as sites that were utilized during the first nourishment of the beach and are potential sites for this renourishment. Staging areas will be located within the perpetual beach storm damage reduction easement areas acquired for project construction as well as the sites identified by the Local Sponsor.

6. **Non-Federal Operation/Maintenance Responsibilities.** The non-Federal sponsors will operate and maintain the project for the project life. Future periodic nourishments are considered construction and will be performed as part of the Federal project.

7. **Non-Federal Authority to Participate in the Project.** Lee County, Florida, is the non-Federal sponsor of the project and is a political subdivision of the State of Florida as provided by Article 8, Section 1 of the Florida Constitution. Counties of Florida are empowered by Florida Statutes 125.001 to "Establish and administer programs of ...flood and Shore Protection..." By Chapter 127, counties are empowered to exercise eminent domain powers for any county purpose except certain restrictions that apply on recreational projects.

8. **Minerals.** There are no known minerals of value in the project area.

9. **Hazardous and Toxic Wastes (HTW).** There have been no hazardous or toxic wastes identified within the project area.

10. **Relocation Assistance Payments (Public Law 91-646).** No persons or business will require relocation.

11. **Recreation Lands.** There are no separable recreational lands identified for the project.

12. **Structures and Facilities.** There are no structures and facilities to be affected as part of the Federal project.

13a. Total Acquisition/Administrative Costs (Both Estero and Gasparilla Islands). [For breakdown of costs for each island, see 13b and 13c below]

a. Federal Acquisition/Administrative Cost Estimate:

Project Planning	$ 8,750
Review of Acquisition	$ 84,750
Total Federal Acquisition/ Administrative Cost	$ 93,500

b. Non-Federal Acquisition/Administrative Cost Estimate:

Acquisitions	$310,000
Temporary Permits	5,000
Damage Claims	6,000
Total Non-Federal Acquisition/ Administrative Cost	$321,000

13b. Acquisition/Administrative Costs. (Estero Island Portion) [Calculation based upon number of tracts to be acquired and 70% of costs are therefore attributed to Estero Island]

a. Federal Acquisition/Administrative Cost Estimate:

Project Planning	$ 6,500
Review of Acquisition	$ 54,250
Total Federal Acquisition/ Administrative Cost	$ 60,750

b. Non-Federal Acquisition/Administrative Cost Estimate:

Acquisitions	$220,000
Temporary Permits	4,400
Damage Claims	5,100
Total Non-Federal Acquisition/ Administrative Cost	$229,500

13c. Acquisition/Administrative Costs. (Gasparilla Island Portion) [Calculation based upon number of tracts to be acquired and 30% of costs are therefore attributed to Gasparilla Island]

a. Federal Acquisition/Administrative Cost Estimate:

Project Planning	$ 2,250
Review of Acquisition	$ 30,500
Total Federal Acquisition/ Administrative Cost	$ 32,750

b. Non-Federal Acquisition/Administrative Cost Estimate:

Acquisitions	$ 90,000
Temporary Permits	600
Damage Claims	900
Total Non-Federal Acquisition/ Administrative Cost	$ 91,500

14a. Summary of Total Real Estate Costs (Both Estero and Gasparilla Islands). [For breakdown of costs for each island, see 14b and 14c below]

a.	Lands:	
	Lands:	0
	Improvements:	0
	Severance Damages:	0
	Minerals:	0
	Total Lands and Damages	$ 0
b.	Acquisition/Administrative	
	Federal	93,500
	Non-Federal	321,000
c.	Public Law 91-646	0
d.	Contingencies (25%)	104,000
e.	Total Real Estate Cost	$518,500

14b. Summary of Real Estate Costs (Estero Island) [Calculation based upon number of tracts to be acquired and 70% of costs are therefore attributed to Estero Island].

a.	Lands:	
	Lands:	0
	Improvements:	0
	Severance Damages:	0
	Minerals:	0
	Total Lands and Damages	$ 0
b.	Acquisition/Administrative	
	Federal	60,750
	Non-Federal	229,500
c.	Public Law 91-646	0
d.	Contingencies (25%)	72,000
e.	Total Real Estate Cost	$362,250

14c. Summary of Total Real Estate Costs (Gasparilla Island). [Calculation based upon number of tracts to be acquired and 30% of costs are therefore attributed to Gasparilla Island]

a.	Lands:	
	Lands:	0
	Improvements:	0
	Severance Damages:	0
	Minerals:	0
	Total Lands and Damages	$ 0
b.	Acquisition/Administrative	
	Federal	32,750
	Non-Federal	91,500
c.	Public Law 91-646	0
d.	Contingencies (25%)	31,000
e.	Total Real Estate Cost	$155,250

15. Real Estate Acquisition Schedule.

According to the latest project schedule, land acquisition is currently contingent upon the final plans in the Plans and Specifications which is also not funded at this time. Acquiring the easements will be the responsibility of the project sponsors.

16. Estates to be Acquired.

It is recommended that the local sponsors acquire the standard perpetual beach storm reduction easement estate, as is described under item a. below. In the event the local sponsors encounter difficulties in acquiring a perpetual beach easement from a private owner and so notifies the Corps of Engineers, it is recommended that approval be granted for the local sponsor to acquire a temporary beach storm reduction easement for a fifty-year term concurrent with the duration of the project. This easement is described under item b.

a. 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) (Tracts 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 Lee County Shore Protection Project, together with the right of public use and access; (to plant vegetation on said dunes and berms; to erect, maintain and remove silt screens and snow fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas;) 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 (except _____); (reserving, however, to the grantor(s), (his) (her) (its) (their) heirs, successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further) 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.

b. Temporary Beach Storm Damage Reduction Easement: A temporary and assignable easement and right-of-way for a fifty-year term concurrent with the duration of the project in, on, over and across the hereinafter described land 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 Lee County Shore Protection Project, together with the right of public use and access; (to plant vegetation on said dunes and berms; to erect, maintain and

remove silt screens and snow fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas;) 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 (except _____); (reserving, however, to the grantor(s), (his) (her) (its) (their) heirs, successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further) 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.

c. Consent of Use -

(1) There is no estate which the Local Sponsor acquires from the State to place material seaward of the ECL, however, the State issues a permit type document known as a "Consent of Use." This consent is issued upon approval of the initial Water Quality Certificate by the Florida Department of Environmental Regulation, and the ECL is approved by the Governor and his Cabinet.

(2) The consent of use basically grants the rights to place sand on state-owned submerged land in accordance with the beach nourishment plans submitted with the application for an ECL. This document must be renewed with the renewal of the Water Quality Certificate.

17. Map. Real estate maps of the proposed project areas are available in the real estate office but not included with this appendix due to their large size.

18. Chart of Accounts.

01	Lands and Damages	
01A00	Project Planning (Federal)	$ 8,750
01B00	Acquisitions	
	By Project Sponsor (Non-Federal)	$ 310,000
	Review of Project Sponsor (Federal)	$ 84,750
01G	Temporary Permits/Rights-of-Entry	
01G20	By Project Sponsor (Non-Federal)	$ 5,000
01G60	Damage Claims	$ 6,000
TOTAL REAL ESTATE COSTS EXCL. CONTINGENCIES (RD)		$ 414,500
TOTAL REAL ESTATE CONTINGENCIES (25%) (RD)		$ 104,000
TOTAL REAL ESTATE COST (RD)		$ 518,500

APPENDIX E
ECONOMIC ANALYSIS of STORM DAMAGES
with RECREATION BENEFITS

LEE COUNTY, FLORIDA SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
GENERAL RE-EVALUATION
1999

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ECONOMIC APPENDIX
STORM DAMAGE ANALYSIS
GENERAL RE-EVALUATION
of
LEE COUNTY, FLORIDA SHORE PROTECTION PROJECT
GASPARILLA AND ESTERO ISLANDS
1999

INTRODUCTION

1. The purpose of this Appendix is to document the economic justification for *The Lee County Shore Protection Project, General Re-evaluation Report*. The Appendix will identify potential losses that could occur from indiced storms which could cause damages to residential, commercial and retail structures in the effected area along the Gulf of Mexico. It will further describe the derivation of the National Economic Development Plan, and, the benefits from the selected alternative plan of improvement based on the expected reduction in damages from storms. The analysis of the NED benefits is based on guidance contained in *ER 1105-2-100* known as *The Planning Guidance Notebook*. This Appendix is prepared independently of other appendices. It is based on economic principles and analysis and reflects the assessment of damages and the benefits to be derived from engineering information provided in making the final conclusions and recommendations.

2. Lee County, Florida is located in the southwestern section of the state. It is one of the lower gulf coast counties. It is bordered on its north by Charlotte County, on the east by Hendry County, on the south by Collier County and on the west by the Gulf of Mexico. It is about 90 miles south of the entrance to Tampa Bay and about 130 miles north of Key West. The 44-mile coastline of Lee County consists of seven coastal barrier islands and several smaller islands separated from the mainland by shallow tidal lagoons. Lee County is the 11th largest county in the state and occupies a land area of 803.6 square miles. The largest city in the county is Cape Coral followed by Ft. Myers. The seat of county government is at Ft. Myers.

PREVIOUS STUDIES

3. In July 1990, a study was conducted[1] to survey the gulf shoreline of Gasparilla Island. The overall objective was to examine the need and feasibility of beach disposal of maintenance material obtained from the Federal navigation project for Charlotte Harbor. The project was to control beach erosion and provide protection to upland development.

4. The economic justification for that study stated that the Federal Government was to cost share in the additional cost to place maintenance material from the Federal navigation project for Charlotte Harbor on the beach, if publicly acceptable. The project was analyzed using two interest rates: 8.5% and 8.75%. Four alternative plans for extension of the beach profile were considered: 25, 50, 75 and 100 feet. Extending the beach width 50 feet seaward produced $681,000 in net benefits and a benefit-to-cost ratio of 1.58 to 1.0, superior to any other extension of the beach profile. Analyzing the project at the 8.75% interest rate, a 50-foot extension produced $674,000 in net benefits and a benefit-to-cost ratio of 1.60 to 1.0. Again, the 50-foot extension was superior to the other three alternative plans for extension of the beach.[2]

5. In an economic update report[3], the project was justified at that point where a benefits-to-cost ratio produced benefits of 3.90 to 1.0 for Gasparilla Island and 8.5 to 1.0 for Estero Island. This was the authorized project which consisted of beach restoration features as revetment and terminal groins.

DEFINITION OF THE STUDY AREA

6. The focus of this study is confined to Gasparilla and Estero Islands in Lee County. Gasparilla Island lies partially in Charlotte County. The larger section of Gasparilla Island lies in Charlotte County, which is outside of the study boundaries. The southern five miles are in Lee County. Storm damages were estimated only for that portion of Gasparilla Island which lies in Lee County for this study. Gasparilla is the larger of the two

1. *Lee County, Florida, Charlotte Harbor, Section 933 Study with Environmental Assessment.* *U.S.Army Corps of Engineers. (July 1990 rev. April 1991*
2. Ibid.1. pg 46
3. Economic Update Report, Lee County, Florida, Beach Erosion Control Project, Gasparilla and Estero Island Segments. U.S. Army Corps of Engineers, Jacksonville District. (February 1995) pg.19 & 20

islands. Gasparilla Island is a narrow low island about 6.7 miles long. It is bounded on the north by Gasparilla Pass and on the south by Boca Grande Pass. The island varies in width from about 800 feet near the middle to about 2,900 feet near the southern end. Boca Grande is the only town located on the island. The island is a popular summer and winter resort area with shorefront development almost continuous along the five miles in Lee County.

7. Estero Island is located totally within Lee County. It lies south of Gasparilla Island and the city of Ft. Myers. It is well established with retail and commercial establishments along with residential structures of varying types.

EXISTING PROBLEM IN THE STUDY AREA

8. Erosion of the shoreline has been a continuous problem in Lee County. Major damages are the result of severe storms which occasionally sweep across the Gulf of Mexico impacting the Lee County shoreline. These storms have caused pronounced erosion and damages along the beach undermining and destroying structures. Sections of public roads have been either washed out, undermined or abandoned. Local efforts at storm damage protection methods have been ineffectual. Construction of either shore or long groins have not provided the desired protective beach width although they have been proposed. Construction of revetments, seawalls and other such coastal armor types have had mixed results in terms of providing protection to upland development. An absence of sand in the nearshore littoral system has greatly reduced the effectiveness of the protective nature of a natural beach and dune system[4]. Aerial photography and reconnaissance shows that in some areas along both islands the only coastal armor is the natural dunes and vegetation. These natural dunes and vegetation are not effective in halting or reducing damages from a storm as small as a 10 year event.

9. Another problem in this study is that the two islands are not joined into one land mass. They are separated by an inlet (Boca Grande Pass). The recession of the beaches differ with erosion rates differing for each island. Inasmuch as there is a separation of the two islands, the analysis was divided into two separate parts for storm damage(one for each island) and four Reaches (two for each island).

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4. Ibid. 3. pg. 6

METHODOLOGY USED TO DEVELOP THE EXISTING CONDITIONS IN THE STUDY

10. The initial process was to describe the without project conditions along both beaches. The method used for this task was divided into two major parts. The first was to delineate damageable properties for each island. Using aerial maps, each structure was defined by type, value, position along the shoreline, size and number of floors. The analysis was simplified by dividing each island into two Reaches. Reaches one and two applied to Gasparilla Island. Reaches three and four related to Estero Island. Each structure was further defined in terms of its distance from mean high water 1996 (MHW) as estimated by the Survey Branch of the Jacksonville District. Structure values were furnished by the Lee County Property Appraiser's office and updated by the Jacksonville District's Real Estate Division using the Replacement less Depreciation Method.

11. The second part was the creation of a database in which each respective structure's information was input. Information about each structure was input into a computer spreadsheet. From this compilation of data, using the Storm Damage Computer Model, expected damages for the without project conditions were determined for each island.

THE STORM DAMAGE MODEL

12. The Jacksonville District has developed a Windows based empirical computer model named the Storm Damage Model [SDM] which simulates damages at existing and future years. The model also computes average annual equivalent damages. The model uses data developed from storm frequencies and shoreline recessions along with data which describes each structure and computes expected damages to each structure. For the purposes of analysis, storm damage is defined as the damage incurred by the temporary loss of a given amount of shoreline as a direct result of erosion caused by a storm of a given magnitude and frequency. In addition to residential structures, storm damages were calculated for commercial and public buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments, bulkheads, replacement of lost backfill etc.

13. Storm Frequency and Shoreline Recession. The initial step in how the storm damage computer model computes damages is based on the relationships between storm frequencies and shoreline recessions and damages to structures expected with a given recesion distance from a given storm of a given magnitude. In addition, the impact of a storm as it invades the shoreline

reduces the beach width and the availability of overall beach area over time. Continuous erosion and shoreline recession result in reduced beach width and hence reduced protective value between a structure and the expected shoreline position. As the invasion of the shoreline continues, less and less beach area is available, thus, the recession of the shoreline. This continuation of the destruction of the shoreline, over periods of years, becomes critical in defining the shoreline. The location of the expected shoreline position for each year is based on the historical shoreline recession rate on a per year basis. There are two recession rates used under this analysis: reaches one and two along Gasparilla Island recede at a rate of 2.77 feet per year. Reaches three and four along Estero Island recede at a rate of 3.52 feet per year. The shoreline position for this analysis is based on the 1995 MHW as determined by the State.

14. A cooperative study between investigators at the Coastal Engineering Research Center [CERC] and the Department of Water Resources Engineering [DWRE] developed a numerical model program [S-BEACH] which calculates dune and beach erosion produced by storm waves and water levels. 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, medium sediment grain size water temperature, two transport parameters [K and Eps] and two characteristic slope parameters [B-max and B-foreshore].

15. Probability and Damages. After the relationship between shoreline recession and damage is determined, relationships between the probability of an occurrence and damage is then determined by assigning probabilities from a frequency-recession curve for each existing condition and each future time increment. The relationship between probability and damage was then determined by tabulating total damage estimates for varying frequency storm events.

16. Shoreline Recession and Future Damages. Due to continuing erosion and shoreline recession over time, future damages to development would be more severe with a given storm under without project conditions. With less shoreline area, the continuing destruction of the remaining shoreline which exist increases the potential for further invasion and losses to upland development.

Therefore, the shoreline recession-damage relationship was modified to accommodate the expected shoreline position in future years with respect to the reference shoreline.

17. Recession-Damage Relationships. Given a recession rate on a yearly bases, it can be estimated that at a time in the future, a percentage of the shoreline would be lost. Included in the lost of shoreline can also be structures which are situated within that erosion period. The recession of the beach would continue until encounterd by the existing coastal armor. Thus, future year damages were simulated by determining the location of the shoreline in future years using the different historical erosion rates. Future long-term recession is halted at the year an existing seawall or protective structure is encountered. In some instances future damages could be less if a coastal armor replacement index is selected which provides greater protection than the current coastal armor type.

18. Computation of Average Annual Damages. From a frequency-damage curve, average annual equivalent damages for each project condition were calculated. Using this information, a frequency-damage relationship was constructed for each year of the project life. The resulting estimates of expected damages were converted to an average annual equivalent basis using an interest rate of 6.625 percent(6-5/8%) for the 50 year period of analysis. The estimation of damage prevention benefits attributable to the with project condition was determined by comparing the without project conditions expected damages to those for the with project conditions. The difference between the two is damage prevention benefits.

STORM DAMAGE MODEL INPUTS

19. The input data necessary for the model are the existing and future shoreline positions, the frequency-recession tables, the values of all structures, physical dimensions for each structure such as the lot widths and the number of floors each structure occupies, and the linear distances from a referenced shoreline position to, (1) the existing coastal armor, (2) the seaward most point of a structure and (3) the mid-point distance through a structure. Vacant lots and street ends are given a value of $0.00. If, in the cases of vacant lots and street ends, no monetary value is input, the model will not run effectively.

20. Existing and Future Shoreline Position. The most critical input value in calculating damages is the position of the shoreline. The position of the shoreline under existing

conditions, is an imaginary line which extends the length of the beach (parallel to the shore). It defines where the shoreline (the seaward most point of land area) would begin as determined from the beach profile survey. The beach profile survey was made by the Department of Natural Resources (DNR) in 1995. Damages that would occur under an existing condition are based on a specific rate of erosion of the beach. Where the future shoreline position exist is referenced to the existing shoreline. Based on an erosion rate per year, the position of the shoreline can be estimated for any future given year. As an example, assume the shoreline position under an existing condition was located at some point (100 feet) from a referenced point as determined by DNR. Assume further, the shoreline recedes (in some future year) at a rate of 1.0 foot per year. In 10 years (based on the existing shoreline reference point) the beach would have receded 10 feet landward. For this study, two erosion rates were used.

21. Engineering studies indicate that the shoreline will recede at a specific rate until the existing coastal armor is encountered without preventive action. The shoreline position can also be allowed to recede by varying distances over the project life. For this study, the shoreline was allowed to recede at a specific rate until the existing coastal armor was encountered. The rates varied according to each island. It was assumed that coastal armor constructed under the without project conditions would be sufficient to halt long term erosion, however, that armor would not halt recession associated with a storm greater than a five-year frequency event. Table E-1 is a display of the structure input data for Estero Island. It shows the variation in the shoreline position for Estero Island over the 50 year project life. The shoreline recedes at a rate of 3.52 feet per year reaching a 50-year recession of 195.8 feet in year 2050. Table E-2 is a similar table for Gasparilla Island. It recedes at a rate of 2.77 feet per year over 50 years. The long term recession described in the tables is expected to occur only in areas unprotected by coastal armor.

TABLE E-1
Structure Input Data
Estero Island
Lee County
[**Partial Listing**]

Shoreline Position (in feet)

2001,50
21.6

23.4	26.9	30.4	33.9	37.4
40.9	44.4	48.0	51.5	55.0
58.5	62.0	65.6	69.1	72.6
76.1	79.6	83.2	86.7	90.2
93.7	97.2	100.8	104.3	107.8
111.3	114.8	118.4	121.9	125.4
128.9	132.4	136.0	139.5	143.0
146.5	150.0	153.6	157.1	160.6
164.1	167.6	171.2	174.7	178.4
181.7	185.2	188.8	192.3	195.8

Frequency-recession relationship

11

.0050,343	200 yr
.0060,331	150 yr
.0100,300	100 yr
.0130,278	75 yr
.0200,243	50 yr
.0400,178	25 yr
.0500,163	20 yr
.1000,127	10 yr
.2000, 95	5 yr
.5000, 16	2 yr
1.000, 2	1 yr

TABLE E-1
Structure Input Data
Estero Island
[cont]

Coastal protective armor types

6

Coastal Armor Types Type	Unit Cost	Protection Level	Effects of Armor Types	Percent Replacement	Armor Type Number
Do Nothing	0	0	0	0.00%	1
CSP-Lrg w/4Ton L	1094	150	1	1.00%	2 [seawall]
20′ CSP w/Toe	895	125	1	1.00%	3
18′ CSP	619	90	1	1.00%	4 condo only-no armor
Limerock 700 lbs	219	80	1	1.00%	5 houses only
Revet-2-ton stone	979	125	1	1.00%	6

1.03

Structural improvement values

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bowditch Point Park	0	300	1	1	1	180	181	182
Coconut Beach Condo	1,624,000	520	2	1	6	140	340	270
Vacant Lot	0	160	1	1	6	125	126	127
Condo	190,000	50	2	1	6	140	310	360
Condo	190,000	50	2	1	6	140	350	400
Condo	250,000	50	5	1	6	140	220	280
Condo	550,000	180	4	1	6	140	180	280
Apartment	406,000	60	7	1	6	150	310	360
Beach Club I	507,500	200	7	1	6	200	220	300
Island Shores	2,378,510	250	6	1	6	200	220	270
Island Shores	812,000	100	2	1	6	200	220	270
Windward Condo	609,000	250	2	1	6	220	240	270
Walkway Access.	0	10	1	1	6	280	350	375
Condo	248675	40	2	1	6	145	240	270
Condo	248675	50	2	1	6	170	190	220
Condo	278516	50	2	1	6	170	180	230
Condo	913500	100	2	1	6	170	235	210
Gatwway Condo	913500	200	2	1	6	150	80	230

TABLE E-2
Structure Input Data
Gasparilla Island
Lee County
[Partial Listing]

```
2001,50
21.6
23.4     26.1     28.8     31.7     34.2
37.2     40.0     42.7     46.5     48.3
51.1     53.8     56.4     59.4     62.1
64.9     67.7     70.4     73.0     76.0
78.8     81.5     84.3     87.1     88.8
92.6     95.4     98.1     100.9    103.7
106.5    109.2    112.0    114.8.0  117.5
120.3    123.1    125.8    128.6    131.4
134.2    136.9    139.7    142.5    145.2
148.0    150.8    153.5    156.3    159.1
Frequency-recession relationship
11
.0050,198        200 yr
.0060,191        150 yr
.0100,173        100 yr
.0133,160         75 yr
.0200,143         50 yr
.0400,117         25 yr
.0500,111         20 yr
.1000, 91         10 yr
.2000, 69          5 yr
.5000, 23          2 yr
1.000,  1          1 yr
```

TABLE E-2
Structure Input Data
Gasparilla Island
[cont]

Coastal protective armor types

6

Coastal Armor Types Type	Unit Cost	Protection Level	Effects of Armor Types	Percent Replacement	Armor Type Number
Do Nothing	0	0	0	0.0%	1
CPS-Lrg w/4 Ton L	1094	150	1	1.00%	2 [seawall]
20' CSP e/Toe	895	125	1	1.00%	3
18'CSP	619	90	1	1.00%	4 condos only-no armor
Limerock 700 lbs	219	80	1	1.00%	5 houses only
Revetment 2 Ton Stone	979	125	1	1.00%	6

Structural improvement values

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1.03								
House	754551	160	1	2	2	30	160	180
Vacant Lot	0	400	1	1	6	30	11	12
House	387009	120	1	2	2	50	180	200
House	492011	140	1	2	2	50	170	240
House	289427	100	1	2	2	50	180	200
Vacant Lot	0	300	1	1	6	50	51	52
House	279379	130	1	2	2	50	180	220
House	502860	120	1	2	2	80	220	240
Vacant Lot	0	300	1	1	6	100	101	102
House	362782	120	1	2	2	100	280	320
House	259870	130	1	2	2	100	300	330
Vacant Lot	0	100	1	1	6	100	101	102
Street End	0	50	1	1	2	100	101	102
House	556839	250	1	2	2	120	260	300

22. Frequency Recession Relationship. Relationships between excedence probability and recession were used as model inputs. The frequency to recession relationships show a relationship between probabilities of a storm and specific recession of the beach. As an example, in Table E-1 at a probability of .0050 (200 year), the beach would recede 343 feet landward. All other probabilities in this table relate to specific recessions of the beach which are associated with specific storm frequency events. A similar relationship applies to Table E-2 for Gasparilla Island.

23. Recession-Damage Relationship. Table E-3 is a display of how the storm damage computer model computes damages. This display is based on the existing conditions for Gasparilla Island for Reach 1. The table shows, based on a yearly recession of the beach, the accumulative damages which are estimated to occur by damage category. In this example, the damages are shown through 170 of the 500 foot project distance. The table indicates that no damages except loss of land occur until the beach has recedes 90 feet landward. This is supported in the data in Table E-1 & E-2, in which the coastal armor type selected (18' CSP) holds until the recession is beyond 90 feet. Beyond 90 feet, failure of the existing armor occurs at which time a replacement armor type is selected (SEE *Coastal Protective Armor Types, Protection Level, 80 feet)*.

TABLE E-3
RECESSION-DAMAGE DATA
GASPARILLA ISLAND REACH 1
(Selected Year=2001)
RECESSION, THROUGH 170 FEET ONLY

Beach Recess.	Upland Development	Backfill	Coastal Armor	Loss of Land
0	0	0	0	0
10	0	0	0	160,970
20	0	0	0	160,970
30	0	0	0	160,970
40	0	0	0	160,970
50	0	0	0	160,970
60	0	0	0	160,970
70	0	0	0	160,970
80	0	0	0	160,970
90	371,469	7,189	43,800	160,970
100	585,330	14,853	66,576	160,970
110	1,881,785	46,916	264,552	160,970
120	3,714,163	84,233	497,272	160,970
130	4,859,745	84,347	697,142	160,970
140	6,063,416	137,804	861,392	160,970
150	7,163,076	149,340	892,052	160,970
160	9,464,625	246,329	3,605,272	160,970
170	11,367,996	362,581	5,535,352	160,970

24. In the case of Estero Island, a similar method is used which would produce similar results. Estero Island is shown in (Table E-4).

TABLE E-4
RECESSION-DAMAGE DATA
ESTERO ISLAND
(Selected Year=2001)
RECESSION, THROUGH 170 FEET ONLY

Beach Recess.	Upland Development	Backfill	Coastal Armor	Loss of Land
0	0	0	0	169,472
10	0	0	0	169,472
20	0	0	0	169,472
30	0	0	0	169,472
40	0	0	0	169,472
50	0	0	0	169,472
60	0	0	0	169,472
70	0	0	0	169,472
80	0	0	0	169,472
90	3,229,912	64,293	557,355	169,472
100	8,095,527	212,943	2,117,579	169,472
110	9,357,180	277,535	2,322,199	169,472
120	11,576,552	355,825	3,069,804	169,472
130	12,651,683	440,697	3,914,214	169,472
140	13,460,075	457,589	4,069,434	169,472
150	14,355,188	510,428	4,422,264	169,472
160	15,317,364	524,642	4,497,304	169,472
170	16,412,405	433,912	4,559,204	169,472

25. Coastal Protection Armor. Field inspections were made in 1996 to determine the type, general location and condition of coastal armor by lot sizes under existing conditions. Coastal armor types are typical of the existing shoreline armor and the type of armor to replace the existing armor type. It was discovered that some of the shorelines had little to no coastal armor. In these areas, there was nothing to retard or halt damages to structures if the beach receded beyond a specific point. In those areas where there was coastal armor, the existing armor type was a concrete sheetpile seawall. In those developed areas without coastal armor, it was assumed that coastal armor would be constructed at the time the long term erosion approached the structure. As noted earlier, it was also assumed the armor constructed under the without project condition would be sufficient to halt long term erosion, but, would not halt recession for storm events greater than the five-year event. An assumption was made in the model that the distance from the MHW to the existing coastal armor would be a minimum of 30 feet. In the case of a vacant lot, the shoreline distances in front of the vacant lot was the average of distances of the lots on either side of the vacant lot. As a result, coastal armor types were then input into the model. The coastal protective armor types were defined and grouped and categorized based on unit cost, the level of protection provided (in feet), and a damage factor. The Effects Of Armor Types shows if the armor will halt the recession or not (Tables E-1 & E-2). If a zero is indicated, the selected armor type will not halt recession. If a "one" is selected, the armor type selected stops the recession of the beach through the 50 year project life. The *Protection Level* provided is the amount of shoreline recession each type of armor would prevent or halt (existing armor fails). The *Unit Cost* per linear foot is based on engineering cost estimates updated March 1996. The damage factor, *Percent Replacement*, 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, under some armor types selected, 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.

26. Structure Improvement Values. Estimates of the values of improvements were developed for the ocean-front properties only. Secondary structures were not a part of this analysis. Tables E-1 & E-2 show the various structural input improvement values. Each input column has been numbered for explanation. Column one identifies the type of structure by name. In the cases for some houses and high-rise structures, the foundations are typically embedded deeply below ground. This will limit their damage susceptibility from storms. Coastal Engineering Construction

Manuals usually require that a multi-floor structure located on the beach be anchored properly and use deeply embedded piles. It is assumed for this study that only the first two floors of multi-floor structures would be damaged from a storm. The other floors are expected to remain anchored to the columns. Column two is the structure value (excluding land and improvement value). Column three defines the lot width (parcel) each structure occupies. Column four is the number of floors each structure occupies. Column five is the type of coastal armor in place at the present time (existing coastal armor). The number is derived from the armor type number as found under "*Coastal Protective Armor Types*". Column six is the replacement coastal armor or the type of coastal armor to be put into place when the existing coastal armor fails. The replacement coastal armor is derived from the armor type number under "*Coastal Protective Armor Types.*" Column seven is a linear measurement from the referenced shoreline position to the existing coastal armor. Column eight is a linear measurement from the referenced shoreline position to the face of the structure (the seaward most point of the structure). Column nine is a linear measurement from the referenced shoreline position to the middle of the structure. Columns seven, eight and nine determine the point at which the coastal armor is to be replaced when a structure is susceptible to damages and the point when a structure is destroyed or condemned respectively.

27. Physical Dimensions. The model requires the lot widths for each different structure type. Lot widths were measured with the aide of aerial maps. Using aerial maps, distances were measured from a reference shoreline point [mean high water]; [1] to the location of existing or future coastal armor; [2] to the face or the seaward most point of the structure [zero value]; and [3] to the point of full value of the structure. The full value distance point is the center of the structure which is applied to such structures as single family homes or condominiums. In the case of pools or utilities, the full value distance point is one foot beyond the face or seaward most point of the structure. The physical dimensions input data are also shown in Tables E-1 and E-2.

MODEL ASSUMPTIONS

28. Assumptions used in the development of an estimate of annual storm damages as are follows:

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

b) damages to structures will not occur until shoreline recession has exceeded the seaward edge of the structure,

c) when the shoreline recedes halfway through a structure, the structure is considered a total loss as in the case of a single family home,

d) when the shoreline recedes halfway through a structure with more than two stories such as high-rise condominiums, the structure value of only the bottom two floors is considered lost,

e) if a structure is less than one-half undermined, the damage is assumed to be equal to the product of the structure value available for damage calculations and the ratio of the horizontal distance eroded through the structure divided by the mid-point of the distance through the structure,

f) all market values of structures are estimated by using the cost approach to value known as *Replacement Cost New less Depreciation,*

g) content damage will not be evaluated in this report,

h) seawalls, revetment and other coastal armor types halt all damage from a given storm until failure. The structure is assumed lost when the volume of scour in front of the structure is sufficient to allow structural failure,

i) although shorefront areas continue to develop through time, damage estimates are limited to existing buildings and structures,

j) repair costs to the coastal armor and the cost of backfill are determined by current engineering estimates of replacement and/or repair cost of such work,

k) after structure failure, the shorefront development, roads, parking lots etc., will be repaired to a condition similar to and in the same location as the without project conditions,

l) the local property owners will protect their own properties to at least a 5-year storm event. In the case of Estero Island, 95 feet and for Gasparilla Island, 69 feet.

Reasonableness of Estimates

29. The assumptions of the Storm Damage Model have been supported by actual storm events by the Manatee County shore protection project that was authorized by the Chief of Engineers in December 1975 under authority of Section 201a of Public Law 89-298, as amended. The authorized project consisted of restoration of 3.2 miles of Gulf of Mexico shoreline of Anna Maria Island with a 50-foot berm at elevation +6 above mean low water and natural slopes as would be shaped by wave action. The initial fill quantity, including five years advances nourishment, was 940,000 cubic yards. Periodic nourishment was authorized for the entire 7.5 miles of the island.

30. The September 1991 General Design Memorandum describes several modifications to the authorized project. The initial restoration length was extended to 4.2 miles go shoreline. The design section was changed to a 75-foot berm with nine years advanced nourishment. Initial fill placement, including advance nourishment and overfill, is 2.2 million cubic yards. A 0.5 mile long taper was added at the south end of the initial fill to reduce potential end losses.

31. Notable Post-Project Storms. Less than two weeks after project completion, the March 17, 1993 "Storm of the Century" hit the project area. The storm, also referred to as the "Blizzard of 1993," was a low pressure storm system, with unprecedented snow, cold temperatures and high hurricane strength winds. Tide data from NOAA included a peak surge of +5.85 feet NGVD at Clearwater Beach in Pinellas County, Florida. This exceeds the design elevation of the Manatee County shore protection project of +5.0 NGVD. The tides were elevated above normal for approximately 15 hours. Several Gulf coast counties of Florida, including Manatee County, were declared Federal disaster areas.

32. No damages to upland structural improvement occurred. No upland development was adversely affected in the project area. The sponsor informed the Corps on 29 April 1993 that they would not seek assistance under Public Law 89-99 for project rehabilitation.

33. Damages Estimated vs. Damages Prevented. The "Storm of the Century" is the one storm of note since the project was constructed. Based on information from the September 1991 GDM, the surge of the storm would correspond to a 10-20-year return interval storm event, based on surge. This would result in a corresponding storm induced beach recession of 132 to 167 feet.

This corresponds to storm induced damages between $8.6 to $17.4 million based on pre-project conditions. Therefore, a reasonable estimate of the storm damage prevented from this storm is $12 million. The project also prevented $181,000 in loss of land which would have occurred without the project.

ASSESSMENT OF STORM DAMAGES

34. The assessment of damages to the existing development was based on the shoreline position at the time the beach profile surveys were taken by DNR. The assessment of damages to existing development is a function of the protection that is provided by the existing widths of the beach and existing dunes. Continuous erosion and shoreline recession results in reduced beach widths and hence reduced protection between a structure and the expected shoreline position. Due to the continuing erosion and shoreline recession, future damages to development would be more severe with a given storm. This is a result of reduced beach width and hence protective value between a structure and the reference shoreline. Future year damages were simulated in the model by describing the location of the reference shoreline in future years. The location of the reference shoreline is based on two different historical shoreline recession rates. Reaches one and two along Gasparilla Island recede at a rate of 2.77 feet per year. Reaches three and four along Estero Island recede at a rate of 3.52 per year. Future recession is halted at the year an existing seawall or other protective coastal armor is encountered.

35. Damage assessment is based on the calculated amount of damages that are expected when a structure is impacted by the recession of the beach area. Based on the shoreline position and the rates of erosion over the life of the project, damages vary depending on the location of the structure in reference to its position along the beach. The closer a structure is to the shoreline, the greater the probability of damages. A single family structure is more susceptible to total loss than a condominium especially if built on pilings. The oceanfront structures are more susceptible to total losses then other structures located within the study area. Secondary structures can also be subject to loss, however, their location makes losses to these structures less likely than for oceanfront structures. Secondary structures are located away from the beach and are subjected to losses if the shoreline recedes, for example, 300 feet landward. Damage assessment also depends on the type of structure.

1. Damages Under Without Project Conditions

36. The without project condition is the *no Federal project* condition. This represents the current status of the beach before any structural alterations or modifications are proposed or take place. For this study, damages will be assessed separately: one set of conditions apply to Gasparilla Island and another set apply to Estero Island. Table E-5 shows the *no Federal project (*existing damages*)* damages by damage category and the total project damages for Reaches 1 and 2 for Gasparilla Island and Reaches 3 and 4 for Estero Island. The total project damages under the *no Federal project* conditions are estimated at $10.669 million. In the analysis of damages by island, greatest damages on Gasparilla Island are in Reach 1. Reach 1, the northern section, extends from DNR-1 to DNR-16. In this area, structures have no protective armor sufficient enough to halt a storm greater than the 5-year frequency event. Around the southern end, the distance between the natural coastal armor and the face of structures is only a few short feet. The less beach area, the greater the likelihood of damages to properties along the beach from a storm.

TABLE E-5
Average Annual Damages under
Existing Conditions for
Gasparilla & Estero Islands
i=6.625% (6-5/8%)

Description of Area	Upland Development	Armor Damages	Backfill Damages	Loss of Land	Avg. Ann Damages
		Gasparilla Island			
Reach 1	$ 827,860	$ 200,569	$ 24,561	$285,316	$ 1,338,306
Reach 2	$ 509,319	$ 342,652	$ 34,072	$126,158	$ 1,012,201
Total Damages	$1,337,179	$ 543,221	$ 58,663	$411,474	$ 2,350,507
		Estero Island			
Reach 3	$4,633,710	$1,407,374	$161,622	$129,636	$ 6,332,342
Reach 4	$1,403,466	$ 338,629	$ 61,579	$182,765	$ 1,986,439
Total Damages	$6,037,176	$1,746,003	$223,201	$312,401	$ 8,318,781
Total Project Damages	$7,374,355	$2,289,224	$281,834	$723,875	$10,669,288

37. For both Gaparilla and Estero Islands, it was assumed that minimal coastal armor would be constructed by the property owners to protect their property. State law permits property owners to construct armor when their property is threatened by at least a 5-year storm event. The without project condition includes coastal armor sufficient to protect against a 5-year storm.

38. In the southern section of the island (DNR-17-DNR-26), there is revetment in some places and coastal armor in the form of a seawall. In Reaches 3 and 4, along Estero Island, the majority of the beach area has no protective coastal armor. A storm surge in these reaches would cause greater damages than in Reaches 1 and 2. This is reflected in the table where the total damages for Estero Island are estimated to be $8.318 million. Along Estero Island, the greatest damages are in Reach 3. Reach 3 extends from DNR-175 to DNR-185. In the northern section, there are many large, expensive condominiums. The southern end consist of smaller condominiums and single family houses.

2. Damages Under With Project Conditions

39. The with project condition consist of seven extensions of the beach profile. Each of the extensions will be subtracted from the *no Federal project* conditions for each island. The objective is to determine which beach extension alternative maximizes net benefits. The ultimate goal is to determine a NED Plan for each project area. Under the analysis, two separate with project conditions are discussed. Tables E-6 and E-7 show the *no Federal project* (existing conditions) for the two islands separately and the with project extensions. Each table concludes with the estimated damages prevented (benefits) for each extensions of the beach.

TABLE E-6
Existing and With Project Damages
Gasparilla Islands
i=6.625%

Beach Profile	Upland Development	Armor Damage	Backfill	Loss of Land	Avg. Ann Eq. Damages	Damages Prevented
			Existing Conditions			
Without Project	$1,337,179	$ 543,221	$58,633	$ 411,474	$ 2,350,507	$ N/A
			With Project			
1 Foot	$ 546,425	$ 285,181	$19,442	$ 0	$ 851,048	$1,499,459
20 Foot	$ 239,568	$ 96,298	$ 8,206	$ 0	$ 344,072	$2,006,435
40 Foot	$ 93,348	$ 17,209	$ 2,963	$ 0	$ 113,520	$2,236,987
60 Foot	$ 34,859	$ 5,755	$ 1,077	$ 0	$ 41,691	$2,308,816
80 Foot	$ 11,087	$ 1,925	$ 370	$ 0	$ 13,383	$2,337,124
100 Foot	$ 1,390	$ 159	$ 28	$ 0	$ 1,577	$2,348,930
120 Foot	$ 0	$ 0	$ 0	$ 0	$ 0	$2,350,507

TABLE E-7
Existing and With Project Damages
Estero Island
i=6.625%

Beach Profile	Upland Development	Armor Damage	Backfill	Loss of Land	Avg. Ann Eq. Damages	Damages Prevented
			Existing Conditions			
Without Project	$6,037,176	$1,746,003	$223,201	$ 312,401	$8,318,781	$ N/A
			With Project			
1 Foot	$4,204,916	$1,042,293	$139,954	$ 0	$5,387,163	$2,931,616
20 Foot	$2,968,998	$ 764,281	$104,356	$ 0	$3,837,635	$4,481,146
40 Foot	$1,875,302	$ 451,161	$ 60,954	$ 0	$2,387,418	$5,931,363
60 Foot	$1,312,183	$ 329,787	$ 42,506	$ 0	$1,684,476	$6,634,305
80 Foot	$ 770,365	$ 197,435	$ 25,018	$ 0	$ 992,819	$7,325,962
100 Foot	$ 522,026	$ 140,406	$ 17,659	$ 0	$ 680,092	$7,638,689
120 Foot	$ 416,367	$ 109,808	$ 13,742	$ 0	$ 539,917	$7,778,864

STORM DAMAGE PREVENTION BENEFITS

40. Damage prevention benefits are 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. A co-operative study between investigators at the Coastal Engineering Research Center (CERC) and the Department of Water Resources Engineering (DWRE) developed a numerical model program [SBEACH] which calculates dune and beach erosion produce by storm waves and water levels.

41. 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 crosshore sand transport rates and beach profile change observed in large tanks. Input to the compute 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 (B-max and B-foreshore). Output consists of a post-storm profile. SBEACH 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 SBEACH is required for beach fill design projects.[5] Due to the lack of surge and wave hydrographs along this segment of shoreline for low probability events, SBEACH was not used to analyze shoreline recession.

42. Birkmeir and Sargent in 1985 developed a recession model program called DUNE used to evolve the relationship between shoreline recession and storm surge. This computer program is based on an empirical method developed at the Delft Hydraulics Laboratory in the Netherlands [Vellinga 1983]. Input to the computer program consist of a pre-storm beach profile, storm surge level, deep water significant wave height, mean sediment grain size and water temperature. The primary output is a post-storm beach profile. Implicit in the model is the assumption that coastal storms can be categorized in terms of frequency of occurrence of storm surge.

43. The three basic assumption underlying dune are, (1) the shape of the post storm profile is in equilibrium; (2) the resultant transport of sand is in the offshore direction; and (3) the amount of material eroded must equal the amount deposited. There is no provision for handling longshore gains or losses to the profile.

5. Based on a letter from the Director of Civil Works, Department of the Army, 28 December 1990.

It should be noted that the model works best for large surge events since it was derived from data with surges greater than 9.8 feet.

EVALUATION OF PROJECT BENEFITS and DEVELOPMENT OF THE NED PLAN

44. The overall benefits to be derived from this project not only include the beach area but the socio-economic benefits that can be derived to Lee County. From the socio-economic view, Lee County derives a percentage of its revenue from activities that are generated from the beach area. These benefits are tax revenues, revenues derived from tourism and visitors to Lee County and recreational benefits from usage of the beach area.

45. Project or primary benefits resulting from storm damage prevention alternatives are the differences between the existing average annual equivalent damages and the with project average annual equivalent damages. The project benefits derived for this study or *Damages Prevented* are displayed in the following two tables: (1) benefits for Gasparilla Island; and (2) benefits for Estero Island.

46. Tables E-8 and E-9 explain the with project conditions for each island separately. The average annual equivalent damages are the total *no Federal project* conditions damages that are occurring under the existing conditions. They are displayed in rows 2 in Tables E-8 and E-9. Project benefits (annual benefits) are the damages that are estimated to be prevented if the various extensions of the beach profile are in place. They are the differences between the without project damages and the with project damages ($2,350,507 - $851,048). Marginal benefits are the extra benefits that are derived from the selection of one alternative over another. As an example, the difference between a one foot extension benefits of the beach profile ($1,499,459)and a 20 foot extension of the beach profile ($2,006,435 produces marginal (extra) benefits of $506,976 as shown in Table E-8. The annual costs are the dollar investments required to construct the project. Different costs figures are shown for the various extensions of the beach. Marginal costs are the extra costs that would incur if a different extension of the beach is selected. Net benefits represent the differences in the project (annual) benefits minus the annual cost. The net benefits from a one foot extension of the beach is estimated at $1,147,037 (Table E-8).

However, net benefits are maximized at the point where marginal benefits are equal to marginal costs. Benefits-to-cost ratio is a division function between the project benefits divided by the annual cost.

47. Project NED benefits are defined as the increases in the net value of the national output of goods and services. The NED Plan is defined as that alternative which maximizes net primary NED benefits. It can be re-stated as that plan which provides the greatest increment of primary benefits over and above project costs.

48. In the summation of the results of the analysis, Table E-8 shows that at an extension of the beach of 20 feet, net benefits of $1,147,037 are estimated to occur resulting in a benefit-to-cost ratio of 4.2 to 1.0. This is clearly superior to the other alternatives because the 20 foot extension gives the highest net benefits. Roughly, 86 percent of the existing damages are prevented with only a 20 foot extension of the beach. However, with a 40 foot extension of the beach, 95 percent of the damages can be prevented. In this case, net benefits of $1,250,412 are less than the net benefits for the 20 foot extension. Table E-9 shows similar results that are excepted for Estero Island. This table indicates that with a 40 foot extension of the beach profile, net benefits of $1,644,467 are estimated with a benefit-to-cost ratio of 1.4:1.0.

TABLE E-8
NATIONAL ECONOMIC DEVELOPMENT PLAN
LEE COUNTY SHORE PROTECTION PROJECT
GASPARILLA ISLAND
i=6.625%

Project Conditions	Avg. Ann. Equiv. Dam.	Project Benefits	Marginal Benefits	Annual Cost	Marginal Cost	Net Benefits	Benefit/Cost Ratio
Without Project	$2,350,507	$ 0	$ 0	$ 0	$ 0	$ 0	N/A
With Project*							
1 Foot	$ 851,048	$1,499,459		$ 352,422	$	$1,147,037	4.2:1.0
			$506,976		$ 380,252		
20 Foot	**$ 344,072**	**$2,006,435**		**$ 732,674**		**$1,273,761**	**2.7:1.0**
			$230,552		$ 253,901		
40 Foot	$ 113,520	$2,236,987		$ 986,575		$1,250,412	2.3:1.0
			$ 64,185		$ 252,060		
60 Foot	$ 41,691	$2,308,616		$1,238,635		$1,074,181	1.8:1.0
			$ 25,292		$ 278,189		
80 Foot	$ 13,383	$2,337,124		$1,516,824		$ 820,300	1.5:1.0
			$ 10,548		$ 243,848		
100 Foot	$ 1,577	$2,348,930		$1,760,672		$ 588,258	1.3:1.0
			$ 1,409		$ 237,013		
120 Foot	$ 0	$2,350,507		$1,997,685		$ 352,822	1.2:1.0

*extensions of the beach profile.

TABLE E-9
NATIONAL ECONOMIC DEVELOPMENT PLAN
LEE COUNTY SHORE PROTECTION PROJECT
ESTERO ISLAND
i=6.625%

Project Conditions	Avg. Ann. Equiv. Dam.	Project Benefits	Marginal Benefits	Annual Cost	Marginal Cost	Net Benefits	Benefit/Cost Ratio
Without Project	$8,318,781	$ 0	$ 0	$ 0	$ 0	$ 0	N/A
With Project*							
1 Foot	$5,337,163	$2,931,618		$1,580,571		$1,351,047	1.8:1.0
			$1,535,387		$1,634,827		
20 Foot	$3,837,635	$4,481,146		$3,215,398		$1,265,748	1.4:1.0
			$1,436,982		$1,071,498		
40 Foot	**$2,387,418**	**$5,931,363**		**$4,286,896**		**$1,644,467**	**1.4:1.0**
			$ 696,527		$1,039,404		
60 Foot	$1,684,476	$6,634,305		$5,326,300		$1,308,005	1.2:1.0
			$ 685,345		$1,033,243		
80 Foot	$ 992,819	$7,325,962		$6,359,543		$ 966,419	1.1:1.0
			$ 309,873		$1,039,097		
100 Foot	$ 680,092	$7,636,689		$7,398,640		$ 240,049	1.0:1.0
			$ 138,895		$1,024,157		
120 Foot	$ 534,917	$7,778,864		$8,422,797		$ -643,933	0.92:1.0

*extensions of the beach profile.

RECREATION BENEFIT

49. Recreation benefits accrues from the preservation of or the increase in the use of shore front recreational facilities for beach activities if beach conditions are improved. The limit of existing useable public beach is usually from vegetation to the mean high water line. In this analysis, recreational facilities are defined as both existing publicly owned beach and publicly owned beach that will be created seaward between current mean high water and the new mean high water with the proposed plan. No recreational benefits are claimed on privately owned land as this would duplicate damage prevention benefits to privately owned property and structures.

50. Study Area - The principle study areas for this portion of this report are Gasparilla and Estero Islands located in Lee County in the State of Florida. As related to analysis for recreation benefits, visitors from other cities and counties in Florida and out of state also recreate in the study areas. Out-of-state visitors to Lee County beaches are generally from eastern and central parts of the United States and other countries. The specific authorized project area extends along the north of the county for approximately 6.7 miles at the southern portion of Gasparilla Island, and Estero Island is located south of the city of Ft. Myers. The two islands are of distinct characteristics, therefore the recreation benefit analyses will focus on each island and those related differences.

51. Beach Accessibility - Public beach is useable only if the public has access to it. The number of public access points and available parking, different modes of transportation available to the public the distance one could reasonably expect a beach participant to walk determine accessibility to the beach. Approximately 57 access points are currently available in Lee County with 1,092 parking spaces. There are no current plans to increase parking availability by increasing the number of public access points in the study area over the project life.

52. Methods of transportation to the beach are separated into walk-on and drive-on participants. Walk-on participants may be further defined into hotel-tourist participants and single and multi-family walk-on participants. Drive-on participants are defined as

automobile and mass-transit participants. A formal analysis of walk-on participation has not been attempted in this analysis. Beachfront single and multi-family unit owners will recreate on their own land while others who live off the beach will use public access strips within ¼ of a mile walking distance of a public entrance.

53. Currently, there are no beach routes provided by mass-transit sources in the county. Therefore, access is restricted to automobile drive-on participants. The available parking in this drive-on category further restricts accessibility to the beach by automobile participants. Beach visitors must park in designated areas and do not park on the public right of ways.

RECREATION DEMAND COMPUTATION

54. Participation Rates - The 1989 report on Outdoor Recreation in Florida and the 1981 SCORP, both published by the Department of Natural Resources, identify the two sources of total beach use participation to be resident participation and tourist participation. These estimates of total participation are dependent upon estimates and projections of population and tourist activity. Participation rates are the accepted method of converting resident population and tourist projections to resident and tourist participation. In this report, county resident participation rates and state resident participation rates were computed from the supplemental statistical data mentioned above. The county participation rate is defined as the average number of times a county resident will participate in saltwater beach activities in the home county in a given year. The rate was computed by summing the number of user occasions in the sample for saltwater activities that originated in Lee County and dividing by the county population at the time of the study. The state participation rate is defined as the average number of times a resident of the state of Florida not located in Lee County will participate in saltwater beach activities in Lee County in a given year. The rate was computed by summing the number of user occasions in the sample for saltwater activities that originated in the State of Florida excluding Lee County that participated in Lee County and dividing by the State less the county population at the time of the study. Tourist participation rates were not available on the county level from the SCORP report or the supplemental statistical information. Therefore, the state tourist participation rate

located in the 1989 SCORP was utilized as the most accurate reflection of participation by tourists originating outside the state of Florida. The State's definition of Region IX includes Sarasota County, Charlotte County, Glades County, Lee County, Hendry County and Collier County.

Participation rates used in the study are listed in Table E-12.

Table E-12
Resident and Tourist Participation Rates
Region IX

Counties	(1) County Resident Part. Rate	(2) State Resident Part. Rate	(3) State Tourist Part. Rate
Charlotte	1.8700	0.0060	4.1840
Collier	5.8200	0.0050	4.1840
Glades	0.6600	0.0000	0.0000
Hendry	1.3200	0.0000	0.0000
Lee	1.6200	0.0730	4.1840
Sarasota	3.9400	0.0370	4.1840

(1) This rate was computed from the 1981 SCORP statistical information.
(2) This rate was computed from the 1981 SCORP statistical information.
(3) This rate is equivalent to the state tourist participation rate computed in the 1989 SCORP statistical information.

55. Regional Demand - The selected method utilizes the 1989 SCORP report to compute total resident and tourist regional participation. It was not possible to separate resident and tourist user occasions for region IX using this report. Thus the following method was employed to determine regional resident demand. Regional population projections were obtained from the 1993 Florida Statistical Abstract University of North Florida, Bureau of Economic Analysis, which provided projections through the year 2020. The remainder of the years in the project life was projected using an extrapolation method. The regional population for each year was then multiplied by the regional resident participation rate to obtain regional resident user occasions. The methodology used to determine regional tourist demand was somewhat different. Combining information provided through the year 1995 by the 1989 SCORP and the Bureau of Economic Analysis, tourist user occasions were

solved for using the following equation: Tourist User Occasions = Total User Occasions - Resident User Occasions. This method was utilized to determine the tourist user occasions through the year 1995. Tourist occasions were calculated for the remaining years of the project life by dividing the summation of 1987-1995 Regional Resident Population by the 1987-1995 Regional Tourist Population and obtaining a factor. This factor was then applied to the regional resident populations for each year. Total regional user occasions were then calculated by summing regional resident user occasions and regional tourist user occasions. Total regional demand, resident, and tourist demand for region IV that is shown in Table E-13

TABLE E-13
Total Regional Demand in User Occasions
Region IX

Year	SCORP[1] Regional Resident Demand	SCORP[2] Regional Tourist Demand	SCORP[3] Total Regional Demand
1995	5,342,100	15,765,900	21,108,000
2001	7,204,200	21,261,100	28,465,300
2011	8,487,500	25,048,500	33,536,000
2021	9,618,100	28,385,200	38,003,400
2031	11,394,000	33,626,300	45,020,300
2041	13,511,400	39,875,100	53,386,500
2051	16,039,200	47,335,400	63,374,600

56. Allocation of Regional Demand to County Demand - Allocation of regional demand to the county level is accomplished using the 1989 SCORP report, current population projections from the UF Bureau of Economic and Business Research for Lee County. Based upon these data, the annual beach activity demand was determined utilizing the following relationships:

CD = (PcNc + PsNs + PtNt) K where:
CD = County Beach activity demand
Pc = Constant from the statistical background data for the 1981 SCORP. This is the participation rate for county residents.

1. Sum of county populations *5.158 Scorp resident per-capita participation rate.
2. Sum of estimated tourist population for each county within the region * 4.184 tourist per-capita participation rate.
3. Sum of regional resident demand and regional tourist demand.

Ps = Constant from the statistical background data for the 1981 SCORP. This is the participation rate of residents from other Florida counties who recreate on Lee County beaches.

Pt = Constant from Telephone conversations with the Division of Recreation and Parks. This is the tourist participation rate for Lee County.

Nc = This is the county resident population.

Ns = This is the State population less the County population.
Nt = This is the County tourist population.

K = This is a constant which expresses the ratio of the total published demand for Region IX in the 1981 SCORP and the computed total demand using the expression above.

57. The current estimates of state population and the 1989 SCORP resident participation rate have been utilized to compute resident participation for the region. The University of Florida, Bureau of Economic Research provides the most recent state and county population projections, April, 1995. These projections have been geometrically extrapolated using average annual growth rates from the year 2001 to 2051. The University of Florida population projections were utilized throughout the analysis to insure consistency with the SCORP report. Participation rates are constant over the project life.

58. Significant information is not available from the DNR to compute out-of-state tourist participation rates at county level. The State tourist participation rate received from the DNR is intra-regional as explained above and is considered a good proxy for inter-county participation because of the relative homogeneity of Region IX. Resident population projections and tourist projections for each county in the region are used along with participation rates for residents and tourists to compute total participation for each county in the region for each 10-year increment of the project life. Each county is then allocated a percentage of the total Region IX demand based upon these county totals. An example of the allocation of Region IX participation in the year 2001 is shown in Table E-14.

59. Distribution of County Demand Within the Project Area - The Lee County study areas (Gasparilla and Estero Island) are treated as two separate market areas in this analysis. Projected attendance in each study area is proportioned to the project area beaches based upon the total square footage of beach available under with and without project conditions. This least density usage approach insures proportional distribution of participation over the study area beaches. If one segment of beach is overcrowded, they all are overcrowded. The opposite is also true. This insures that a participant will find useable beach if it is available in the study areas. No attractiveness indexes are used to distribute participation. While it is true that participants may exhibit a preference for a given park because of differences in access and beach facilities available and that the more desirable beaches will be occupied first, the avoidance of overcrowding will be the dominant concern. With the authorized plan, additional public beach is created in the study area and excess demand can be accommodated at the various accesses.

60. As the beaches in the county erode throughout the project life, the allocation of demand to these beaches also changes to reflect the decreased amount of useable beach, which varies in the study area under this condition. Likewise, one could expect a different distribution of participation with the proposed improvements, which maintain and increase public areas for recreation at the project beaches. The analysis therefore provides a realistic and dynamic analysis of beach usage over time.

61. Without Project - Information defining existing supplies of useable beach areas for Lee County is based upon 1988 aerial photographs which was updated to show 1998 MHW. Existing supplies of useable public beach in square feet, beach lengths and erosion rates for Gasparilla and Estero Islands are shown in Tables E-15 and E-16. Public areas were then eroded from 1998 to the beginning of the project life, 2001, and then in 10-year increments throughout the 50-year project life. Erosion of public beach area throughout the project life without the proposed project is primarily dependent upon mean high water recession rates. The procedure used to calculate public beach at a given point in time is to multiply the annual mean high water erosion rate by the front footage of the park by the time increment. The area computed is subtracted from the remaining area in the preceding time increment if the beach is receding or added

if the beach is accreting. Without project supplies of useable public beach from 1998 to 2051 for Gasparilla and Estero Islands are shown in tables E-17 through E-18

62. With Project - The total capacity of useable public beach with the plan alternative requires the following computation.

a. The computation of the total area of beaches to be renourished. This is dependent upon average project width.

b. The deletion of all privately owned land in the renourished area.

c. The limitation of useable public beach to ¼ mile of a mile in either direction from the nearest access. The ¼-mile limit is measured from the outlying boundaries of access strips or exiting public parks.

d. The addition of all public beach not re-nourished in the study area.

63. The computation of useable public beach for Lee County for the authorized plan is shown in Table E-19 and E-20. Square footages are converted to the number of people per day that the public beach can support. This analysis is done for each park and access strip for each 10 year increment in the project life for the with and without project conditions. A hundred (100) square public beach area is multiplied by 2 to compute people per day. The results of these calculations for with and without project are displayed in tables E-21 through E-24.

64. Beach Accessibility-Unconstrained Parking - Public beach is useable only if the public has access to it. Accessibility to the beach is determined by the number of public access point's available and available parking, different modes of transportation available to the public, and the distance one could reasonably expect a beach participant to walk. Methods of transportation to the beach can be separated into walk-on participants, drive-on participants, and other modes including bicycling. Walk-on participants may be further defined into hotel-tourist participants and single and multi-family walk-on participants. Drive-on participants are defined as automobile and mass-transit participants. When comparing beach visits based on constrained parking versus

unconstrained parking, beach visits with unconstrained parking are more reflective of actual beach counts, while constrained parking estimates greatly under estimated beach use. However, for the project areas in this report, beach goers are constrained to designated parking areas. Therefore, the data in Tables E-21 through E-28 were computed for both unconstrained and constrained parking.

65. Demand Allocation Based Upon Supply -Park participation is derived by dividing the supply of beach area for each park in people per day by the total supply for the study area. These percentages are used to allocate constrained beach participation. The analysis is done in 10-year increments for with and without the beach fill alternatives. The resulting participation is assigned to each park. Yearly user occasions without and with project for constrained parking on Gasparilla and Estero Islands are shown in tables E-29 through E-32

66. Daily Demand - User groups characterize Historical patterns of beach use along the coast of Florida. These groups define how annual participation occurs within the given year. Daily attendance within the year reflects the climate or season, which affects monthly participation. Weekdays and weekends also influence daily attendance. Daily attendance records were kept for several beach areas in Lee County (Gasparillo, Cayo Costa State Park(North and South) Sanibel Island and Estero Island). Utilizing these records, user groups were derived by ranking daily attendance in descending order. Each day's attendance was divided by the attendance for the year to determine the percentage of yearly participation attributable to that day. To reduce the number of groups and simplify the computational process, groups with similar percentages were averaged. The net result was user groups representing 365 days in the year. These user groups are shown in table E-33. It should be noted that attendance patterns developed are assumed valid for all Lee County beaches although a one-to-one correlation may not exist.

Table E-14
Allocation of County Demand
Region IX (Year 2001)

County	(a) County Residents	(b) County Residents Demand	(c) State Population Less County	State Resident Demand	Estimated Tourist	County Demand Tourists	Total (a+b+c)	Adjusted SCORP Demand
Charlotte	168,500	315,095	14,721,000	82,200	613,000	2,564,792	2,962,087	3,170,200
Collier	286,000	1,664,520	14,650,000	66,300	1,040,500	4,353,452	6,084,272	6,511,800
Glades	11,800	7,788	14,852,200	0	42,900	0	7,788	8,300
Hendry	38,200	50,424	14,827,400	0	139,000	0	50,424	10,425,200
Lee	515,500	833,110	14,459,400	1,057,700	1,875,500	7,847,892	9,740,702	10,010,800
SARASOTA	376,700	1,484,198	14,538,500	532,700	1,370,500	5,734,172	7,751,070	8,295,800
TOTALS	1,056,700	4,357,135		1,738,900	5,081,400	20,500,308	26,596,343	28,765,300

TABLE E-15
RECREATIONAL BEACH INFRASTRUCTURE
Gasparilla Island Market Area

Full Services Pub. Beaches/Accesses	Beach Length (Feet)	M.H.W Shore Front Wid.	1997 Beach Area (1000) (Sq. Feet)	*Recession Rate (Ft.Per Yr.)	# Of Parking Space	With Project Berm Width	With Project Sq. Feet	# Of Parking With Turnover Rate
Englewood Public Beach	1,500	9	13,500	-1.0	225	0	13,500	1,800
Port Charlotte Bch.St.Re	6,130	10	61,300	0.0	0	0	61,300	0
Lido Beach/N.Lido	6,000	72	432,750	-10.0	400	0	432,000	3,200
South Lido County Park	1.000	102	101,750	-10.0	137	0	101,750	1,096
Columbus Blvd.	80	20	1,600	0.0	0	0	1,600	0
Avenida Navarra	60	80	4,800	0.0	6	0	4,800	48
Ocean Blvd.	60	110	6,600	-2.2	30	0	6,600	240
Calle Des Siesta	60	78	6,120	0.0	15	0	4,680	120
Plaza Des Palmas-North	60	118	7,080	0.0	17	0	7,080	136
Plaza Des Palmas-South	60	102	6,120	0.0	13	0	6,120	104
Calle Del Inviereno	60	51	3,060	0.0	5	0	3,060	40
Siesta Beach	2,430	151	367,500	0.0	800	0	367,500	6,400
Turtle Beach	2,575	14	36,000	-1.5	230	0	36,000	1,840
Palmer Point	1,250	50	62,500	-0.5	0	0	62,500	0
Nokomis	1,700	47	79,900	0.0	189	0	79,900	1,512
North Jetty Park	900	80	72,000	0.0	348	0	72,000	2,784
Higel Park	555	0	0	-2.2	89	0	0	712
Venice Beach	900	74	67,000	-2.2	130	0	67,000	1,040
Ocala Street	40	0	0	-2.2	7	0	0	56
Service Club Park	325	12	3,900	-0.0	15	0	3,900	120
Brohard Park	8,840	100	884,000	-0.4	58	0	884,000	464
Venice Fishing Pier	565	80	45,200	-2.2	106	0	45,200	848
Caspersen Beach	9,150	25	229,000	-6.1	120	0	229,000	960
Manasota Beach	1,394	65	90,200	-0.0	170	0	90,200	1,360
Blind Pass Beach	2,940	24	70,000	-0.5	212	0	70,000	1,696

TABLE E-15(Continued)
RECREATIONAL BEACH INFRASTRUCTURE

Gasparilla Island Market Area

Full Services Pub. Beaches/Accesses	Beach Length (Feet)	M.H.W Shore Front Wid.	1997 Beach Area (1000) (Sq. Feet)	*Recession Rate (Ft.Per Yr.)	# Of Parking Space	With Project Berm Width	With Project Sq.Feet	# of Parking With Turnover Rate
19th Street	20	50	1,000	-2.77	0	20	1,000	0
17th Street	50	35	1,750	-2.77	2	20	1,750	16
13th Street	50	40	2,000	-2.77	2	20	2,000	16
12th Street	30	30	900	-2.77	16	20	900	128
11th Street	20	50	1,000	-2.77	20	20	1,000	160
10th Street	50	80	4,000	-2.77	12	20	4,000	96
Seventh Street	50	65	3,250	-2.77	6	20	4,250	48
Fourth Street	60	15	900	-2.77	12	20	2,100	96
Third Street	60	25	1,500	-2.77	24	20	2,700	192
Boca Grande Bch Park	1,328	121	160,688	-2.77	40	20	187,248	320
Gasparila Island St.Rec.Area	3,451	80	278,080	-2.77	144	20	345,100	1,152
Cayo Costa State Park	36,960	30	1,108,800	-2.77	0	20	1,848,000	0

TABLE E-16
RECREATIONAL BEACH INFRASTRUCTURE

Estero Island Market Area

Full Services Pub. Beaches/Accesses	Beach Length (Feet)	M.H.W Shore Front Wid.	1997 Beach Area (1000) (Sq. Feet)	*Recession Rate (Ft.Per Yr.)	# Of Parking Space	With Project Berm Width	With Project Sq.Feet	# of Parking With Turnover Rate
Blind Pass	1,930	63	121,590	0.0	659	0	121,590	5,272
Captiva Drive	50	40	2,000	0.0	40	0	2,000	320
Andy Rosse Lane	50	9	450	0.0	3	0	45 0	24
Turner Beach (At Blind Pass	160	30	4,800	0.0	240	0	4,800	1,920
Turner Beach - East	120	40	4,800	0.0	22	0	4,800	176
Bowman's	11,000	50	550,000	0.0	214	0	550,000	1,712
Tarpon Bay Road	80	20	1,600	0.0	3	0	1,600	24
Gulfside City Park	990	50	49,500	0.0	43	0	49,500	344
Nerita Street	50	10	500	0.0	5	0	500	40
Lighthouse Park	1,420	10	14,200	0.0	75	0	14,200	600
Bodwitch Park	1,800	104	187,200	-3.52	5	40	187,200	40
Ft.Myers Beach	600	15	9,000	-3.52	118	40	9,000	944
San Carlos Boulevard	50	90	4,500	-3.52	0	40	6,500	0
Canal Street	30	0	0	-3.52	0	40	1,200	0
Avenue A	30	55	1,650	-3.52	0	40	2,850	0
Avenue C	18	55	990	-3.52	0	40	1,710	0
Alva Drive	14	70	980	-3.52	0	40	1,540	0
Avenue E	14	60	840	-3.52	0	40	1,400	0
Miramar Street	18	75	1,350	-3.52	0	40	2,070	0
Palm Street	50	55	2,750	-3.52	6	40	4,750	48
Pearl Street	15	55	825	-3.52	0	40	1,425	0
Delmar Avenue	43	50	2,150	-3.52	6	40	3,870	48
Mango Street	30	50	1,500	-3.52	6	40	1,500	48
Chapel Street	30	50	1,500	-3.52	0	40	1,500	0
Gulf Beach Road	25	75	1,875	-3.52	4	40	1,875	32
Pompano Street	50	10	500	-3.52	2	40	500	16
Seaview Drive	50	90	4,500	-3.52	4	40	4,500	32

TABLE E-16(Continued)
RECREATIONAL BEACH INFRASTRUCTURE
Estero Island Market Area

M.H.W Full Services Pub. Beaches/Accesses	Beach Length (Feet)	# Shore Front Wid.	With 1997 Beach Area (1000) (Sq. Feet)	*Recession Rate (Ft.Per Yr.)	Of Parking Space	Project Berm Width	With Project Sq.Feet	# of Parking With Turnover Rate
Connecticut Street	50	35	1,750	-3.52	10	40	1,750	80
Hercules Drive	50	80	4,000	-3.52	6	40	4,000	48
Coconut Drive	30	65	1,950	-3.52	6	40	1,950	48
Bayview Avenue	50	90	4,500	-3.52	2	40	6,500	16
Gulfview Avenue	50	85	4,250	-3.52	6	40	6,250	48
Strandview Avenue	50	55	2,750	-3.52	6	40	4,750	48
Dakota Aveneue	50	25	1,250	-3.52	4	40	3,250	24
Sterling Avenue	15	50	750	-3.52	5	40	1,350	32
Aberdeen Avenue	40	50	2,000	-3.52	4	40	3,600	40
Lanark Avenue	40	70	2,800	-3.52	2	40	4,400	16
Gulf Road	40	55	2,200	-3.52	4	40	3,800	32
Flamingo Street	40	165	2,000	-3.52	8	40	8,200	64
Lover's Key State Park	7,650	50	382,500	-3.52	200	40	382,500	1,600
Big Hickory Island	2,115	60	126,900	-3.52	0	40	126,900	0
Lynn Hall Park	705	43	30,315	-3.52	110	40	30,315	880
Bonita Beach #1	250	50	12,500	-3.52	14	40	12,500	112
Bonita Beach #2	50	50	2,500	-3.52	3	40	2,500	24
Bonita Beach #3	50	44	2,200	-3.52	5	40	2,200	40
Bonita Beach #4	50	49	2,450	-3.52	3	40	2,450	24
Bonita Beach #5	5	49	245	-3.52	4	40	245	32
Bonita Beach #6	50	47	2,350	-3.52	6	40	2,350	48
Bonita Beach #7	50	60	3,000	-3.52	8	40	5,000	64
Bonita Beach #8	50	55	2,750	-3.52	5	40	4,750	40
Bonita Beach #9	50	43	2,150	-3.52	6	40	4,150	48
Bonita Beach #10	100	66	6,600	-3.52	19	40	10,600	152
Bonita Beach Park	470	65	30,550	-3.52	88	40	49,350	704

TABLE E-17
GASPARILLA ISLAND
WITHOUT PROJECT SUPPLY IN (SQFT)
1998 TO 2051
UNCONSTRAINED PARKING

Gasparilla Market Area #1

PARKS	RECESSION PER YEAR MHW	ESC	LIM	1998	2001	2011	2021	2031	2041	2051	FF
	---	---	---	---	---	---	---	---	---	---	--
Englewood Public Beac	-1.0	.0	.0	13500.	9000.	0.	0.	0.	0.	0.	1500.00
Prot Charlotte Bch St	.0	.0	.0	61300.	61300.	61300.	61300.	61300.	61300.	61300.	6130.00
Lido Beach/N. Lido	-10.0	.0	.0	432750.	252750.	0.	0.	0.	0.	0.	6000.00
South Lido Cty Park	-10.0	.0	.0	101750.	71750.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd	.0	.0	.0	1600.	1600.	1600.	1600.	1600.	1600.	1600.	80.00
Avenida Navarra	-2.2	.0	.0	4800.	4404.	3084.	1764.	444.	0.	0.	60.00
Ocean Blvd	.0	.0	.0	6600	6120.	6120.	6120.	6120.	6120.	6120.	60.00
Plaza Des Palmas- N.	.0	.0	.0	7080.	7080.	7080.	7080.	7080.	7080.	7080.	60.00
Plaza Des Palmas- S.	.0	.0	.0	6120.	6120.	6120.	6120.	6120.	6120.	6120.	60.00
Calle Del Invierno	.0	.0	.0	3060.	3060.	3060.	3060.	3060.	3060.	3060.	60.00
Siesta Beach	.0	.0	.0	367500.	367500.	367500.	367500.	367500.	367500.	367500.	2430.00
Turtle Beach	-1.5	.0	.0	36000.	24413.	0.	0.	0.	0.	0.	2575.00
Palmer Point	-.5	.0	.0	62500.	60625.	54375.	48125.	41875.	35625.	29375.	1250.00
Nokomis	.0	.0	.0	79900.	79900.	79900.	79900.	79900.	79900.	79900.	1700.00
North Jetty Park	.0	.0	.0	72000.	72000.	72000.	72000.	72000.	72000.	72000.	900.00
Higel Park	-2.2	.0	.0	0.	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	-2.2	.0	.0	67000.	61060.	41260.	21460.	1660.	0.	0.	900.00
Ocala Street	-2.2	.0	.0	0.	0	0.	0.	0.	0.	0.	40.00
Service Club Park	.0	.0	.0	3900.	3900.	3900.	3900.	3900.	3900.	3900.	325.00

TABLE E-17 (cont0

Brohard Park	-.4	.0	.0	884000.	873392.	838032.	802672.	767312.	731952.	696592.	8840.00
Venice Fishing Pier	-2.2	.0	.0	45200.	41471.	29041.	16611.	4181.	0.	0.	565.00
Caspersen Beach	-6.1	.0	.0	229000.	61555.	0.	0.	0.	0.	0.	9150.00
Manasota Beach	.0	.0	.0	90200.	90200.	90200.	90200.	90200.	90200.	90200.	1394.00
Blind Pass Beach	-.5	.0	.0	70000.	65590.	50890.	36190.	21490.	6790.	0.	2940.00
19th Street	-2.8	.0	.0	1000.	832.	272.	0.	0.	0.	0.	20.00
17th Street	-2.8	.0	.0	1750.	1330.	0.	0.	0.	0.	0.	50.00
13th Street	-2.8	.0	.0	2000.	1580.	180.	0.	0.	0.	0.	50.00
12th Street	-2.8	.0	.0	900.	648.	0.	0.	0.	0.	0.	30.00
11th Street	-2.8	.0	.0	1000.	832.	272.	0.	0.	0.	0.	20.00
10th	-2.8	.0	.0	3250.	2830.	1430.	30.	0.	0.	0.	50.00
4th Street	-2.8	.0	. 0	900.	396.	0.	0.	0.	0.	0.	60.00
3rd Street	-2.8	.0	.0	1500.	996.	0.	0.	0.	0.	0.	60.00
Boca Grande Bch Park	-2.8	.0	.0	160688.	149533.	112349.	75165.	37981.	797	0.	3451.00
Cayo Costa State Park	-2.8	.0	.0	1108800.	798336.	0.	0.	0.	0.	0.	36960.00
TOTAL MARKET AREA				4215748.	3441374.	1991208.	1764012.	1580323.	1480544.	1431347.	

TABLE E-18
ESTERO BEACH
WITHOUT PROJECT SUPPLY IN (SQFT)
1998 TO 2051
UNCONSTRAINED PARKING

Estero Market Area

PARKS	RECESSION PER YEAR MHW	ESC	LIM	1998	2001	2011	2021	2031	2041	2051	FF
	---	---	---	---	---	---	---	---	--		
Blind Pass	.0	.0	.0	121590.	121590.	121590.	121590.	121590.	121590.	121590.	1930.00
Captiva Drive	.0	.0	.0	2000.	2000.	2000.	2000.	2000.	2000.	2000.	50.00
Andy Rosse Lane	.0	.0	.0	450.	450.	450.	450.	450.	450.	450.	50.00
Turner Beach (Blind P	.0	.0	.0	4800.	4800.	4800.	4800.	4800.	4800.	4800.	160.00
Turner Beach East	.0	.0	.0	4800.	4800.	4800.	4800.	4800.	4800.	4800.	120.00
Bowman's Beach	.0	.0	.0	550000.	550000.	550000.	550000.	550000.	550000.	550000.	11000.00
Tarpon Bay Road	.0	.0	.0	1600.	1600.	1600.	1600.	1600.	1600.	1600.	80.00
Gulfside City Park	.0	.0	.0	49500.	49500.	49500.	49500.	49500.	49500.	49500.	990.00
Nerita Street	.0	.0	.0	500.	500.	500.	500.	500.	500.	500.	50.00
Lighthouse Park	.0	.0	.0	14200.	14200.	14200.	14200.	14200.	14200.	14200.	1420.00
Bodwitch Park	-3.5	.0	.0	187200.	168300.	105300.	42300.	0.	0.	0.	1800.00
Ft. Myers Beach	-3.5	.0	.0	9000.	2700.	0.	0.	0.	0.	0.	600.00
San Carlos Blvd	-3.5	.0	.0	4500.	3975.	2225.	475.	0.	0.	0.	50.00
Canal Street	-3.5	.0	.0	0.	0.	0.	0.	0.	0.	0.	30.00
Avenue A	-3.5	.0	.0	1650.	1335.	285.	0.	0.	0.	0.	30.00
Avenue C	-3.5	.0	.0	990.	801.	171.	0.	0.	0.	0.	18.00
Alva Drive	-3.5	.0	.0	980.	833.	343.	0.	0.	0.	0.	14.00
Avenue E	-3.5	.0	.0	840.	693.	203.	0.	0.	0.	0.	14.00
Miramar Street	-3.5	.0	.0	1350.	1161.	531.	0.	0.	0.	0.	18.00
Palm Street	-3.5	.0	.0	2750.	2225.	475.	0.	0.	0.	0.	50.00
Pearl Street	-3.5	.0	.0	820.	663.	138.	0.	0.	0.	0.	15.00

TABLE E-18 (cont)

Delmar Avenue	-3.5	.0	.0	2150.	1699.	194.	0.	0.	0.	0.	43.00
Mango Street	-3.5	.0	.0	1500.	1185.	135.	0.	0.	0.	0.	30.00
Chapel Street	-3.5	.0	.0	1500.	1185.	135.	0.	0.	0.	0.	30.00
Gulf Beach Road	-3.5	.0	.0	1875.	1613.	738.	0.	0.	0.	0.	25.00
Pompano Street	-3.5	.0	.0	500.	0.	0.	0.	0.	0.	0.	50.00
Seaview Drive	-3.5	.0	.0	4500.	3975.	2225.	475.	0.	0.	0.	50.00
Connecticut Street	-3.5	.0	.0	1750.	1225.	0.	0.	0.	0.	0.	50.00
Hercules F\Drive	-3.5	.0	.0	4000.	3475.	1725.	0.	0.	0.	0.	50.00
Coconut Drive	-3.5	.0	.0	1950.	1635.	585.	0.	0.	0.	0.	30.00
Bayview Avenue	-3.5	.0	.0	4500.	3975.	2225.	475.	0.	0.	0.	50.00
Gulfview Avenue	-3.5	.0	.0	4250.	3725.	1975.	225.	0.	0.	0.	50.00
Strandview Avenue	-3.5	.0	.0	2750.	2225.	475.	0.	0.	0.	0.	50.00
Dakota Avenue	-3.5	.0	.0	1250.	725.	0.	0.	0.	0.	0.	50.00
Sterling Avenue	-3.5	.0	.0	750.	593.	68.	0.	0.	0.	0.	15.00
Aberdeen Avenue	-3.5	.0	.0	2000.	1580.	180.	0.	0.	0.	0.	40.00
Lanark Avenue	-3.5	.0	.0	2800.	2380.	980.	0.	0.	0.	0.	40.00
Gulf Road	-3.5	.0	.0	2200.	1780.	380.	0.	0.	0.	0.	40.00
Flamingo Street	-3.5	.0	.0	2000.	1580.	180.	0.	0.	0.	0.	40.00
Lover's Key State Pa	-3.5	.0	.0	382500.	311625.	75375.	0.	0.	0.	0.	6750.00
Big Hickory Island	-3.5	.0	.0	126900.	104693.	30668.	0.	0.	0.	0.	2115.00
Lynn Hall Park	-3.5	.0	.0	30315.	22913.	0.	0.	0.	0.	0.	705.00
Bonita Beach #1	-3.5	.0	.0	12500.	9875.	1125.	0.	0.	0.	0.	250.00
Bonita Beach #2	-3.5	.0	.0	2500.	1975.	225.	0.	0.	0.	0.	50.00
Bonita Beach #3	-3.5	.0	.0	2200.	1675.	0.	0.	0.	0.	0.	50.00
Bonita Beach #4	-3.5	.0	.0	2450.	1925.	175.	0.	0.	0.	0.	50.00
Bonita Beach #5	-3.5	.0	.0	245.	193.	18.	0.	0.	0.	0.	5.00
Bonita Beach #6	-3.5	.0	.0	2350.	1825.	75.	0.	0.	0.	0.	50.00
Bonita Beach #7	-3.5	.0	.0	3000.	2475.	725.	0.	0.	0.	0.	50.00
Bonita Beach #8	-3.5	.0	.0	2750.	2225.	475.	0.	0.	0.	0.	50.00
Bonita Beach #9	-3.5	.0	.0	2150.	1625.	0.	0.	0.	0.	0.	50.00
Bonita Beach #10	-3.5	.0	.0	6600.	5550.	2050.	0.	0.	0.	0.	100.00
Bonita Beach Park	-3.5	.0	.0	30550.	25615.	9165.	0.	0.	0.	0.	470.00
TOTAL ALL MARKET AREAS				1608755.	1460867.	991384.	793390.	749440.	749440.	749440.	

TABLE E-19
WITH PROJECT SUPPLY IN (SQFT)
1998 TO 2051
UNCONSTRAINED PARKING

Gasparilla Market Area

PARKS	RECESSION PER YEAR MHW	ESC	LIM	1998	2001	2011	2021	2031	2041	2051	FF
Englewood Public Beac	-1.0	.0	.0	13500.	9000.	0.	0.	0.	0.	0.	1500.00
Prot Charlotte Bch St	.0	.0	.0	61300.	61300.	61300.	61300.	61300.	61300.	61300.	6130.00
Lido Beach/N. Lido	-10.0	.0	.0	432750.	252750.	0.	0.	0.	0.	0.	6000.00
South Lido Cty Park	-10.0	.0	.0	101750.	71750.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd	.0	.0	.0	1600.	1600.	1600.	1600.	1600.	1600.	1600.	80.00
Avenida Navarra	-2.2	.0	.0	4800.	4404.	3084.	1764.	444.	0.	0.	60.00
Ocean Blvd	.0	.0	.0	6600.	6600.	6600.	6600.	6600.	6600.	6600.	60.00
Calle Des Siesta	.0	.0	.0	6120.	6120.	6120.	6120.	6120.	6120.	6120.	60.00
Plaza Des Palmas- N.	.0	.0	.0	7080.	7080.	7080.	7080.	7080.	7080.	7080.	60.00
Plaza Des Palmas- S.	.0	.0	.0	6120.	6120.	6120.	6120.	6120.	6120.	6120.	60.00
Calle Del Invierno	.0	.0	.0	3060.	3060.	3060.	3060.	3060.	3060.	3060.	60.00
Siesta Beach	.0	.0	.0	367500.	367500.	367500.	367500.	367500.	367500.	367500.	2430.00
Turtle Beach	-1.5	.0	.0	36000.	24413.	0.	0.	0.	0.	0.	2575.00
Palmer Point	-.5	.0	.0	62500.	60625.	54375.	48125.	41875.	35625.	29375.	1250.00
Nokomis	.0	.0	.0	79900.	79900.	79900.	79900.	79900.	79900.	79900.	1700.00
North Jetty Park	.0	.0	.0	72000.	72000.	72000.	72000.	72000.	72000.	72000.	900.00
Higel Park	-2.2	.0	.0	0.	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	-2.2	.0	.0	67000.	61060.	41260.	21460.	1660.	0.	0.	900.00
Ocala Street	-2.2	.0	.0	0.	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	.0	.0	.0	3900.	3900.	3900.	3900.	3900.	3900.	3900.	325.00

TABLE E- 19 (cont)

Brohard Park	-.4	.0	.0	884000.	873392.	838032.	802672.	767312.	731952.	696592.	8840.00
Venice Fishing Pier	-2.2	.0	.0	45200.	41471.	2904 1.	16611.	4181.	0.	0.	565.00
Caspersen Beach	-6.1	.0	.0	229000.	61555.	0.	0.	0.	0.	0.	9150.00
Manasota Beach	.0	.0	.0	90200.	90200.	90200.	90200.	90200.	90200.	90200.	1394.00
Blind Pass Beach	-.5	.0	.0	70000.	65590.	50890.	36190.	21490.	6790.	0.	2940.00
19th Street	-2.8	.0	.0	1000.	832.	272.	0.	0.	0.	0.	20.00
17th Street	.0	.0	.0	1750.	1750.	1750.	1750.	1750.	1750.	1750.	50.00
13th Street	.0	.0	.0	2000.	2000.	2000.	2000.	2000.	2000.	2000.	50.00
12th Street	.0	.0	.0	900.	900.	900.	900.	900.	900.	900.	30.00
11th Street	.0	.0	.0	1000.	1000.	1000.	1000.	1000.	1000.	1000.	20.00
10th Street	.0	.0	.0	4000.	4000.	4000.	4000.	4000.	4000.	4000.	50.00
7th Street	.0	.0	.0	3250.	4250.	4250.	4250.	4250.	4250.	4250.	50.00
4th Street	.0	.0	.0	900.	2100.	2100.	2100.	2100.	2100.	2100.	60.00
3rd Street	.0	.0	.0	1500.	2700.	2700.	2700.	2700.	2700.	2700.	60.00
Boca Grande Bch Park	.0	.0	.0	160688	187248.	187248.	187248.	187248.	187248.	187248.	1328.00
Gasparilla Island St.	.0	.0	.0	278080.	345100.	345100.	345100.	345100.	345100.	345100.	3451.00
Cayo Costa State Park	-2.8	.0	.0	1108800.	798336.	0.	0.	0.	0.	0.	36960.00

TOTAL ALL MARKET AREAS	4215748.	3581606.	2273382.	2183250.	2093390.	2030795.	1982395.

TABLE E-20
WITH PROJECT SUPPLY IN (SQFT)
1998 TO 2051
UNCONSTRAINED PARKING

Estero Market Area

PARKS	RECESSION PER YEAR MHW	ESC	LIM	1998	2001	2011	2021	2031	2041	2051	FF
	---	---	---	----	----	----	----	----	----	----	--
Blind Pass	.0	.0	.0	121590.	121590.	121590.	121590.	121590.	121590.	121590.	1930.00
Captiva Drive	.0	.0	.0	2000.	2000.	2000.	2000.	2000.	2000.	2000.	50.00
Andy Rosse Lane	.0	.0	.0	450.	450.	450.	450.	450.	450.	450.	50.00
Turner Beach (Blind P	.0	.0	.0	4800.	4800.	4800.	4800.	4800.	4800.	4800.	160.00
Turner Beach East	.0	.0	.0	4800.	4800.	4800.	4800.	4800.	4800.	4800.	120.00
Bowman's Beach	.0	.0	.0	550000.	550000.	550000.	550000.	550000.	550000.	550000.	11000.00
Tarpon Bay Road	.0	.0	.0	1600.	1600.	1600.	1600.	1600.	1600.	1600.	80.00
Gulfside City Park	.0	.0	.0	49500.	49500.	49500.	49500.	49500.	49500.	49500.	990.00
Nerita Street	.0	.0	.0	500.	500.	500.	500.	500.	500.	500.	50.00
Lighthouse Park	.0	.0	.0	14200.	14200.	14200.	14200.	14200.	14200.	14200.	1420.00
Bodwitch Park	-3.5	.0	.0	187200.	168300.	105300.	42300.	0.	0.	0.	1800.00
Ft. Myers Beach	.0	.0	.0	9000.	9000.	9000.	9000.	9000.	9000.	9000.	600.00
San Carlos Blvd	.0	.0	.0	4500.	6500.	6500.	6500.	6500.	6500.	6500.	50.00
Canal Street	.0	.0	.0	0.	1200.	1200.	1200.	1200.	1200.	1200.	30.00
Avenue A	.0	.0	.0	1650.	2850.	2850.	2850.	2850.	2850.	2850.	30.00
Avenue C	.0	.0	.0	990.	1710.	1710.	1710.	1710.	1710.	1710.	18.00
Alva Drive	.0	.0	.0	980.	1540.	1540.	1540.	1540.	1540.	1540.	14.00
Avenue E	.0	.0	.0	840.	1400.	1400.	1400.	1400.	1400.	1400.	14.00
Miramar Street	.0	.0	.0	1350.	2070.	2070.	2070.	2070.	2070.	2070.	18.00
Palm Street	.0	.0	.0	2750.	4750.	4750.	4750.	4750.	4750.	4750.	50.00
Pearl Street	.0	.0	.0	820.	1425.	1425.	1425.	1425.	1425.	1425.	15.00

TABLE E-20 (cont)

Delmar Avenue	.0	.0	.0	2150.	3870.	3870.	3870.	3870.	3870.	3870.	43.00
Mango Street	.0	.0	.0	1500.	1500.	1500.	1500.	1500.	1500.	1500.	30.00
Chapel Street	.0	.0	.0	1500.	1500.	1500.	1500.	1500.	150 0.	1500.	30.00
Gulf Beach Road	.0	.0	.0	1875.	1875.	1875.	1875.	1875.	1875.	1875.	25.00
Pompano Street	.0	.0	.0	500.	500.	500.	500.	500.	500.	500.	50.00
Seaview Drive	.0	.0	.0	4500.	4500.	4500.	4500.	4500.	4500.	4500.	50.00
Connecticut Street	.0	.0	.0	1750.	1750.	1750.	1750.	1750.	1750.	1750.	50.00
Hercules F\Drive	.0	.0	.0	4000.	4000.	4000.	4000.	4000.	4000.	4000.	50.00
Coconut Drive	.0	.0	.0	1950.	1950.	1950.	1950.	1950.	1950.	1950.	30.00
Bayview Avenue	.0	.0	.0	4500.	6500.	6500.	6500.	6500.	6500.	6500.	50.00
Gulfview Avenue	.0	.0	.0	4250.	6250.	6250.	6250.	6250.	6250.	6250.	50.00
Strandview Avenue	.0	.0	.0	2750.	4750.	4750.	4750.	4750.	4750.	4750.	50.00
Dakota Avenue	.0	.0	.0	1250.	3250.	3250.	3250.	3250.	3250.	3250.	50.00
Sterling Avenue	.0	.0	.0	750.	1350.	1350.	1350.	1350.	1350.	1350.	15.00
Aberdeen Avenue	.0	.0	.0	2000.	3600.	3600.	3600.	3600.	3600.	3600.	40.00
Lanark Avenue	.0	.0	.0	2800.	4400.	4400.	4400.	4400.	4400.	4400.	40.00
Gulf Road	.0	.0	.0	2200.	3800.	3800.	3800.	3800.	3800.	3800.	40.00
Flamingo Street	.0	.0	.0	2000.	8200.	8200.	8200.	8200.	8200.	8200.	40.00
Lover's Key State Par	-3.5	.0	.0	382500 .	311625.	75375.	0.	0.	0.	0.	6750.00
Big Hickory Island	-3.5	.0	.0	126900.	104693.	30668.	0.	0.	0.	0.	2115.00
Lynn Hall Park	-3.5	.0	.0	30315.	22913.	0.	0.	0.	0.	0.	705.00
Bonita Beach #1	-3.5	.0	.0	12500.	9875.	1125.	0.	0.	0.	0.	250.00
Bonita Beach #2	-3.5	.0	.0	2500.	1975.	225.	0.	0.	0.	0.	50.00
Bonita Beach #3	-3.5	.0	.0	2200.	1675.	0.	0.	0.	0.	0.	50.00
Bonita Beach #4	-3.5	.0	.0	2450.	1925.	175.	0.	0.	0.	0.	50.00
Bonita Beach #5	-3.5	.0	.0	245.	193.	18.	0.	0.	0.	0.	5.00
Bonita Beach #6	-3.5	.0	.0	2350.	1825.	75.	0.	0.	0.	0.	50.00
Bonita Beach #7	-3.5	.0	.0	3000.	2475.	725.	0.	0.	0.	0.	50.00
Bonita Beach #8	-3.5	.0	.0	2750.	2225.	475.	0.	0.	0.	0.	50.00
Bonita Beach #9	-3.5	.0	.0	2150.	1625.	0.	0.	0.	0.	0.	50.00
Bonita Beach #10	-3.5	.0	.0	6600.	5550.	2050.	0.	0.	0.	0.	100.00
Bonita Beach Park	-3.5	.0	.0	30550.	25615.	9165.	0.	0.	0.	0.	470.00
TOTAL ALL MARKET AREAS				1608755.	1507918.	1070805.	887730.	845430.	845430.	845430.	

TABLE E-21
WITHOUT PROJECT SUPPLY IN (PPD)
1998 TO 2051
UNCONSTRAINED PARKING

Gasparilla Market Area #1

PARKS	RECESSION PER YEAR MHW ESC LIM	1998	2001	2011	2021	2031	2041	2051	FF
Englewood Public Beac	--- --- ---	270.	180.	0.	0.	0.	0.	0	1500.00
Prot Charlotte Bch S	--- --- ---	1226.	1226.	1226.	1226.	1226.	1226.	1226.	6130.00
Lido Beach/N. Lido	--- --- ---	8655.	5055.	0.	0.	0.	0.	0.	6000.00
South Lido Cty Park	--- --- ---	2035.	1435.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd	--- --- ---	32.	32.	32.	32.	32.	32.	32.	80.00
Avenida Navarra	--- --- ---	96.	88.	62.	35.	9.	0.	0.	60.00
Ocean Blvd	--- --- ---	132.	132.	132.	132.	132.	132.	132.	60.00
Calle Des Siesta	--- --- ---	122.	122.	122.	122.	122.	122.	122.	60.00
Plaza Des Palmas- N.	--- --- ---	142.	142.	142.	142.	142.	142.	142.	60.00
Plaza Des Palmas- S.	--- --- ---	122.	122.	122.	122.	122.	122.	122.	60.00
Calle Del Invierno	--- --- ---	61.	61.	61.	61.	61.	61.	61.	60.00
Siesta Beach	--- --- ---	7350.	7350.	7350.	7350.	7350.	7350.	7350.	2430.00
Turtle Beach	--- --- ---	720.	488.	0.	0.	0.	0.	0.	2575.00
Palmer Point	--- --- ---	1250.	1213.	1088.	963.	838.	713.	588.	1250.00
Nokomis	--- --- ---	1598.	1598.	1598.	1598.	1598.	1598.	1598.	1700.00
North Jetty Park	--- --- ---	1440.	1440.	1440.	1440.	1440.	1440.	1440.	900.00
Higel Park	--- --- ---	0.	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	--- --- ---	1340.	1221.	825.	429.	33.	0.	0.	900.00
Ocala Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	--- --- ---	78.	78.	78.	78.	78.	78.	78.	325.00
Brohard Park	--- --- ---	17680.	17468.	16761.	16053.	15346.	14639.	13932.	8840.00

TABLE E-21 (cont)

Venice Fishing Pier --- --- ---	904.	829.	581.	332.	84.	0.	0.	565.00
Caspersen Beach --- --- ---	4580.	1231.	0.	0.	0.	0.	0.	9150.00
Manasota Beach --- --- ---	1804.	1804.	1804.	1804.	1804.	1804.	1804.	1394.00
Blind Pass Beach --- --- ---	1400.	1312.	1018.	724.	430.	136.	0.	2940.00
19th Street --- --- ---	20.	17.	5.	0.	0.	0.	0.	20.00
17th Street --- --- ---	35.	27.	0.	0.	0.	0.	0.	50.00
13th Street --- --- ---	40.	32.	4.	0.	0.	0.	0.	50.00
12th Street --- --- ---	18.	13.	0.	0.	0.	0.	0.	30.00
11th Street --- --- ---	20.	17.	5.	0.	0.	0.	0.	20.00
10th Street --- --- ---	80.	72.	44.	16.	0.	0.	0.	50.00
7th Street --- --- ---	65.	57.	29.	1.	0.	0.	0.	50.00
4th Street --- --- ---	18.	8.	0.	0.	0.	0.	0.	60.00
3rd Street --- --- ---	30.	20.	0.	0.	0.	0.	0.	60.00
Boca Grande Bch Park --- --- ---	3214.	2991.	2247.	1503.	760.	16.	0.	1328.00
Gasparilla Island St. --- --- ---	5562.	4982.	3049.	1117.	0.	0.	0.	3451.00
Cayo Costa State Park --- --- ---	22176.	15967.	0.	0.	0.	0.	0.	36960.00
TOTAL ALL MARKET AREAS	84315.	68827.	39824.	35280.	31606.	29611.	28627.	

TABLE E-22
WITHOUT PROJECT SUPPLY IN (PPD)
1998 TO 2051
UNCONSTRAINED PARKING

Estero Market Area

PARKS	RECESSION PER YEAR MHW	ESC	LIM	1998	2001	2011	2021	2031	2041	2051	FF
Blind Pass	---	---	---	2432.	2432.	2432.	2432.	2432.	2432.	2432.	1930.00
Captiva Drive	---	---	---	40.	40.	40.	40.	40.	40.	40.	50.00
Andy Rosse Lane	---	---	---	9.	9.	9.	9.	9.	9.	9.	50.00
Turner Beach (Blind P	---	---	---	96.	96.	96.	96.	96.	96.	96.	160.00
Turner Beach East	---	---	---	96.	96.	96.	96.	96.	96.	96.	120.00
Bowman's Beach	---	---	---	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.00
Tarpon Bay Road	---	---	---	32.	32.	32.	32.	32.	32.	32.	80.00
Gulfside City Park	---	---	---	990.	990.	990.	990.	990.	990.	990.	990.00
Nerita Street	---	---	---	10.	10.	10.	10.	10.	10.	10.	50.00
Lighthouse Park	---	---	---	284.	284.	284.	284.	284.	284.	284.	1420.00
Bodwitch Park	---	---	---	3744.	3366.	2106.	846.	0.	0.	0.	1800.00
Ft. Myers Beach	---	---	---	180.	54.	0.	0.	0.	0.	0.	600.00
San Carlos Blvd	---	---	---	90.	80.	45.	10.	0.	0.	0.	50.00
Canal Street	---	---	---	0.	0.	0.	0.	0.	0.	0.	30.00
Avenue A	---	---	---	33.	27.	6.	0.	0.	0.	0.	30.00
Avenue C	---	---	---	20.	16.	3.	0.	0.	0.	0.	18.00
Alva Drive	---	---	---	20.	17.	7.	0.	0.	0.	0.	14.00
Avenue E	---	---	---	17.	14.	4.	0.	0.	0.	0.	14.00
Miramar Street	---	---	---	27.	23.	11.	0.	0.	0.	0.	18.00
Palm Street	---	---	---	55.	45.	10.	0.	0.	0.	0.	50.00
Pearl Street	---	---	---	16.	13.	3.	0.	0.	0.	0.	15.00

TABLE E-22 (cont)

Delmar Avenue	---	---	---	43.	34.	4.	0.	0.	0.	0.	43.00
Mango Street	---	---	---	30.	24.	3.	0.	0.	0.	0.	30.00
Chapel Street	---	---	---	30.	24.	3.	0.	0.	0.	0.	30.00
Gulf Beach Road	---	---	---	38.	32.	15.	0.	0.	0.	0.	25.00
Pompano Street	---	---	---	10.	0.	0.	0.	0.	0.	0.	50.00
Seaview Drive	---	---	---	90.	80.	45.	10.	0.	0.	0.	50.00
Connecticut Street	---	---	---	35.	25.	0.	0.	0.	0.	0.	50.00
Hercules F\Drive	---	---	---	80.	70.	35.	0.	0.	0.	0.	50.00
Coconut Drive	---	---	---	39.	33.	12.	0.	0.	0.	0.	30.00
Bayview Avenue	---	---	---	90.	80.	45.	10.	0.	0.	0.	50.00
Gulfview Avenue	---	---	---	85.	75.	40.	5.	0.	0.	0.	50.00
Strandview Avenue	---	---	---	55.	45.	10.	0.	0.	0.	0.	50.00
Dakota Avenue	---	---	---	25.	15.	0.	0.	0.	0.	0.	50.00
Sterling Avenue	---	---	---	15.	12.	1.	0.	0.	0.	0.	15.00
Aberdeen Avenue	---	---	---	40.	32.	4.	0.	0.	0.	0.	40.00
Lanark Avenue	---	---	---	56.	48.	20.	0.	0.	0.	0.	40.00
Gulf Road	---	---	---	44.	36.	8.	0.	0.	0.	0.	40.00
Flamingo Street	---	---	---	40.	32.	4.	0.	0.	0.	0.	40.00
Lover's Key State Par	---	---	---	7650.	6233.	1508.	0.	0.	0.	0.	6750.00
Big Hickory Island	---	---	---	2538.	2094.	613.	0.	0.	0.	0.	2115.00
Lynn Hall Park	---	---	---	606.	458.	0.	0.	0.	0.	0.	705.00
Bonita Beach #1	---	---	---	250.	198.	23.	0.	0.	0.	0.	250.00
Bonita Beach #2	---	---	---	50.	40.	5.	0.	0.	0.	0.	50.00
Bonita Beach #3	---	---	---	44.	34.	0.	0.	0.	0.	0.	50.00
Bonita Beach #4	---	---	---	49.	39.	4.	0.	0.	0.	0.	50.00
Bonita Beach #5	---	---	---	5.	4.	0.	0.	0.	0.	0.	5.00
Bonita Beach #6	---	---	---	47.	37.	2.	0.	0.	0.	0.	50.00
Bonita Beach #7	---	---	---	60.	50.	15.	0.	0.	0.	0.	50.00
Bonita Beach #8	---	---	---	55.	45.	10.	0.	0.	0.	0.	50.00
Bonita Beach #9	---	---	---	43.	33.	0.	0.	0.	0.	0.	50.00
Bonita Beach #10	---	---	---	132.	111.	41.	0.	0.	0.	0.	100.00
Bonita Beach Park	---	---	---	611.	512.	183.	0.	0.	0.	0.	470.00
TOTAL ALL MARKET AREAS				32175.	29217.	19828.	15868.	14989.	14989.	14989.	

TABLE E-23
WITH PROJECT SUPPLY IN (PPD)
1998 TO 2051
UNCONSTRAINED PARKING

Gasparilla Market Area #1

PARKS	RECESSION PER YEAR MHW ESC LIM	1998	2001	2011	2021	2031	2041	2051	FF
		---	---	---	---	---	---	--	
Englewood Public Beac	--- --- ---	270.	180.	0.	0.	0.	0.	0.	1500.00
Prot Charlotte Bch St	--- --- ---	1226.	1226.	1226.	1226.	1226.	1226.	1226.	6130.00
Lido Beach/N. Lido	--- --- ---	8655.	5055.	0.	0.	0.	0.	0.	6000.00
South Lido Cty Park	--- --- ---	2035.	1435.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd	--- --- ---	32.	32.	32.	32.	32.	32.	32.	80.00
Avenida Navarra	--- --- ---	96.	88.	62.	35.	9.	0.	0.	60.00
Ocean Blvd	--- --- ---	132.	132.	132.	132.	132.	132.	132.	60.00
Calle Des Siesta	--- --- ---	122.	122.	122.	122.	122.	122.	122.	60.00
Plaza Des Palmas- N.	--- --- ---	142.	142.	142.	142.	142.	142.	142.	60.00
Plaza Des Palmas- S.	--- --- ---	122.	122.	122.	122.	122.	122.	122.	60.00
Calle Del Invierno	--- --- ---	61.	61.	61.	61.	61.	61 .	61.	60.00
Siesta Beach	--- --- ---	7350.	7350.	7350.	7350.	7350.	7350.	7350.	2430.00
Turtle Beach	--- --- ---	720.	488.	0.	0.	0.	0.	0.	2575.00
Palmer Point	--- --- ---	1250.	1213.	1088.	963.	838.	713.	588.	1250.00
Nokomis	--- --- ---	1598.	1598.	1598.	1598.	1598.	1598.	1598.	1700.00
North Jetty Park	--- --- ---	1440.	1440.	1440.	1440.	1440.	1440.	1440.	900.00
Higel Park	--- --- ---	0.	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	--- --- ---	1340.	1221.	825.	429.	33.	0.	0.	900.00
Ocala Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	--- --- ---	78.	78.	78.	78.	78.	78.	78.	325.00

TABLE E-23 (cont)

Brohard Park	--- --- ---	17680.	17468.	16761.	16053.	15346.	14639.	13932.	8840.00
Venice Fishing Pier	--- --- ---	904.	829.	581.	332.	84.	0.	0.	565.00
Caspersen Beach	--- --- ---	4580.	1231.	0.	0.	0.	0.	0.	9150.00
Manasota Beach	--- --- ---	1804.	1804.	1804.	1804.	1804.	1804.	1804.	1394.00
Blind Pass Beach	--- --- ---	1400.	1312.	1018.	724.	430.	136.	0.	2940.00
19th Street	--- --- ---	20.	17.	5.	0.	0.	0.	0.	20.00
17th Street	--- --- ---	35.	35.	35.	35.	35.	35.	35.	50.00
13th Street	--- --- ---	40.	40.	40.	40.	40.	40.	40.	50.00
12th Street	--- --- ---	18.	18.	18.	18.	18.	18.	18.	30.00
11th Street	--- --- ---	20.	20.	20.	20.	20.	20.	20.	20.00
10th Street	--- --- ---	80.	80.	80.	80.	80.	80.	80.	50.00
7th Street	--- --- ---	65.	85.	85.	85.	85.	85.	85.	50.00
4th Street	--- --- ---	18.	42.	42.	42.	42.	42.	42.	60.00
3rd Street	--- --- ---	30.	54.	54.	54.	54.	54.	54.	60.00
Boca Grande Bch Park	--- --- ---	3214.	3745.	3745.	3745.	3745.	3745.	3745.	1328.00
Gasparilla Island St.	--- --- ---	5562.	6902.	6902.	6902.	6902.	6902.	6902.	3451.00
Cayo Costa State Park	--- --- ---	22176.	15967.	0.	0.	0.	0.	0.	36960.00
TOTAL ALL MARKET AREAS		84315.	71632.	45468.	43665.	41868.	40616.	39648.	

TABLE E-24
WITH PROJECT SUPPLY IN (PPD)
1998 TO 2051
UNCONSTRAINED PARKING

Estero Market Area

PARKS	RECESSION PER YEAR MHW ESC LIM	1998	2001	2011	2021	2031	2041	2051	FF
	--- --- ---	----	----	----	----	----	----	----	--
Blind Pass	--- --- ---	2432.	2432.	2432.	2432.	2432.	2432.	2432.	1930.00
Captiva Drive	--- --- ---	40.	40.	40.	40.	40.	40.	40.	50.00
Andy Rosse Lane	--- --- ---	9.	9.	9.	9.	9.	9.	9.	50.00
Turner Beach (Blind P	--- --- ---	96.	96.	96.	96.	96.	96.	96.	160.00
Turner Beach East	--- --- ---	96.	96.	96.	96.	96.	96.	96.	120.00
Bowman's Beach	--- --- ---	11000.	11000.	11000.	11000.	11000.	11000.	11000.	11000.00
Tarpon Bay Road	--- --- ---	32.	32.	32.	32.	32.	32.	32.	80.00
Gulfside City Park	--- --- ---	990.	990.	990.	990.	990.	990.	990.	990.00
Nerita Street	--- --- ---	10.	10.	10.	10.	10.	10.	10.	50.00
Lighthouse Park	--- --- ---	284.	284.	284.	284.	284.	284.	284.	1420.00
Bodwitch Park	--- --- ---	3744.	3366.	2106.	846.	0.	0.	0.	1800.00
Ft. Myers Beach	--- --- ---	180.	180.	180.	180.	180.	180.	180.	600.00
San Carlos Blvd	--- --- ---	90.	130.	130.	130.	130.	130.	130.	50.00
Canal Street	--- --- ---	0.	24.	24.	24.	24.	24.	24.	30.00
Avenue A	--- --- ---	33.	57.	57.	57.	57.	57.	57.	30.00
Avenue C	--- --- ---	20.	34.	34.	34.	34.	34.	34.	18.00
Alva Drive	--- --- ---	20.	31.	31.	31.	31.	31.	31.	14.00
Avenue E	--- --- ---	17.	28.	28.	28.	28.	28.	28.	14.00
Miramar Street	--- --- ---	27.	41.	41.	41.	41.	41.	41.	18.00
Palm Street	--- --- ---	55.	95.	95.	95.	95.	95.	95.	50.00
Pearl Street	--- --- ---	16.	29.	29.	29.	29.	29.	29.	15.00
Delmar Avenue	--- --- ---	43.	77.	77.	77.	77.	77.	77.	43.00

TABLE E-24 (cont)

Mango Street --- --- ---	30.	30.	30.	30.	30.	30.	30.	30.00
Chapel Street --- --- ---	30.	30.	30.	30.	30.	30.	30.	30.00
Gulf Beach Road --- --- ---	38.	38.	38.	38.	38.	38.	38.	25.00
Pompano Street --- --- ---	10.	10.	10.	10.	10.	10.	10.	50.00
Seaview Drive --- --- ---	90.	90.	90.	90.	90.	90.	90.	50.00
Connecticut Street --- --- ---	35.	35.	35.	35.	35.	35.	35.	50.00
Hercules F\Drive --- --- ---	80.	80.	80.	80.	80.	80.	80.	50.00
Coconut Drive --- --- ---	39.	39.	39.	39.	39.	39.	39.	30.00
Bayview Avenue --- --- ---	90.	130.	130.	130.	130.	130.	130.	50.00
Gulfview Avenue --- --- ---	85.	125.	125.	125.	125.	125.	125.	50.00
Strandview Avenue --- --- ---	55.	95.	95.	95.	95.	95.	95.	50.00
Dakota Avenue --- --- ---	25.	65.	65.	65.	65.	65.	65.	50.00
Sterling Avenue --- --- ---	15.	27.	27.	27.	27.	27.	27.	15.00
Aberdeen Avenue --- --- ---	40.	72.	72.	72.	72.	72.	72.	40.00
Lanark Avenue --- --- ---	56.	88.	88.	88.	88.	88.	88.	40.00
Gulf Road --- --- ---	44.	76.	76.	76.	76.	76.	76.	40.00
Flamingo Street --- --- ---	40.	164.	164.	164.	164.	164.	164.	40.00
Lover's Key State Par --- --- ---	7650.	6233.	1508.	0.	0.	0.	0.	6750.00
Big Hickory Island --- --- ---	2538.	2094.	613.	0.	0.	0.	0.	2115.00
Lynn Hall Park --- --- ---	606.	458.	0.	0.	0.	0.	0.	705.00
Bonita Beach #1 --- --- ---	250.	198.	23.	0.	0.	0.	0.	250.00
Bonita Beach #2 --- --- ---	50.	40.	5.	0.	0.	0.	0.	50.00
Bonita Beach #3 --- --- ---	44.	34.	0.	0.	0.	0.	0.	50.00
Bonita Beach #4 --- --- ---	49.	39.	4.	0.	0.	0.	0.	50.00
Bonita Beach #5 --- --- ---	5.	4.	0.	0.	0.	0.	0.	5.00
Bonita Beach #6 --- --- ---	47.	37.	2.	0.	0.	0.	0.	50.00
Bonita Beach #7 --- --- ---	60.	50.	15.	0.	0.	0.	0.	50.00
Bonita Beach #8 --- --- ---	55.	45.	10.	0.	0.	0.	0.	50.00
Bonita Beach #9 --- --- ---	43.	33.	0.	0.	0.	0.	0.	50.00
Bonita Beach #10 --- --- ---	132.	111.	41.	0.	0.	0.	0.	100.00
Bonita Beach Park --- --- ---	611.	512.	183.	0.	0.	0.	0.	470.00
TOTAL ALL MARKET AREAS	32175.	30158.	21416.	17755.	16909.	16909.	16909.	

TABLE E-25
WITHOUT PROJECT SUPPLY IN (PPD)
1998 TO 2051
CONSTRAINED PARKING

Gasparilla Market Area

PARKS	RECESSION PER YEAR MHW	ESC	LIM	1998	2001	2011	2021	2031	2041	2051	FF
	---	---	---	---	---	---	---	---	---	---	--
Englewood Public Beac	---	---	---	270.	180.	0.	0.	0.	0.	0.	1500.00
Prot Charlotte Bch St	---	---	---	0.	0.	0.	0.	0.	0.	0.	6130.00
Lido Beach/N. Lido	---	---	---	3200.	3200.	0.	0.	0.	0.	0.	6000.00
South Lido Cty Park	---	---	---	1096.	1096.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd	---	---	---	0.	0.	0.	0.	0.	0.	0.	80.00
Avenida Navarra	---	---	---	48.	48.	48.	35.	9.	0.	0.	60.00
Ocean Blvd	---	---	---	132.	132.	132.	132.	132.	132.	132.	60.00
Calle Des Siesta	---	---	---	120.	120.	120.	120.	120.	120.	120.	60.00
Plaza Des Palmas- N.	---	---	---	136.	136.	136.	136.	136.	136.	136.	60.00
Plaza Des Palmas- S.	---	---	---	104.	104.	104.	104.	104.	104.	104.	60.00
Calle Del Invierno	---	---	---	40.	40.	40.	40.	40.	40.	40.	60.00
Siesta Beach	---	---	---	6400.	6400.	6400.	6400.	6400.	6400.	6400.	2430.00
Turtle Beach	---	---	---	720.	488.	0.	0.	0.	0.	0.	2575.00
Palmer Point	---	---	---	0.	0.	0.	0.	0.	0.	0.	1250.00
Nokomis	---	---	---	1512.	1512.	1512.	1512.	1512.	1512.	1512.	1700.00
North Jetty Park	---	---	---	1440.	1440.	1440.	1440.	1440.	1440.	1440.	900.00
Higel Park	---	---	---	0.	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	---	---	---	1040.	1040.	825.	429.	33.	0.	0.	900.00
Ocala Street	---	---	---	0.	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	---	---	---	78.	78.	78.	78.	78.	78.	78.	325.00

TABLE 25 (cont)

Brohard Park	--- --- ---	464.	464.	464.	464.	464.	464.	464.	8840.00
Venice Fishing Pier	--- --- ---	848.	829.	581.	332.	84.	0.	0.	565.00
Caspersen Beach	--- --- ---	960.	960.	0.	0.	0.	0.	0.	9150.00
Manasota Beach	--- --- ---	1360.	1360.	1360.	1360.	1360.	1360.	1360.	1394.00
Blind Pass Beach	--- --- ---	1400.	1312.	1018.	724.	430.	136.	0.	2940.00
19th Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	20.00
17th Street	--- --- ---	16.	16.	0.	0.	0.	0.	0.	50.00
13th Street	--- --- ---	16.	16.	4.	0.	0.	0.	0.	50.00
12th Street	--- --- ---	18.	13.	0.	0.	0.	0.	0.	30.00
11th Street	--- --- ---	20.	17.	5.	0.	0.	0.	0.	20.00
10th Street	--- --- ---	80.	72.	44.	16.	0.	0.	0.	50.00
7th Street	--- --- ---	48.	48.	29.	1.	0.	0.	0.	50.00
4th Street	--- --- ---	18.	8.	0.	0.	0.	0.	0.	60.00
3rd Street	--- --- ---	30.	20.	0.	0.	0.	0.	0.	60.00
Boca Grande Bch Park	--- --- ---	320.	320.	320.	320.	320.	16.	0.	1328.00
Gasparilla Island St.	--- --- ---	1152.	1152.	1152.	1117.	0.	0.	0.	3451.00
Cayo Costa State Park	--- --- ---	0.	0.	0.	0.	0.	0.	0.	36960.00
TOTAL ALL MARKET AREAS		23086.	22621.	15811.	14759.	12661.	11938.	11786.	

TABLE E-26
WITHOUT PROJECT SUPPLY IN (PPD)
1998 TO 2051
PARKING CONSTRAINTS

Estero Market Area #1

PARKS	RECESSION PER YEAR MHW ESC LIM	1998	2001	2011	2021	2031	2041	2051	FF
Blind Pass	--- --- ---	5272.	5272.	5272.	5272.	5272.	5272.	5272.	1930.00
Captiva Drive	--- --- ---	320.	320.	320.	320.	320.	320.	320.	50.00
Andy Rosse Lane	--- --- ---	24.	24.	24.	24.	24.	24.	24.	50.00
Turner Beach (Blind P	--- --- ---	1920.	1920.	1920.	1920.	1920.	1920.	1920.	160.00
Turner Beach East	--- --- ---	176.	176.	176.	176.	176.	176.	176.	120.00
Bowman's Beach	--- --- ---	1712.	1712.	1712.	1712.	1712.	1712.	1712.	11000.00
Tarpon Bay Road	--- --- ---	24.	24.	24.	24.	24.	24.	24.	80.00
Gulfside City Park	--- --- ---	344.	344.	344.	344.	344.	344.	344.	990.00
Nerita Street	--- --- ---	40.	40.	40.	40.	40.	40.	40.	50.00
Lighthouse Park	--- --- ---	600.	600.	600.	600.	600.	600.	600.	1420.00
Bodwitch Park	--- --- ---	40.	40.	40.	40.	40.	40.	40.	1800.00
Ft. Myers Beach	--- --- ---	944.	944.	944.	944.	944.	944.	944.	600.00
San Carlos Blvd	--- --- ---	0.	0.	0.	0.	0.	0.	0.	50.00
Canal Street	--- --- ---	0.	0.	0.	0.	0.	0	0.	30.00
Avenue A	--- --- ---	0.	0.	0.	0.	0.	0.	0.	30.00
Avenue C	--- --- ---	0.	0.	0.	0.	0.	0.	0.	18.00
Alva Drive	--- --- ---	0.	0.	0.	0.	0.	0.	0.	14.00
Avenue E	--- --- ---	0.	0.	0.	0.	0.	0.	0.	14.00
Miramar Street	--- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Pearl Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	15.00
Delmar Avenue	--- --- ---	48.	48.	48.	48.	48.	48.	48.	43.00

TABLE E-26 (cont)

Mango Street	--- --- ---	48.	48.	48.	48.	48.	48.	48.	30.00
Chapel Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	30.00
Gulf Beach Road	--- --- ---	32.	32.	32.	32.	32.	32.	32.	25.00
Pompano Street	--- --- ---	16.	16.	16.	16.	16.	16.	16.	50.00
Seaview Drive	--- --- ---	32.	32.	32.	32.	32.	32.	32.	50.00
Connecticut Street	--- --- ---	80.	80.	80.	80.	80.	80.	80.	50.00
Hercules F\Drive	--- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Coconut Drive	--- --- ---	48.	48.	48.	48.	48.	48.	48.	30.00
Bayview Avenue	--- --- ---	16.	16.	16.	16.	16.	16.	16.	50.00
Gulfview Avenue	--- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Strandview Avenue	--- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Dakota Avenue	--- --- ---	32.	32.	32.	32.	32.	32.	32.	50.00
Sterling Avenue	--- --- ---	40.	40.	40.	40.	40.	40.	40.	15.00
Aberdeen Avenue	--- --- ---	32.	32.	32.	32.	32.	32.	32.	40.00
Lanark Avenue	--- --- ---	16.	16.	16.	16.	16.	16.	16.	40.00
Gulf Road	--- --- ---	32.	32.	32.	32.	32.	32.	32.	40.00
Flamingo Street	--- --- ---	64.	64.	64.	64.	64.	64.	64.	40.00
Lover's Key State Par	--- --- ---	1600.	1600.	1600.	1600.	1600.	1600.	1600.	6750.00
Big Hickory Island	--- --- ---	0.	0.	0.	0.	0.	0.	0.	2115.00
Lynn Hall Park	--- --- ---	880.	880.	880.	880.	880.	880.	880.	705.00
Bonita Beach #1	--- --- ---	112.	112.	112.	112.	112.	112.	112.	250.00
Bonita Beach #2	--- --- ---	24.	24.	24.	24.	24.	24.	24.	50.00
Bonita Beach #3	--- --- ---	40.	40.	40.	40.	40.	40.	40.	50.00
Bonita Beach #4	--- --- ---	24.	24.	24.	24.	24.	24.	24.	50.00
Bonita Beach #5	--- --- ---	32.	32.	32.	32.	32.	32.	32.	5.00
Bonita Beach #6	--- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Bonita Beach #7	--- --- ---	64.	64.	64.	64.	64.	64.	64.	50.00
Bonita Beach #8	--- --- ---	40.	40.	40.	40.	40.	40.	40.	50.00
Bonita Beach #9	--- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Bonita Beach #10	--- --- ---	152.	152.	152.	152.	152.	152.	152.	100.00
Bonita Beach Park	--- --- ---	704.	704.	704.	704.	704.	704.	704.	470.00
TOTAL ALL MARKET AREAS		15912.	15912.	15912.	15912.	15912.	15912.	15912.	

TABLE E-27
WITH PROJECT SUPPLY IN (PPD)
1998 TO 2051
CONSTRAINED PARKING

Gasparilla Market

PARKS	RECESSION PER YEAR MHW ESC LIM	1998	2001	2011	2021	2031	2041	2051	FF
Englewood Public Beac	--- --- ---	270.	180.	0.	0.	0.	0.	0.	1500.00
Prot Charlotte Bch St	--- --- ---	0.	0.	0.	0.	0.	0.	0.	6130.00
Lido Beach/N. Lido	--- --- ---	3200.	3200.	0.	0.	0.	0.	0.	6000.00
South Lido Cty Park	--- --- ---	1096.	1096.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd	--- --- ---	0.	0.	0.	0.	0.	0.	0.	80.00
Avenida Navarra	--- --- ---	48.	48.	48.	35.	9.	0.	0.	60.00
Ocean Blvd	--- --- ---	132.	132.	132.	132.	132.	132.	132.	60.00
Calle Des Siesta	--- --- ---	120.	120.	120.	120.	120.	120.	120.	60.00
Plaza Des Palmas- N.	--- --- ---	136.	136.	136.	136.	136.	136.	136.	60.00
Plaza Des Palmas- S.	--- --- ---	104.	104.	104.	104.	104.	104.	104.	60.00
Calle Del Invierno	--- --- ---	40.	40.	40.	40.	40.	40.	40.	60.00
Siesta Beach	--- --- ---	6400.	6400.	6400.	6400.	6400.	6400.	6400.	2430.00
Turtle Beach	--- --- ---	720.	488.	0.	0.	0.	0.	0.	2575.00
Palmer Point	--- --- ---	0.	0.	0.	0.	0.	0.	0.	1250.00
Nokomis	--- --- ---	1512.	1512.	1512.	1512.	1512.	1512.	1512.	1700.00
North Jetty Park	--- --- ---	1440.	1440.	1440.	1440.	1440.	1440.	1440.	900.00
Higel Park	--- --- ---	0.	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	--- --- ---	1040.	1040.	825.	429.	33.	0.	0.	900.00
Ocala Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	--- --- ---	78.	78.	78.	78.	78.	78.	78.	325.00

TABLE E-27 (cont)

Brohard Park --- --- ---	464.	464.	464.	464.	464.	464.	464.	8840.00
Venice Fishing Pier --- --- ---	848.	829.	581.	332.	84.	0.	0.	565.00
Caspersen Beach --- --- ---	960.	960.	0.	0.	0.	0.	0.	9150.00
Manasota Beach --- --- ---	1360.	1360.	1360.	1360.	1360.	1360.	1360.	1394.00
Blind Pass Beach --- --- ---	1400.	1312.	1018	724.	430.	136.	0.	2940.00
19th Street --- --- ---	0.	0.	0.	0.	0.	0.	0.	20.00
17th Street --- --- ---	16.	16.	16.	16.	16.	16.	16.	50.00
13th Street --- --- ---	16.	16.	16.	16.	16.	16.	16.	50.00
12th Street --- --- ---	18.	18.	18.	18.	18.	18.	18.	30.00
11th Street --- --- ---	20.	20.	20.	20.	20.	20.	20.	20.00
10th Street --- --- ---	80.	80.	80.	80.	80.	80.	80.	50.00
7th Street --- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
4th Street --- --- ---	18.	42.	42.	42.	42.	42.	42.	60.00
3rd Street --- --- ---	30.	54.	54.	54.	54.	54.	54.	60.00
Boca Grande Bch Park --- --- ---	320.	320.	320.	320.	320.	320.	320.	1328.00
Gasparilla Island St. --- --- ---	1152.	1152.	1152.	1152.	1152.	1152.	1152.	3451.00
Cayo Costa State Park --- --- ---	0.	0.	0.	0.	0.	0.	0.	36960.00
TOTAL ALL MARKET AREAS	23086.	22705.	16024.	15073.	14107.	13688.	13552.	

TABLE E-28
WITH PROJECT SUPPLY IN (PPD)
1998 TO 2051
CONSTRAINED PARKING

Estero Market Area #1

PARKS	RECESSION PER YEAR MHW ESC LIM	1998	2001	2011	2021	2031	2041	2051	FF
	--- --- ---	---	---	---	---	---	---	---	--
Blind Pass	--- --- ---	2432.	2432.	2432.	2432.	2432.	2432.	2432.	1930.00
Captiva Drive	--- --- ---	40.	40.	40.	40.	40.	40.	40.	50.00
Andy Rosse Lane	--- --- ---	9.	9.	9.	9.	9.	9.	9.	50.00
Turner Beach (Blind P	--- --- ---	96.	96.	96.	96.	96.	96.	96.	160.00
Turner Beach East	--- --- ---	96.	96.	96.	96.	96.	96.	96.	120.00
Bowman's Beach	--- --- ---	1712.	1712.	1712.	1712.	1712.	1712.	1712.	11000.00
Tarpon Bay Road	--- --- ---	24.	24.	24.	24.	24.	24.	24.	80.00
Gulfside City Park	--- --- ---	344.	344.	344.	344.	344.	344.	344.	990.00
Nerita Street	--- --- ---	10.	10.	10.	10.	10.	10.	10.	50.00
Lighthouse Park	--- --- ---	284.	284.	284.	284.	284.	284.	284.	1420.00
Bodwitch Park	--- --- ---	40.	40.	40.	40.	0.	0.	0.	1800.00
Ft. Myers Beach	--- --- ---	180.	180.	180.	180.	180.	180.	180.	600.00
San Carlos Blvd	--- --- ---	0.	0.	0.	0.	0.	0.	0.	50.00
Canal Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	30.00
Avenue A	--- --- ---	0.	0.	0.	0.	0.	0.	0.	30.00
Avenue C	--- --- ---	0.	0.	0.	0.	0.	0.	0.	18.00
Alva Drive	--- --- ---	0.	0.	0.	0.	0.	0.	0.	14.00
Avenue E	--- --- ---	0.	0.	0.	0.	0.	0.	0.	14.00
Miramar Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	18.00
Palm Street	--- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Pearl Street	--- --- ---	0.	0.	0.	0.	0.	0.	0.	15.00
Delmar Avenue	--- --- ---	43.	48.	48.	48.	48.	48.	48.	43.00

TABLE E-28 (cont)

Mango Street --- --- ---	30.	30.	30.	30.	30.	30.	30.	30.00
Chapel Street --- --- ---	0.	0.	0.	0.	0.	0.	0.	30.00
Gulf Beach Road --- --- ---	32.	32.	32.	32.	32.	32.	32.	25.00
Pompano Street --- --- ---	10.	10.	10.	10.	10.	10.	10.	50.00
Seaview Drive --- --- ---	32.	32.	32.	32.	32.	32.	32.	50.00
Connecticut Street --- --- ---	35.	35.	35.	35.	35.	35.	35.	50.00
Hercules F\Drive --- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Coconut Drive --- --- ---	39.	39.	39.	39.	39.	39.	39.	30.00
Bayview Avenue --- --- ---	16.	16.	16.	16.	16.	16.	16.	50.00
Gulfview Avenue --- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Strandview Avenue --- --- ---	48.	48.	48.	48.	48.	48.	48.	50.00
Dakota Avenue --- --- ---	25.	32.	32.	32.	32.	32.	32.	50.00
Sterling Avenue --- --- ---	15.	27.	27.	27.	27.	27.	27.	15.00
Aberdeen Avenue --- --- ---	32.	32.	32.	32.	32.	32.	32.	40.00
Lanark Avenue --- --- ---	16.	16.	16.	16.	16.	16.	16.	40.00
Gulf Road --- --- ---	32.	32.	32.	32.	32.	32.	32.	40.00
Flamingo Street --- --- ---	40.	64.	64.	64.	64.	64.	64.	40.00
Lover's Key State Par --- --- ---	1600.	1600.	1508.	0.	0.	0.	0.	6750.00
Big Hickory Island --- --- ---	0.	0.	0.	0.	0.	0.	0.	2115.00
Lynn Hall Park --- --- ---	606.	458.	0.	0.	0.	0.	0.	705.00
Bonita Beach #1 --- --- ---	112.	112.	23.	0.	0.	0.	0.	250.00
Bonita Beach #2 --- --- ---	24.	24.	5.	0.	0.	0.	0.	50.00
Bonita Beach #3 --- --- ---	40.	34.	0.	0.	0.	0.	0.	50.00
Bonita Beach #4 --- --- ---	24.	24.	4.	0.	0.	0.	0.	50.00
Bonita Beach #5 --- --- ---	5.	4.	0.	0.	0.	0.	0.	5.00
Bonita Beach #6 --- --- ---	47.	37.	2.	0.	0.	0.	0.	50.00
Bonita Beach #7 --- --- ---	60.	50.	15.	0.	0.	0.	0.	50.00
Bonita Beach #8 --- --- ---	40.	40.	10.	0.	0.	0.	0.	50.00
Bonita Beach #9 --- --- ---	43.	33.	0.	0.	0.	0.	0.	50.00
Bonita Beach #10 --- --- ---	132.	111.	41.	0.	0.	0.	0.	100.00
Bonita Beach Park --- --- ---	611.	512.	183.	0.	0.	0.	0.	470.00
TOTAL ALL MARKET AREAS	9200.	8941.	7692.	5904.	5864.	5864.	5864.	

TABLE E-29
WITHOUT PROJECT DEMAND
IN YEARLY USER OCCASSIONS
CONSTRAINED PARKING

Gasparilla Market Area

PARKS	2001	2011	2021	2031	2041	2051	FF
Englewood Public Beac	79621.	0.	0.	0.	0.	0.	1500.00
Prot Charlotte Bch St	0.	0.	0.	0.	0.	0.	6130.00
Lido Beach/N.Lido	1415487.	0.	0.	0.	0.	0.	6000.00
South Lido County Par	484804.	0.	0.	0.	0.	0.	1000.00
Columbus Blvd.	0.	0.	0.	0.	0.	0.	80.00
Avenida Navarra	21232.	35944.	33774.	11833.	0.	0.	60.00
Ocean Blvd	58389.	98846.	126366.	175902.	222206.	263062.	60.00
Calle Des Siesta	53081.	89860.	114878.	159911.	202005.	239148.	60.00
Plaza Des Palmas-Nort	60158.	101841.	130195.	181233.	228939.	271034.	60.00
Plaza Des Palmas-Sout	46003.	77879.	99561.	138590.	175071.	207261.	60.00
Calle Del Invierno	17694.	29953.	38293.	53304.	67335.	79716.	60.00
Siesta Beach	2830973.	4792529.	6126818.	8528603.	10773610.	12754530.	2430.00
Turtle Beach	215972.	0.	0.	0.	0.	0.	2575.00
Palmer Point	0.	0.	0.	0.	0.	0.	1250.00
Nokomis	668817.	1132235.	1447461.	2014882.	2545265.	3013258.	1700.00
North Jetty Park	636969.	1078319.	1378534.	1918936.	2424062.	2869770.	900.00
Higel Park	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	460033.	617937.	410880.	44242.	0.	0.	900.00
Ocala Street	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	34502.	58409.	74671.	103942.	131303.	155446.	325.00
Brohard Park	205246.	347458.	444194.	618324.	781087.	924704.	8840.00
Venice Fishing Pier	366885.	434937.	318039.	111432.	0.	0.	565.00

TABLE E-29 (cont)

Caspersen Beach	424646.	0.	0.	0.	0.	0.	9150.00
Manasota Beach	601582.	1018412.	1301949.	1812328.	2289392.	2710338.	1394.00
Blind Pass Beach	580261.	762162.	692905.	572749.	228603.	0.	2940.00
19th Street	0.	0.	0.	0.	0.	0.	20.00
17th Street	11806.	0.	0.	0.	0.	0.	50.00
13th Street	7077.	2988.	0.	0.	0.	0.	50.00
12th Street	5757.	0.	0	0.	0.	0.	20.00
10th Street	31711.	32941.	15595.	0.	0.	0.	50.00
11th Streret	7376.	4190.	0.	0.	0.	0.	20.00
Seventh Street	21232.	21709.	1235.	0.	0.	0.	50.00
Fourth Street	3551.	0.	0.	0.	0.	0.	60.00
Third Street	8859.	0.	0.	0.	0.	0.	60.00
Boca Grande Bch Park	141549.	239626.	306341.	426430.	84502.	0.	1328.00
Gasparilla Island St.	509575.	862655.	1076344.	0.	0.	0.	3451.00
Cayo Costa State Park	0.	0.	0.	0.	0.	0.	36960.00
TOTAL ALL MARKET AREAS	10010850.	11840830.	14138030.	16872640.	20153380.	23488270.	

TABLE E-30
WITHOUT PROJECT DEMAND IN
YEARLY USER OCCASSIONS
CONSTRAINED PARKING

Estero Market Area

PARK	2001	2011	2021	2031	2041	2051	FF
Blind Pass	2800573.	4633561.	6729576.	8130080.	9710904.	11317820.	1930.00
Captiva Drive	46066.	76216.	110693.	133729.	159732.	186164.	50.00
Andy Rosse Lane	10365.	17149.	24906.	30089.	35940.	41887.	50.00
Turner Beach(At Blind	110558.	182919.	265663.	320951.	383357.	446793.	160.00
Turner Beach East	110558.	182919.	265663.	320951.	383357.	446793.	120.00
Bowman's Beach	1971618.	3262051.	4737657.	5723619.	6836528.	7967806.	11000.00
Tarpon Bay Road	27640.	45730.	66416.	80238.	95839.	111698.	80.00
Gulfside City Park	396166.	655459.	951959.	1150073.	1373695.	1601008.	990.00
Nerita Street	11516.	19054.	27673.	33432.	39933.	46541.	50.00
Lighthouse Park	327067.	541135.	785920.	949479.	1134097.	1321762.	1420.00
Bodwitch Park	46066.	76216.	110693.	0.	0.	0.	1800.00
Ft.Myers Beach	61360.	0.	0.	0.	0.	0.	600.00
San Carlos Boulevard	0.	0.	0.	0.	0.	0.	50.00
Canal Street	0.	0.	0.	0.	0.	0.	30.00
Avenue A	0.	0.	0.	0.	0.	0.	30.00
Avenue C	0.	0.	0.	0.	0.	0.	18.00
Alva Drive	0.	0.	0.	0.	0.	0.	14.00
Avenue E	0.	0.	0.	0.	0.	0.	14.00
Miramar Street	0.	0.	0.	0.	0.	0.	18.00
Palm Street	51179.	17606.	0.	0.	0.	0.	50.00
Pearl Street	0.	0.	0.	0.	0.	0.	15.00
Delmar Avenue	39062.	6948.	0.	0.	0.	0.	43.00
Mango Street	27253.	4847.	0.	0.	0.	0.	30.00
Chapel Street	0.	0.	0.	0.	0.	0.	30.00

TABLE E-30 (cont)

Gulf Beach Road	36853.	27857.	0.	0.	0.	0.	25.00
Pompano Street	0.	0.	0.	0.	0.	0.	50.00
Seaview Drive	36853.	60973.	25017.	0.	0.	0.	50.00
Connecticut Street	28146.	0.	0.	0.	0.	0.	50.00
Hercules F\Drive	55279.	65241.	0.	0.	0.	0.	50.00
Coconut Drive	37617.	21996.	0.	0.	0.	0.	30.00
Bayview Avenue	18426.	30486.	25017.	0.	0.	0.	50.00
Gulfview Avenue	55279.	74768.	11180.	0.	0.	0.	50.00
Strandview Avenue	51179.	17606.	0.	0.	0.	0.	50.00
Dakota Avenue	16630.	0.	0.	0.	0.	0.	50.00
Sterling Avenue	13626.	2424.	0.	0.	0.	0.	15.00
Aberdeen Avenue	36337.	6463.	0.	0.	0.	0.	40.00
Lanark Avenue	18426.	30486.	0.	0.	0.	0.	40.00
Gulf Road	36853.	14085.	0.	0.	0.	0.	40.00
Flamingo Street	36337.	6463.	0.	0.	0.	0.	40.00
Lover's Key State Park	1842633.	1236074.	0.	0.	0.	0.	7650.00
Big Hickory Island	0.	0.	0.	0.	0.	0.	2115.00
Lynn Hall Park	526767.	0.	0.	0.	0.	0.	705.00
Bonita Beach #1	128984.	40395.	0.	0.	0.	0.	250.00
Bonita Beach #2	27640.	8079.	0.	0.	0.	0.	50.00
Bonita Beach #3	38511.	0.	0.	0.	0.	0.	50.00
Bonita Beach #4	27640.	6174.	0.	0.	0.	0.	50.00
Bonita Beach #5	4427.	617.	0.	0.	0.	0.	5.00
Bonita Beach #6	41966.	2363.	0.	0.	0.	0.	50.00
Bonita Beach #7	56937.	27133.	0.	0.	0.	0.	50.00
Bonita Beach #8	46066.	17606.	0.	0.	0.	0.	50.00
Bonita Beach #9	37359.	0.	0.	0.	0.	0.	50.00
Bonita Beach #10	127694.	77131.	0.	0.	0.	0.	100.00
Bonita Beach Park	589339.	344604.	0.	0.	0.	0.	470.00
TOTAL ALL MARKET AREAS	10010850.	11840830.	14138030.	16872640.	20153380.	23488270.	

TABLE E-31
WITH PROJECT DEMAND
IN YEARLY USER OCCASSIONS
CONSTRAINED PARKING

Gasparilla Market Area

PARKS	2001	2011	2021	2031	2041	2051	FF
Englewood Public Beac	120346.	142346.	169962.	202836.	242276.	282366.	1500.00
Prot Charlotte Bch St	0.	0.	0.	0.	0.	0.	6130.00
Lido Beach/N.Lido	1426326.	1687058.	2014359.	2403981.	2871414.	3346563.	6000.00
South Lido County Par	488517.	577818.	689918.	823363.	983459.	1146198.	1000.00
Columbus Blvd.	0.	0.	0.	0.	0.	0.	80.00
Avenida Navarra	21395.	25306.	30215.	36060.	43071.	50198.	60.00
Ocean Blvd	58836.	69591.	83092.	99164.	118446.	138046.	60.00
Calle Des Siesta	41720.	49346.	58920.	70316.	83989.	97887.	60.00
Plaza Des Palmas-Nort	60619.	71700.	85610.	102169.	122035.	142229.	60.00
Plaza Des Palmas-Sout	46356.	54829.	65467.	78129.	93321.	108763.	60.00
Calle Del Invierno	17829.	21088.	25179.	30050.	35893.	41832.	60.00
Siesta Beach	2852653.	3374117.	4028718.	4807962.	5742829.	6693126.	2430.00
Turtle Beach	32092.	37959.	45323.	54090.	64607.	75298.	2575.00
Palmer Point	0.	0.	0.	0.	0.	0.	1250.00
Nokomis	673939.	797135.	951785.	1135881.	1356743.	1581251.	1700.00
North Jetty Park	641847.	759176.	906462.	1081791.	1292136.	1505953.	900.00
Higel Park	0.	0.	0.	0.	0.	0.	555.00
Venice Beach	463556.	548294.	654667.	781294.	933210.	1087633.	900.00
Ocala Street	0.	0.	0.	0.	0.	0.	40.00
Service Club Park	34767.	41122.	49100.	58597.	69991.	81572.	325.00
Brohard Park	206817.	244623.	292082.	348577.	416355.	485252.	8840.00
Venice Fishing Pier	377977.	447071.	533805.	637055.	760925.	886839.	565.00

TABLE E-31 (cont)

Caspersen Beach	427898.	506118.	604308.	721194.	861424.	1003969.	9150.00
Manasota Beach	606189.	717000.	856103.	1021692.	1220351.	1422289.	1394.00
Blind Pass Beach	624018.	738088.	881282.	1051742.	1256244.	1464121.	2940.00
19th Street	0.	0.	0.	0.	0.	0.	20.00
17th Street	7132.	8435.	10072.	12020.	14357.	16733.	50.00
13th Street	7132.	8435.	10072.	12020.	14357.	16733.	50.00
12th Street	8023.	9490.	11331.	13522.	16152.	18824.	30.00
11th Street	8915.	10544.	12590.	15025.	17946.	20916.	20.00
10th Street	35658.	42176.	50359.	60100.	71785.	83664.	50.00
Seventh Street	21395.	25306.	30215.	36060.	43071.	50198.	50.00
Fourth Street	18721.	22143.	26438.	31552.	37687.	43924.	60.00
Third Street	24069.	28469.	33992.	40567.	48455.	56473.	60.00
Boca Grande Bch Park	142633.	168706.	201436.	240398.	287141.	334656.	1328.00
Gasparilla Island St.	513478.	607341.	725169.	865433.	1033709.	1204763.	3451.00
Cayo Costa State Park	0.	0.	0.	0	0.	0.	36960.00
TOTAL ALL MARKET AREAS	10010850.	11840830.	14138030.	16872640.	20153380.	23488270.	

TABLE E-32
WITH PROJECT DEMAND IN
YEARLY USER OCCASSIONS
CONSTRAINED PARKING

Estero Market Area

PARK	2001	2011	2021	2031	2041	2051	FF
Blind Pass	2598120.	3073056.	3669249.	4378964.	5230416.	6095921.	1930.00
Captiva Drive	42736.	50548.	60354.	72028.	86034.	100270.	50.00
Andy Rosse Lane	9616.	11373.	13580.	16206.	19358.	22561.	50.00
Turner Beach(At Blind	102566.	121315.	144851.	172868.	206481.	240648.	160.00
Turner Beach East	102566.	121315.	144851.	172868.	206481.	240648.	120.00
Bowman's Beach	1829090.	2163447.	2583171.	3082813.	3682240.	4291560.	11000.00
Tarpon Bay Road	25641.	30329.	36213.	43217.	51620.	60162.	80.00
Gulfside City Park	367527.	434711.	519048.	619444.	739889.	862323.	990.00
Nerita Street	10684.	12637.	15089.	18007.	21508.	25068.	50.00
Lighthouse Park	303424.	358890.	428517.	511401.	610839.	711918.	1420.00
Bodwitch Park	42736.	50548.	60354.	72028.	86034.	100270.	1800.00
Ft.Myers Beach	192311.	227465.	271595.	324128.	387151.	451215.	600.00
San Carlos Boulevard	0.	0.	0.	0.	0.	0.	50.00
Canal Street	0.	0.	0.	0.	0.	0.	30.00
Avenue A	0.	0.	0.	0.	0.	0.	30.00
Avenue C	0.	0.	0.	0.	0.	0.	18.00
Alva Drive	0.	0.	0.	0.	0.	0.	14.00
Avenue E	0.	0.	0.	0.	0.	0.	14.00
Miramar Street	0.	0.	0.	0.	0	0.	18.00
Palm Street	51283.	60657.	72425.	86434.	103240.	120324.	50.00
Pearl Street	0.	0.	0.	0.	0.	0.	15.00
Delmar Avenue	51283.	60657.	72425.	86434.	103240.	120324.	43.00

TABLE E-32 (cnt)

Mango Street	32052.	37911.	45266.	54021.	64525.	75203.	30.00
Chapel Street	0.	0.	0.	0.	0.	0.	30.00
Gulf Beach Road	34189.	40438.	48284.	57623.	68827.	80216.	25.00
Pompano Street	10684.	12637.	15089.	18007.	21508.	25068.	50.00
Seaview Drive	34189.	40438.	48284.	57623.	68827.	80216.	50.00
Connecticut Street	37394.	44229.	52810.	63025.	75279.	87736.	50.00
Hercules F\Drive	51283.	60657.	72425.	86434.	103240.	120324.	50.00
Coconut Drive	41667.	49284.	58846.	70228.	83883.	97763.	30.00
Bayview Avenue	17094.	20219.	24142.	28811.	34413.	40108.	50.00
Gulfview Avenue	51283.	60657.	72425.	86434.	103240.	120324.	50.00
Strandview Avenue	51283.	60657.	72425.	86434.	103240.	120324.	50.00
Dakota Avenue	34189.	40438.	48284.	57623.	68827.	80216.	50.00
Sterling Avenue	28847.	34120.	40739.	48619.	58073.	67682.	15.00
Aberdeen Avenue	34189.	40438.	48284.	57623.	68827.	80216.	40.00
Lanark Avenue	17094.	20219.	24142.	28811.	34413.	40108.	40.00
Gulf Road	34189.	40438.	48284.	57623.	68827.	80216.	40.00
Flamingo Street	68377.	80877.	96567.	115245.	137654.	160432.	40.00
Lover's Key State Park	1709430.	2021913.	2414178.	2881134.	3441346.	4010804.	7650.00
Big Hickory Island	0.	0.	0.	0.	0.	0	2115.00
Lynn Hall Park	647767.	766179.	914823.	1091770.	1304055.	1519844.	705.00
Bonita Beach #1	119660.	141534.	168992.	201679.	240894.	280756.	250.00
Bonita Beach #2	25641.	30329.	36213.	43217.	51620.	60162.	50.00
Bonita Beach #3	42736.	50548.	60354.	72028.	86034.	100270.	50.00
Bonita Beach #4	25641.	30329.	36213.	43217.	51620.	60162.	50.00
Bonita Beach #5	5235.	6192.	7393.	8823.	10539.	12283.	5.00
Bonita Beach #6	50215.	59394.	70916.	84633.	101090.	117817.	50.00
Bonita Beach #7	68377.	80877.	96567.	115245.	137654.	160432.	50.00
Bonita Beach #8	42736.	50548.	60354.	72028.	86034.	100270.	50.00
Bonita Beach #9	51283.	60657.	72425.	86434.	103240.	120324.	50.00
Bonita Beach #10	162396.	192082.	229347.	273708.	326928.	381026.	100.00
Bonita Beach Park	752149.	889642.	1062238.	1267699.	1514192.	1764754.	470.00
TOTAL ALL MARKET AREAS	10010850.	11840830.	14138030.	16872640.	20153380.	23488270.	

TABLE E-33
CAYO COSTA ISLAND STATE PARK

RANK	NO. DAYS IN GROUP	AVERAGE DAILY ATTENDANCE	AVERAGE DAILY % OF TOTAL (IN %)
1	1	2646.60	1.298
2	1	2377.93	1.166
3	2	2255.63	1.106
4	3	2101.24	1.030
5	2	2047.10	1.004
6	2	1988.96	.975
7	1	1844.60	.904
8	1	1780.44	.873
9	2	1712.27	.840
10	1	1672.17	.820
11	2	1597.98	.783
12	3	1555.88	.763
13	2	1515.78	.743
14	4	1465.66	.719
15	2	1395.48	.684
16	4	1343.35	.659
17	4	1303.45	.639
18	3	1239.09	.608
19	4	1184.95	.581
20	5	1141.66	.560
21	4	1076.69	.528
22	6	1047.28	.513
23	3	972.12	.477
24	9	927.14	.455
25	9	881.05	.432
26	10	832.83	.408
27	12	772.93	.379
28	8	719.72	.353
29	11	662.08	.325
30	11	602.09	.295
31	16	559.68	.274
32	14	500.15	.245
33	12	442.54	.217
34	18	396.61	.194
35	15	343.67	.168
36	24	296.35	.145
37	29	236.83	.116
38	33	186.66	.092
39	25	134.16	.066
40	32	82.15	.040
41	9	32.43	.016
42	6	.00	.000
TOTAL	365		

DETERMINATION OF WILLINGNESS TO PAY - TRAVEL COST METHOD

67. The travel cost method was used to determine the value of a beach visit. The premise of the travel cost method (TCM) is that the per capita use of a recreation site will decrease as the out-of-pocket and time cost of traveling from place of origin to site increases. The value of a beach visit is determined by dividing the area under the cost of Travel versus Beach Activity Demand Curve by the total annual demand. The procedures, which comprise the analysis, are listed below and discussed in the following paragraphs.

a. Considering the Lee County coast as mile 0, establish 10-mile wide origin zones that lie equal distance to the coast.

b. Establish population by zipcode for each zone by use of 1990 census data.

c. Establish per capita beach use rate in each zone.

d. Establish mean round trip distance for each zone and establish a per capita use relationship (per capita participation rate versus mean round trip travel distance).

e. Compute travel and opportunity costs per person for each zone for a given trip.

f. Adjust travel and opportunity costs for round trip distance and compute "e" on a per mile basis for each zone.

g. Average the values in each zone computed in "f" and equate to a price per person per mile.

h. Calculate total demand from all zones as points on price-demand curve where price equals 0.0.

i. Simulate moving the Lee County Gulf Coast inward using 10-mile increments for a distance up to total of 50 miles.

j. For each simulation estimate per capita participation from the per capita use relationship and compute estimated demand for each zone.

k. For each simulation plot price versus demand on a composite demand curve.

l. Estimate value of a beach visit by dividing the area under the curve enveloped by steps I, j, and k by the total demand.

68. Origin Zones - Selection of the origin zones was based on the geography of the study area in which Lee County is located. An area with a radius of 50 miles was selected from a center point of the shorefront on Gasparilla and Estero Islands and measure in 10-miles increments. In addition to Lee County, a portion of Sarasota, Charlotte, Glades, Henry, and Collier counties are included in the 50-mile radius.

69. Using 1990 population established population Distribution - The population for each zone was established by using the 1990 Census of Population. These data were used as the bases to create population groups. The methodology used to establish population groupings is as follows:

a. Zipcode numbers were identified and located on a master map.

b. The zone in which the Zipcodes were located was noted along with the population from each Zone.

c. A compilation was made for each Zipcode. The Zipcode population for each zone was established and the average travel distance within each zone was computed. These calculations are summarized in table E-34.

70. Zone Per Capita Use Rate - The participation rates for beach visits in Lee County were obtained from a statistical survey made by the State of Florida. The total number of beach visits or demand from each zone was calculated by multiplying the zip code participation rates by the number of people residing in that zip code within a given area. These estimates of visits per zip code were summed to obtain the total zone visitation. The total zone visitation when divided by the zone population gives the average zone participation rate.

71. Travel Distance Computation - Travel distance are of a paramount importance when using the travel cost method as a proxy for willingness to pay for a beach visit. The utilization of zones allows the determination of a mean weighted average travel distance (MWATD). The MWATD for each zone was calculated by first taking the distance from the center of each participation block and multiplying it by the block population. The number thus obtains for each block was summed for each zone and the total zone population to obtain the MWATD divided this culminated value. These distance in miles, are also shown in table E-34.

TABLE E-34
BEACH PARTICIPATION ZONE CHARACTERISTICS

GASPARILLO

Zone	Distance In Miles	Population	County Part. Rate	Weighted Average Visitation	Weighted Visitors Part.Rate	Weighted Average Miles	Distance	Roundtrip Distance
10 Mile	5	10,819	9.3	100,617	9.30	503,084	5.00	10.0
20 Mile	15	90,397	7.7	696,057	7.70	10,440,854	15.00	30.0
30 Mile	25	30,128	6.1	183,781	6.10	4,594,520	25.00	50.0
40 Mile	35	82,740	4.6	380,604	4.60	13,321,140	35.00	70.0
50 Mile	45	63,571	3.0	190,713	3.00	8,582,085	45.00	90.0
TOTAL	125	277,655		1,551,771	5.59	37,441,682	24.13	48.3

ESTERO

Zone	Distance In Miles	Population	County Part. Rate	Weighted Average Visitation	Weighted Visitors Part.Rate	Weighted Average Miles	Distance	Roundtrip Distance
10 Mile	5	102,796	6.0	616,776	6.00	3,083,88 0	5.00	10.0
20 Mile	15	108,758	2.4	261,019	2.40	3,915,288	15.00	30.0
30 Mile	25	115,024	1.5	172,536	1.50	4,313,400	25.00	50.0
40 Mile	35	38,900	0.8	31,120	0.80	1,089,200	35.00	70.0
50 Mile	45	6,886	0.3	2,066	0.30	92,961	45.00	90.0
Total	125	375,364		1,083,517	2.91	12,494,729	11.53	23.1

72. A per capita utilization curve which relates per capita participation and travel distance was created by drawing a smooth curve through the average participation rates computed for the zones and their respective mean weighted round trip travel distances (Figure 1). A round trip travel

distance of 50 miles was determined at the point and location of the farthest zipcode area. The cost of travel is comprised of the out-of-pocket travel cost and the opportunity cost of time. The travel cost per mile is determined as an average variable cost per mile. Costs of travel extracted from the 1998 Edition of the American Automobile Association (AAA) Your Driving Costs. These costs are summarized in table E-35.

TABLE E-35
AVERAGE VARIABLE COST TO OPERATE AN AUTOMOBILE
(dollars per mile)

1998 Variable Cost	Large	Intermediate	Compact	Average
Gas and Oil	0.074	0.063	0.058	0.65
Maintenance	0.032	0.031	0.029	0.031
Tires	0.014	0.014	0.013	0.14
Total	0.120	0.108	0.100	0.110

73. The opportunity cost of time was determined using the guidance provided by EC-1105-2-xx dated 31 March 1993. Based on a median family income of $32,191, the opportunity cost of time $9.62 per car per hour. Based on the 1990 U. S. Census, the average family income in Lee County is $32,310. Therefore the opportunity cost of time is computed as shown below:

$$\$9.62 \times \$32,310 / 32,191 = \$9.66$$

For an average of 4 people per car, this results in an opportunity cost of time of $2.41 per hour per visitor.

74. Based on the previous discussion, the total cost required to access the beach and return is given in Table E-37. Notice that 1 mile has been added to the commuting distance to allow for parking.

75. The total cost of travel per beach visitor from the previously established origin zones as shown in Table 36 is summarized by the following equation:

Total Cost of Travel = Out-of-pocket-Cost + Opportunity Cost of Time where,
Out-of-pocket Cost = D x CM ; and
4

Opportunity Cost of Time = D x CH ; and
V

D = total cost;CM = cost per mile;CH = Cost per hour; V = velocity; and 4 = number of persons per vehicle

76. Average Value of Travel - Values utilized for price which include travel cost and opportunity cost were converted to a price per person by the weighted mean round trip distance in that zone. Price per person per mile computed for the zones are as shown in table E-36. The difference in these values is mainly attributable to different travel times reflected in opportunity cost. An average value of .071 cents per mile was calculated for the five zones.

TABLE E-36
EXISTING TRAVEL COST TO BEACH

ZONE	ROUND TRIP MWATD (mi)	PARKING PLUS 1-MILE	VARIABLE AUTO ($)	TIME TIME□ (HRS)	VALUE ($)	TOTAL ($)	TRIP COST	COST PER MILE($)
10 Mile	10.0	11.0	1.21	0.200	1.92	3.13	0.78	0.071
20 Mile	30.0	31.0	3.41	0.564	5.43	8.84	2.21	0.071
30 Mile	50.0	50.0	5.61	0.927	8.92	14.53	3.63	0.071
40 Mile	70.0	71.0	7.81	1.291	12.42	20.23	5.06	0.071
50 Mile	90.0	91.0	10.0	1.655	15.92	25.93	6.48	0.071

AVERAGE COST PER PERSON PER MILE 0.071

77. Value of Recreation - The travel cost method requires the analysis of small incremental increases in the price of participation to measure the quantity of use that would be demanded given these changes. This is equivalent to moving the project farther and farther from the potential users, requiring them to pay more and more in travel cost.

78. Estimated visitation was computed by multiplying the population of each zone by an appropriate participation rate from the per-capita utilization curve. The results were summed and entered as a line item in Tables E-37 and 38. Costs were determined by computing a relationship between round trip travel distance which includes parking distance and the total trip cost per person shown in Table E-36. A demand curve, which relates the expected visitation at varying price levels was then, plotted (Figure E-2) using information in Table E-36 The area under the curve represents the total value of the visits to the entire

sample area. The computed value of these visits Gasparilla is $86,198 and for Estero is $1,682,204. The average value per visit is computed by dividing the value by the total number of visits in the sample area which is 1,555,529 for Gasparilla and 1,363,597 for Estero (See tables E-38and E-39 The average value per visit is $2.00 (Gasparilla) and $ .91 (Estero) which will be used in the remaining analysis.

RECREATION DEMAND COMPUTATION

79. Method - Recreation benefits have been computed for each 10-year increment in the project life for the project area. The procedure used to compute project benefits is shown in Tables E-40 through E-58 (Gasparilla Market Areas 1,2 and 3) and Tables E-59 through E-76 for the years 2001 to 2051 for the entire Lee County Market Areas. In these table, the "Group Daily % of Total" column is the User group percentage of total annual demand attributable to a user group. Column 2 indicates the current participation which can be expected to be satisfied by the area of the beach without the project for a given user day. This is calculated by multiplying yearly participation without the project by the user day percentage. The result is total demand for this user group per day expressed as people per day. If this result is larger than the without project condition supply in people per day, then the smaller value is entered and the remaining demand is unsatisfied. The unsatisfied demand for the group multiplied by the number of days in the group is entered in column 3. This value indicates in people per days the extent of overcrowding in the user group. Negative numbers indicate excess capacity. The total participation for each group in people per day is displayed in column 4. This is determined by multiplying column 2 by the number of days. The number of participants in column 4 is multiplied by the value of a use visit to derive the total value of user visits without the project for a given group (column 6).

80. This procedure is also done with the authorized plan using with project supply and demand values. The difference between the without project and with project value of user visits is the benefit for a given user day group. The sum of the benefits computed for each user group is the annual recreational benefit attributable to the area in a specific year for a given alternative.

TABLE E-37
Gasparila Island
TRAVEL COST DEMAND CURVE POINTS

Miles	Additional Visitation	Estimated Cost
1.0	1,555,929	0.071
10.0	1,139,259	0.71
20.0	818,979	1.42
25.0	658,376	1.78
30.0	477,173	2.13
35.0	442,868	2.49
40.0	391,480	2.84
45.0	315,327	3.20
50.0	302,725	3.55
55.0	242,172	3.91
60.0	209,897	4.26
65.0	203,540	4.62
70.0	124,911	4.97
75.0	113,279	5.33
80.0	78,628	5 68
85.0	70,354	6.04
90.0	40,880	6.39
95.0	23,597	6.75
100.0	12,339	7.10
105.0	2,164	7.46

Area under demand curve

Value Per Visit = $\frac{3,114,970}{1,555,929}$ = $2.00

TABLE E-38
Estero Island
TRAVEL COST DEMAND CURVE POINTS

Miles	Additional Visitation	Estimated Cost
1.0	1,363,597	0.071
10	618,567	1.710
20	275,708	1.420
25	241,827	1.780
30	114,864	2.130
35	82,833	2.490
40	3,084	2.890

Area under demand curve
Value Per Visit = $\frac{1,244,924}{1,363,597}$ = $0.91

FIGURE E-2

81. Computational Observations - On any given day in the project life, participation is allocated so that the density of usage is the same at all parks in the project area. A useful indicator of density is the constrained daily total participation expected per day divided by the useful supply of beach in people per day. When this demand-supply ratio (D/S)>1, there is overcrowding and excess demand. When, D/S<1, all demand is satisfied and extra capacity exists. The authorized plan increases useable beach area and decreases beach density so that on any given day, D/S with the project, D/S(WP), is less than D/S without the project D/S(WO). Whenever D/S(WO)>1, all or part of a benefit for the reduction of overcrowding is claimed depending upon whether D/S(WP) is less than or greater than 1. In addition, satisfied demand without the project may move to the project beaches also seeking least density whenever D/S(WP)<1. In the extreme case when D/S(WO)<1 and D/S(WP)<D/S(WO), all participants have achieved minimum satisfaction without the project. In this case, there is no net benefit since willingness to pay does not vary among beaches in the project area. Therefore, negative benefits may occur at unimproved beaches, which experience a decline in participation with a given plan. However, this decline is compensated for at other beaches.

82. Average Annual Benefits - Benefits are displayed for the Lee County market area for the authorized plan in 10-year increments. These benefits were computed based on Lee

County Beach being nourished at the beginning of each 10-year period and then eroding to the pre-project condition at the end of each 10-year period. The benefits shown are the difference between the with and without project condition. Benefits are shown for the beginning and ending of each 10-year period. Even though the beachfill is allowed to erode to the pre-project condition, benefits are still being accrued because if the project had not been in place erosion would have occurred past the pre-project condition. These benefits are amortized and discounted at 6.875 percent to obtain the average annual equivalent benefit. These benefits are shown in Tables E-75.and E-76 for Gasparilla and Estero Islands.

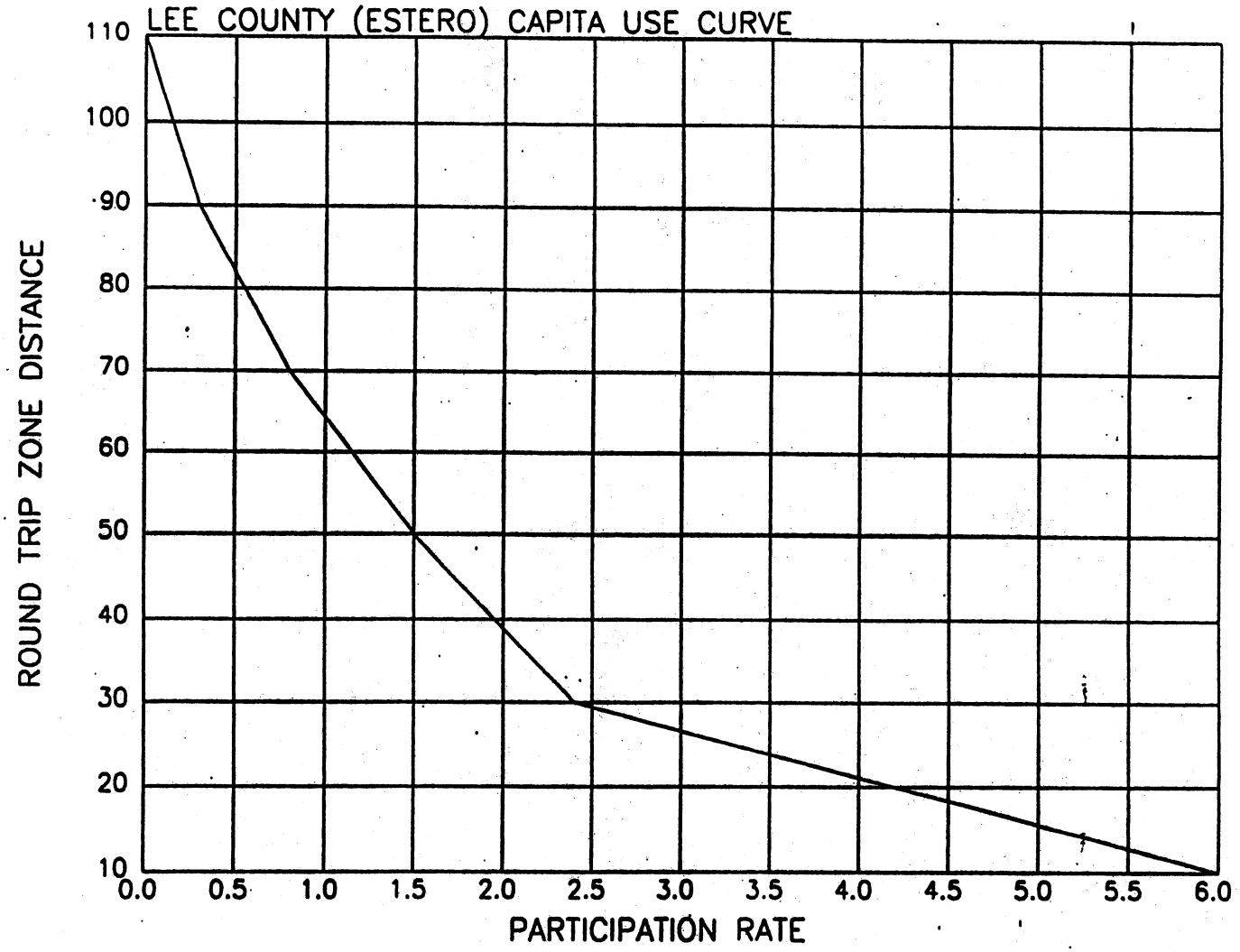
LEE COUNTY (ESTERO) CAPITA USE CURVE
ROUND TRIP ZONE DISTANCE
110
100
90
80
70
60
50
40
30
20
10
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
PARTICIPATION RATE

Figure E-1

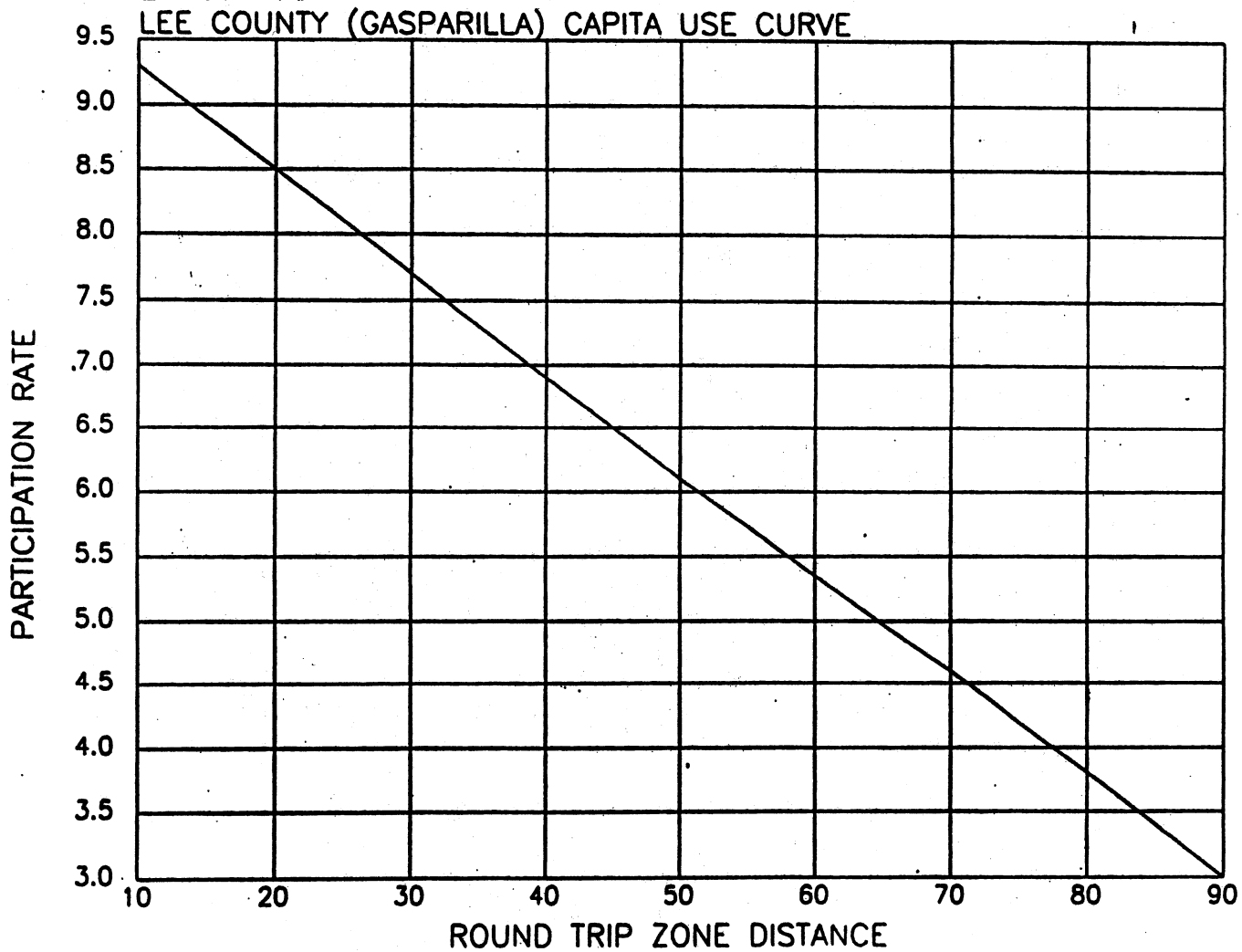
LEE COUNTY (GASPARILLA) CAPITA USE CURVE
PARTICIPATION RATE
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
10
20
30
40
50
60
70
80
90
ROUND TRIP ZONE DISTANCE

Figure E-1

TABLE E-39
GASPARILLA #1
CURRENT YEAR= 2001

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS) VALUE	NO. DAYS	TOTAL WITHOUT (PA)	CURRENT (WITH) PARTICIPATION	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	11456.00	54300.	11456.00	1.	21766.40	11519.60	11519.60	21887.24	120.84	55108.
1.17	11456.00	47625.	11456.00	1.	21766.40	11519.60	11519.60	21887.24	120.84	48344.
1.11	11456.00	89172.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	90530.
1.03	11456.00	122251.	34368.00	3.	65299.19	11519.60	34558.80	65661.71	362.52	124136.
1.00	11456.00	78811.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	80031.
.98	11456.00	75921.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	77104.
.90	11456.00	34374.	11456.00	1.	21766.40	11519.60	11519.60	21887.24	120.84	34918.
.87	11456.00	32780.	11456.00	1.	21766.40	11519.60	11519.60	21887.24	120.84	33302.
.84	11456.00	62172.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	63173.
.82	11456.00	30090.	11456.00	1.	21766.40	11519.60	11519.60	21887.24	120.84	30577.
.78	11456.00	56493.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	57418.
.76	11456.00	81602.	34368.00	3.	65299.19	11519.60	34558.80	65661.71	362.52	82948.
.74	11456.00	52408.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	53279.
.72	11456.00	99835.	45824.00	4.	87065.59	11519.60	46078.40	87548.95	483.36	101511.
.68	11456.00	46431.	22912.00	2.	43532.79	11519.60	23039.20	43774.47	241.68	47222.
.66	11456.00	87681.	45824.00	4.	87065.59	11519.60	46078.40	87548.95	483.36	89195.
.64	11456.00	83715.	45824.00	4.	87065.59	11519.60	46078.40	87548.95	483.36	85177.
.61	11456.00	57989.	34368.00	3.	65299.19	11519.60	34558.80	65661.71	362.52	59022.
.58	11456.00	71939.	45824.00	4.	87065.59	11519.60	46078.40	87548.95	483.36	73245.
.56	11456.00	84545.	57280.00	5.	108832.00	11519.60	57598.00	109436.20	604.20	86107.
.53	11456.00	61179.	45824.00	4.	87065.59	11519.60	46078.40	87548.95	483.36	62343.
.51	11456.00	87385.	68736.00	6.	130598.40	11519.60	69117.59	131323.40	725.03	89072.
.48	11456.00	38090.	34368.00	3.	65299.19	11519.60	34558.80	65661.71	362.52	38860.
.45	11456.00	104212.	103104.00	9.	195897.60	11519.60	103676.40	196985.10	1087.55	106387.
.43	11456.00	93907.	103104.00	9.	195897.60	11519.60	103676.40	196985.10	1087.55	95945.

.41	11456.00	92360.	114560.00	10.	217664.00	11519.60	115196.00	218872.40	1208.39	94466.
.38	11456.00	92973.	137472.00	12.	261196.80	11519.60	138235.20	262646.80	1450.07	95264.
.35	11456.00	51406.	91648.00	8.	174131.20	11519.60	92156.80	175097.90	966.72	52793.
.32	11456.00	54930.	126016.00	11.	239430.40	11519.60	126715.60	240759.60	1329.24	56628.
.30	11456.00	38536.	126016.00	11.	239430.40	11519.60	126715.60	240759.60	1329.24	40017.
.27	11456.00	39191.	183296.00	16.	348262.30	11519.60	184313.60	350195.80	1933.44	41121.
.25	11456.00	13587.	160384.00	14.	304729.60	11519.60	161274.40	306421.30	1691.74	15002.
.22	10994.98	-5532.	131939.80	12.	250685.50	11140.69	133688.30	254007.70	3322.14	-4547.
.19	9853.98	-28836.	177371.70	18.	337006.20	9984.57	179722.30	341472.20	4466.04	-27631.
.17	8538.60	-43761.	128079.10	15.	243350.20	8651.76	129776.40	246575.10	3224.92	-43018.
.15	7362.87	-98235.	176708.80	24.	335746.80	7460.44	179050.60	340196.10	4449.35	-97420.
.12	5884.17	-161583.	170641.10	29.	324218.00	5962.15	172902.40	328514.60	4296.58	-161166.
.09	4637.65	-225005.	153042.50	33.	290780.80	4699.11	155070.70	294634.30	3853.46	-225076.
.07	3333.24	-203069.	83330.90	25.	158328.70	3377.41	84435.22	160426.90	2098.20	-203555.
.04	2041.16	-301275.	65316.96	32.	124102.20	2068.20	66182.55	125746.80	1644.62	-302445.
.02	805.79	-95852.	7252.14	9.	13779.06	816.47	7348.25	13961.67	182.60	-96328.
.00	.00	-68736.	.00	6.	.00	.00	.00	.00	.00	-69118.
TOTAL			2949555.00		5604154.00		2974352.00	5651268.00	47113.89	

NOTES:

W/O PROJECT CAPACITY (C) = 11456.
WITH PROJECT CAPACITY (W) = 11520.
YEARLY PARTICIPATION (WO) = 5067442.
YEARLY PARTICIPATION (WP) = 5134596.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 2117889.
YEARLY UNSATISFIED DEMAND (WP) = 2160247.

TABLE E-40
GASPARILLA #1
CURRENT YEAR= 2011

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	6980.00	60845.	6980.00	1.	13262.00	11519.60	11519.60	21887.24	8625.24	67287.
1.17	6980.00	53959.	6980.00	1.	13262.00	11519.60	11519.60	21887.24	8625.24	59287.
1.11	6980.00	101650.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	111291.
1.03	6980.00	140606.	20940.00	3.	39786.00	11519.60	34558.80	65661.71	25875.71	153145.
1.00	6980.00	90962.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	98873.
.98	6980.00	87982.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	95410.
.90	6980.00	40292.	6980.00	1.	13262.00	11519.60	11519.60	21887.24	8625.24	43406.
.87	6980.00	38647.	6980.00	1.	13262.00	11519.60	11519.60	21887.24	8625.24	41496.
.84	6980.00	73801.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	78932.
.82	6980.00	35873.	6980.00	1.	13262.00	11519.60	11519.60	21887.24	8625.24	38272.
.78	6980.00	67943.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	72126.
.76	6980.00	98678.	20940.00	3.	39786.00	11519.60	34558.80	65661.71	25875.71	104428.
.74	6980.00	63730.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	67230.
.72	6980.00	122322.	27920.00	4.	53047.99	11519.60	46078.40	87548.95	34500.95	128491.
.68	6980.00	57564.	13960.00	2.	26524.00	11519.60	23039.20	43774.47	17250.48	60066.
.66	6980.00	109784.	27920.00	4.	53047.99	11519.60	46078.40	87548.95	34500.95	113923.
.64	6980.00	105694.	27920.00	4.	53047.99	11519.60	46078.40	87548.95	34500.95	109171.
.61	6980.00	74323.	20940.00	3.	39786.00	11519.60	34558.80	65661.71	25875.71	76129.
.58	6980.00	93548.	27920.00	4.	53047.99	11519.60	46078.40	87548.95	34500.95	95058.
.56	6980.00	111387.	34900.00	5.	66309.99	11519.60	57598.00	109436.20	43126.19	112376.
.53	6980.00	82449.	27920.00	4.	53047.99	11519.60	46078.40	87548.95	34500.95	82162.
.51	6980.00	119152.	41880.00	6.	79571.99	11519.60	69117.59	131323.40	51751.43	117989.
.48	6980.00	53798.	20940.00	3.	39786.00	11519.60	34558.80	65661.71	25875.	52281.
.45	6980.00	151018.	62820.00	9.	119358.00	11519.60	103676.40	196985.10	77627.14	144787.
.43	6980.00	140388.	62820.00	9.	119358.00	11519.60	103676.40	196985.10	77627.14	132436.
.41	6980.00	143629.	69800.00	10.	132620.00	11519.60	115196.00	218872.40	86252.38	132792.

.38	6980.00	153934.	83760.00	12.	159144.00	11519.60	138235.20	262646.80	103502.90	137947.
.35	6980.00	91714.	55840.00	8.	106096.00	11519.60	92156.80	175097.90	69001.91	79290.
.32	6980.00	109858.	76780.00	11.	145882.00	11519.60	126715.60	240759.60	94877.62	90143.
.30	6980.00	92948.	76780.00	11.	145882.00	11519.60	126715.60	240759.60	94877.62	70496.
.27	6980.00	117805.	111680.00	16.	212192.00	11519.60	184313.60	350195.80	138003.80	82331.
.25	6980.00	81724.	97720.00	14.	185668.00	11519.60	161274.40	306421.30	120753.30	47226.
.22	6980.00	52330.	83760.00	12.	159144.00	11519.60	138235.20	262646.80	103502.90	19891.
.19	6980.00	57311.	125640.00	18.	238716.00	11519.60	207352.80	393970.30	155254.30	5223.
.17	6980.00	27408.	104700.00	15.	198930.00	10233.30	153499.50	291649.00	92719.06	-19294.
.15	6980.00	14748.	167520.00	24.	318288.00	8824.21	211781.00	402383.90	84095.95	-64689.
.12	6069.28	-26411.	176009.00	29.	334417.10	7052.03	204509.00	388567.00	54149.88	-129559.
.09	4783.54	-72483.	157856.90	33.	299928.10	5558.11	183417.60	348493.40	48565.29	-196729.
.07	3438.09	-88548.	85952.30	25.	163309.40	3994.80	99869.97	189752.90	26443.56	-188120.
.04	2105.37	-155988.	67371.69	32.	128006.20	2446.27	78280.73	148733.40	20727.17	-290346.
.02	831.14	-55340.	7480.27	9.	14212.52	965.72	8691.50	16513.86	2301.34	-94985.
.00	.00	-41880.	.00	6.	.00	.00	.00	.00	.00	-69118.

TOTAL 2107050.00 4003395.00 3151812.00 5988443.00 1985048.00

NOTES:

W/O PROJECT CAPACITY (C) = 6980.
WITH PROJECT CAPACITY (W) = 11520.
YEARLY PARTICIPATION (WO) = 5226852.
YEARLY PARTICIPATION (WP) = 6073200.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 3119804.
YEARLY UNSATISFIED DEMAND (WP) = 2921390.

TABLE E-41
GASPARILLA #1
CURRENT YEAR -2021

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	6967.28	79582.	6967.28	1.	13237.83	11519.60	11519.60	21887.24	8649.41	82576.
1.17	6967.28	70796.	6967.28	1.	13237.83	11519.60	11519.60	21887.24	8649.41	73024.
1.11	6967.28	133593.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	137352.
1.03	6967.28	185243.	20901.84	3.	39713.49	11519.60	34558.80	65661.71	25948.22	189561.
1.00	6967.28	119955.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	122524.
.98	6967.28	116152.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	118390.
.90	6967.28	53355.	6967.28	1.	13237.83	11519.60	11519.60	21887.24	8649.41	54062.
.87	6967.28	51257.	6967.28	1.	13237.83	11519.60	11519.60	21887.24	8649.41	51781.
.84	6967.28	98055.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	98715.
.82	6967.28	47716.	6967.28	1.	13237.83	11519.60	11519.60	21887.24	8649.41	47932.
.78	6967.28	90581.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	90589.
.76	6967.28	131740.	20901.84	3.	39713.49	11519.60	34558.80	65661.71	25948.22	131392.
.74	6967.28	85204.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	84743.
.72	6967.28	163851.	27869.12	4.	52951.32	11519.60	46078.40	87548.95	34597.62	162358.
.68	6967.28	77336.	13934.56	2.	26475.66	11519.60	23039.20	43774.47	17298.81	76189.
.66	6967.28	147853.	27869.12	4.	52951.32	11519.60	46078.40	87548.95	34597.62	144965.
.64	6967.28	142633.	27869.12	4.	52951.32	11519.60	46078.40	87548.95	34597.62	139290.
.61	6967.28	100661.	20901.84	3.	39713.49	11519.60	34558.80	65661.71	25948.22	97603.
.58	6967.28	127133.	27869.12	4.	52951.32	11519.60	46078.40	87548.95	34597.62	122439.
.56	6967.28	151837.	34836.40	5.	66189.16	11519.60	57598.00	109436.20	43247.02	145352.
.53	6967.28	112971.	27869.12	4.	52951.32	11519.60	46078.40	87548.95	34597.62	107041.
.51	6967.28	163686.	41803.68	6.	79426.98	11519.60	69117.59	131323.40	51896.44	154289.
.48	6967.28	74469.	20901.84	3.	39713.49	11519.60	34558.80	65661.71	25948.22	69128.
.45	6967.28	210169.	62705.52	9.	119140.50	11519.60	103676.40	196985.10	77844.65	192991.
.43	6967.28	196605.	62705.52	9.	119140.50	11519.60	103676.40	196985.10	77844.65	178243.

.41	6967.28	202680.	69672.80	10.	132378.30	11519.60	115196.00	218872.40	86494.05	180903.
.38	6967.28	219709.	83607.36	12.	158854.00	11519.60	138235.20	262646.80	103792.90	191528
.35	6967.28	132553.	55738.24	8.	105902.60	11519.60	92156.80	175097.90	69195.24	112552.
.32	6967.28	161525.	76640.09	11.	145616.10	11519.60	126715.60	240759.60	95143.46	132215.
.30	6967.28	139947.	76640.09	11.	145616.10	11519.60	126715.60	240759.60	95143.46	108756.
.27	6967.28	181365.	111476.50	16.	211805.30	11519.60	184313.60	350195.80	138390.50	134062.
.25	6967.28	131443.	97541.92	14.	185329.60	11519.60	161274.40	306421.30	121091.70	87676.
.22	6967.28	90055.	83607.36	12.	158854.00	11519.60	138235.20	262646.80	103792.90	50569.
.19	6967.28	108050.	125411.00	18.	238281.00	11519.60	207352.80	393970.30	155689.30	46464.
.17	6967.28	64071.	104509.20	15.	198567.50	11519.60	172794.00	328308.50	129741.10	10485.
.15	6967.28	65374.	167214.70	24.	317707.90	10536.17	252868.00	480449.10	162741.20	-23602.
.12	6967.28	22551.	202051.10	29.	383897.10	8420.17	244185.00	463951.50	80054.42	-89883.
.09	6104.19	-28482.	201438.10	33.	382732.30	6636.42	219001.80	416103.30	33371.00	-161145.
.07	4387.28	-64500.	109682.10	25.	208395.90	4769.82	119245.40	226566.20	18170.35	-168745.
.04	2686.62	-136981.	85971.70	32.	163346.20	2920.87	93467.70	177588.60	14242.39	-275160.
.02	1060.60	-53160.	9545.43	9.	18136.32	1153.0 8	10377.71	19717.65	1581.33	-93299.
.00	.00	-41804.	.00	6.	.00	.00	.00	.00	.00	-69118.

TOTAL 2218130.00 4214447.00 3323703.00 6315034.00 2100588.00

NOTES:

W/O PROJECT CAPACITY (C) = 6967.
WITH PROJECT CAPACITY (W) = 11520.
YEARLY PARTICIPATION (WO) = 6669884.
YEARLY PARTICIPATION (WP) = 7251441.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 4451757.
YEARLY UNSATISFIED DEMAND (WP) = 3927741.

TABLE E-42
GASPARILLA #1
CURRENT YEAR= 2031

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	6940.88	113081.	6940.88	1.	13187.67	11519.60	11519.60	21887.24	8699.57	100777.
1.17	6940.88	100897.	6940.88	1.	13187.67	11519.60	11519.60	21887.24	8699.57	89377.
1.11	6940.88	190700.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	168375.
1.03	6940.88	265047.	20822.64	3.	39563.01	11519.60	34558.80	65661.71	26098.70	232910.
1.00	6940.88	171788.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	150680.
.98	6940.88	166514.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	145745.
.90	6940.88	76710.	6940.88	1.	13187.67	11519.60	11519.60	21887.24	8699.57	66747.
.87	6940.88	73801.	6940.88	1.	13187.67	11519.60	11519.60	21887.24	8699.57	64025.
.84	6940.88	141419.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	122265.
.82	6940.88	68891.	6940.88	1.	13187.67	11519.60	11519.60	21887.24	8699.57	59431.
.78	6940.88	131053.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	112567.
.76	6940.88	190852.	20822.64	3.	39563.01	11519.60	34558.80	65661.71	26098.70	163491.
.74	6940.88	123597.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	105591.
.72	6940.88	238102.	27763.52	4.	52750.68	11519.60	46078.40	87548.95	34798.27	202675.
.68	6940.88	112686.	13881.76	2.	26375.34	11519.60	23039.20	43774.47	17399.13	95382.
.66	6940.88	215916.	27763.52	4.	52750.68	11519.60	46078.40	87548.95	34798.27	181917.
.64	6940.88	208678.	27763.52	4.	52750.68	11519.60	46078.40	87548.95	34798.27	175145.
.61	6940.88	147753.	20822.64	3.	39563.01	11519.60	34558.80	65661.71	26098.70	123166.
.58	6940.88	187184.	27763.52	4.	52750.68	11519.60	46078.40	87548.95	34798.27	155034.
.56	6940.88	224163.	34704.40	5.	65938.35	11519.60	57598.00	109436.20	43497.83	184607.
.53	6940.88	167544.	27763.52	4.	52750.68	11519.60	46078.40	87548.95	34798.27	136658.
.51	6940.88	243315.	41645.28	6.	79126.02	11519.60	69117.59	131323.40	52197.39	197501.
.48	6940.88	111432.	20822.64	3.	39563.01	11519.60	34558.80	65661.71	26098.70	89183.
.45	6940.88	315938.	62467.92	9.	118689.00	11519.60	103676.40	196985.10	78296.09	250373.
.43	6940.88	297127.	62467.92	9.	118689.00	11519.60	103676.40	196985.10	78296.09	232773.
.41	6940.88	308273.	69408.80	10.	131876.70	11519.60	115196.00	218872.40	86995.66	238175.

.38	6940.88	337330.	83290.56	12.	158252.00	11519.60	138235.20	262646.80	104394.80	255312.
.35	6940.88	205583.	55527.04	8.	105501.40	11519.60	92156.80	175097.90	69596.53	152147.
.32	6940.88	253923.	76349.68	11.	145064.40	11519.60	126715.60	240759.60	95695.23	182298.
.30	6940.88	224000.	76349.68	11.	145064.40	11519.60	126715.60	240759.60	95695.23	154301.
.27	6940.88	295041.	111054.10	16.	211002.70	11519.60	184313.60	350195.80	139193.10	195643.
.25	6940.88	220370.	97172.32	14.	184627.40	11519.60	161274.40	306421.30	121793.90	135829.
.22	6940.88	157533.	83290.56	12.	158252.00	11519.60	138235.20	262646.80	104394.80	87088.
.19	6940.88	198813.	124935.80	18.	237378.10	11519.60	207352.80	393970.30	156592.20	95557.
.17	6940.88	129664.	104113.20	15.	197815.00	11519.60	172794.00	328308.50	130493.50	45936.
.15	6940.88	155958.	166581.10	24.	316504.10	11519.60	276470.40	525293.70	208789.60	25308.
.12	6940.88	110178.	201285.50	29.	382442.40	10048.82	291415.80	553690.00	171247.60	-42653.
.09	6940.88	50293.	229049.00	33.	435193.10	7920.05	261361.60	496587.00	61393.90	-118785.
.07	6084.01	-21422.	152100.20	25.	288990.30	5692.40	142310.10	270389.20	-18601.18	-145680.
.04	3725.63	-102888.	119220.20	32.	226518.30	3485.83	111546.40	211938.20	-14580.11	-257081.
.02	1470.78	-49231.	13237.01	9.	25150.31	1376.11	12384.99	23531.49	-1618.83	-91291.
.00	.00	-41645.	.00	6.	.00	.00	.00	.00	-69118.	

TOTAL 2318236.00 4404647.00 3480046.00 6612087.00 2207441.00

NOTES:

W/O PROJECT CAPACITY (C) = 6941.
WITH PROJECT CAPACITY (W) = 11520.
YEARLY PARTICIPATION (WO) = 9249377.
YEARLY PARTICIPATION (WP) = 8654030.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 6931146.
YEARLY UNSATISFIED DEMAND (WP) = 5173988.

TABLE E-43
GASPARILLA #1
CURRENT YEAR= 2041

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	6932.00	144489.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	122612.
1.17	6932.00	129118.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	108995.
1.11	6932.00	244240.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	205594.
1.03	6932.00	339861.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	284917.
1.00	6932.00	220380.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	184458.
.98	6932.00	213726.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	178564.
.90	6932.00	98604.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	81966.
.87	6932.00	94933.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	78714.
.84	6932.00	182066.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	150518.
.82	6932.00	88739.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	73227.
.78	6932.00	168988.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	138934.
.76	6932.00	246256.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	202000.
.74	6932.00	159582.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	130602.
.72	6932.00	307693.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	251042.
.68	6932.00	145816.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	118408.
.66	6932.00	279703.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	226249.
.64	6932.00	270571.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	218159.
.61	6932.00	191882.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	153835.
.58	6932.00	243453.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	194138.
.56	6932.00	291931.	34660.00	5.	65853.99	11519.60	57598.00	109436.20	43582.19	231701.
.53	6932.00	218675.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	172190.
.51	6932.00	317918.	41592.00	6.	79024.79	11519.60	69117.59	131323.40	52298.63	249342.
.48	6932.00	146059.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	113244.
.45	6932.00	415015.	62388.00	9.	118537.20	11519.60	103676.40	196985.10	78447.94	319214.
.43	6932.00	391283.	62388.00	9.	118537.20	11519.60	103676.40	196985.10	78447.94	298193.
.41	6932.00	407169.	69320.00	10.	131708.00	11519.60	115196.00	218872.40	87164.38	306885.

.38	6932.00	447478.	83184.00	12.	158049.60	11519.60	138235.20	262646.80	104597.30	331834.
.35	6932.00	273965.	55456.00	8.	105366.40	11519.60	92156.80	175097.90	69731.51	199650.
.32	6932.00	340425.	76252.00	11.	144878.80	11519.60	126715.60	240759.60	95880.82	242383.
.30	6932.00	302674.	76252.00	11.	144878.80	11519.60	126715.60	240759.60	95880.82	208943.
.27	6932.00	401424.	110912.00	16.	210732.80	11519.60	184313.60	350195.80	139463.00	269522.
.25	6932.00	303568.	97048.00	14.	184391.20	11519.60	161274.40	306421.30	122030.10	193598.
.22	6932.00	220643.	83184.00	12.	158049.60	11519.60	138235.20	262646.80	104597.30	130900.
.19	6932.00	283671.	124776.00	18.	237074.40	11519.60	207352.80	393970.30	156895.90	154456.
.17	6932.00	190957.	103980.00	15.	197562.00	11519.60	172794.00	328308.50	130746.60	88466.
.15	6932.00	240552.	166368.00	24.	316099.20	11519.60	276470.40	525293.70	209194.50	83986.
.12	6932.00	191920.	201028.00	29.	381953.20	11519.60	334068.40	634729.90	252776.70	14011.
.09	6932.00	123666.	228756.00	33.	434636.30	9460.03	312181.10	593144.10	158507.70	-67966.
.07	6932.00	18592.	173300.00	25.	329270.00	6799.24	169981.10	322964.00	-6305.94	-118009.
.04	4700.32	-71414.	150410.10	32.	285779.20	4163.61	133235.70	253147.70	-32631.41	-235392.
.02	1855.56	-45688.	16700.03	9.	31730.05	1643.68	14793.15	28106.98	-3623.07	-88883.
.00	.00	-41592.	.00	6.	.00	.00	.00	.00	.00	-69118.

TOTAL 2371486.00 4505823.00 3625287.00 6888044.00 2382221.00

NOTES:

W/O PROJECT CAPACITY (C) = 6932.
WITH PROJECT CAPACITY (W) = 11520.
YEARLY PARTICIPATION (WO) = 11669170.
YEARLY PARTICIPATION (WP) = 10336730.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 9297684.
YEARLY UNSATISFIED DEMAND (WP) = 6711450.

TABLE E-44
GASPARILLA #1
CURRENT YEAR= 2051

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	6932.00	172331.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	144807.
1.17	6932.00	154133.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	128937.
1.11	6932.00	291697.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	243427.
1.03	6932.00	406175.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	337783.
1.00	6932.00	263450.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	218793.
.98	6932.00	255573.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	211924.
.90	6932.00	118009.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	97435.
.87	6932.00	113663.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	93646.
.84	6932.00	218091.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	179238.
.82	6932.00	106329.	6932.00	1.	13170.80	11519.60	11519.60	21887.24	8716.44	87250.
.78	6932.00	202609.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	165737.
.76	6932.00	295358.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	241145.
.74	6932.00	191473.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	156026.
.72	6932.00	369366.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	300209.
.68	6932.00	175177.	13864.00	2.	26341.60	11519.60	23039.20	43774.47	17432.88	141814.
.66	6932.00	336229.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	271312.
.64	6932.00	325418.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	261884.
.61	6932.00	230986.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	185009.
.58	6932.00	293315.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	233888.
.56	6932.00	351981.	34660.00	5.	65853.99	11519.60	57598.00	109436.20	43582.19	279573.
.53	6932.00	263981.	27728.00	4.	52683.19	11519.60	46078.40	87548.95	34865.75	208308.
.51	6932.00	384021.	41592.00	6.	79024.79	11519.60	69117.59	131323.40	52298.63	302040.
.48	6932.00	176738.	20796.00	3.	39512.39	11519.60	34558.80	65661.71	26149.31	137702.
.45	6932.00	502794.	62388.00	9.	118537.20	11519.60	103676.40	196985.10	78447.94	389192.
.43	6932.00	474699.	62388.00	9.	118537.20	11519.60	103676.40	196985.10	78447.94	364692.
.41	6932.00	494780.	69320.00	10.	131708.00	11519.60	115196.00	218872.40	87164.38	376730.

.38	6932.00	545050.	83184.00	12.	158049.60	11519.60	138235.20	262646.80	104597.30	409619.
.35	6932.00	334535.	55456.00	8.	105366.40	11519.60	92156.80	175097.90	69731.51	247937.
.32	6932.00	417038.	76252.00	11.	144878.80	11519.60	126715.60	240759.60	95880.82	303460.
.30	6932.00	372346.	76252.00	11.	144878.80	11519.60	126715.60	240759.60	95880.82	264486.
.27	6932.00	495626.	110912.00	16.	210732.80	11519.60	184313.60	350195.80	139463.00	344620.
.25	6932.00	377229.	97048.00	14.	184391.20	11519.60	161274.40	306421.30	122030.10	252321.
.22	6932.00	276508.	83184.00	12.	158049.60	11519.60	138235.20	262646.80	104597.30	175435.
.19	6932.00	358771.	124776.00	18.	237074.40	11519.60	207352.80	393970.30	156895.90	214326.
.17	6932.00	245187.	103980.00	15.	197562.00	11519.60	172794.00	328308.50	130746.60	131698.
.15	6932.00	315372.	166368.00	24.	316099.20	11519.60	276470.40	525293.70	209194.50	143633.
.12	6932.00	264170.	201028.00	29.	381953.20	11519.60	334068.40	634729.90	252776.70	71609.
.09	6932.00	188465.	228756.00	33.	434636.30	11025.44	363839.50	691294.90	256658.50	-16307.
.07	6932.00	53875.	173300.00	25.	329270.00	7924.35	198108.80	376406.70	47136.68	-89881.
.04	5564.56	-43758.	178065.80	32.	338324.90	4852.59	155282.90	295037.50	-43287.39	-213344.
.02	2196.74	-42617.	19770.63	9.	37564.20	1915.67	17241.05	32758.00	-4806.20	-86435.
.00	.00	-41592.	.00	6.	.00	.00	.00	.00	.00	-69118.

TOTAL 2402213.00 4564203.00 3729568.00 7086178.00 2521976.00

NOTES:

W/O PROJECT CAPACITY (C) = 6932.
WITH PROJECT CAPACITY (W) = 11520.
YEARLY PARTICIPATION (WO) = 13814750.
YEARLY PARTICIPATION (WP) = 12047210.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 11412550.
YEARLY UNSATISFIED DEMAND (WP) = 8317645.

TABLE E-45
GASPARILLA #2
CURRENT YEAR= 2001

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	8171.67	38733.	8171.67	1.	15526.17	7774.00	7774.00	14770.60	-755.57	37189.
1.17	8171.67	33971.	8171.67	1.	15526.17	7774.00	7774.00	14770.60	-755.57	32625.
1.11	8171.67	63607.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	61094.
1.03	8171.67	87203.	24515.01	3.	46578.51	7774.00	23322.00	44311.79	-2266.72	83773.
1.00	8171.67	56216.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	54009.
.98	8171.67	54155.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	52033.
.90	8171.67	24519.	8171.67	1.	15526.17	7774.00	7774.00	14770.60	-755.57	23564.
.87	8171.67	23382.	8171.67	1.	15526.17	7774.00	7774.00	14770.60	-755.57	22474.
.84	8171.67	44348.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	42632.
.82	8171.67	21463.	8171.67	1.	15526.17	7774.00	7774.00	14770.60	-755.57	20635.
.78	8171.67	40297.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	38749.
.76	8171.67	58207.	24515.01	3.	46578.51	7774.00	23322.00	44311.79	-2266.72	55977.
.74	8171.67	37383.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	35956.
.72	8171.67	71214.	32686.68	4.	62104.68	7774.00	31096.00	59082.39	-3022.29	68505.
.68	8171.67	33119.	16343.34	2.	31052.34	7774.00	15548.00	29541.20	-1511.15	31868.
.66	8171.67	62543.	32686.68	4.	62104.68	7774.00	31096.00	59082.39	-3022.29	60194.
.64	8171.67	59715.	32686.68	4.	62104.68	7774.00	31096.00	59082.39	-3022.29	57482.
.61	8171.67	41364.	24515.01	3.	46578.51	7774.00	23322.00	44311.79	-2266.72	39831.
.58	8171.67	51315.	32686.68	4.	62104.68	7774.00	31096.00	59082.39	-3022.29	49430.
.56	8171.67	60307.	40858.35	5.	77630.86	7774.00	38870.00	73852.99	-3777.87	58109.
.53	8171.67	43639.	32686.68	4.	62104.68	7774.00	31096.00	59082.39	-3022.29	42072.
.51	8171.67	62332.	49030.02	6.	93157.02	7774.00	46644.00	88623.59	-4533.44	60110.
.48	8171.67	27170.	24515.01	3.	46578.51	7774.00	23322.00	44311.79	-2266.72	26224.
.45	8171.67	74336.	73545.03	9.	139735.50	7774.00	69966.00	132935.40	-6800.17	71796.
.43	8171.67	66985.	73545.03	9.	139735.50	7774.00	69966.00	132935.40	-6800.17	64749.
.41	8171.67	65881.	81716.70	10.	155261.70	7774.00	77740.00	147706.00	-7555.74	63750.

.38	8171.67	66318.	98060.04	12.	186314.00	7774.00	93288.00	177247.20	-9066.87	64289.
.35	8171.67	36668.	65373.36	8.	124209.40	7774.00	62192.00	118164.80	-6044.58	35627.
.32	8171.67	39182.	89888.37	11.	170787.90	7774.00	85514.00	162476.60	-8311.30	38215.
.30	8171.67	27488.	89888.37	11.	170787.90	7774.00	85514.00	162476.60	-8311.30	27005.
.27	8171.67	27955.	130746.70	16.	248418.70	7774.00	124384.00	236329.60	-12089.17	27751.
.25	8171.67	9692.	114403.40	14.	217366.40	7774.00	108836.00	206788.40	-10578.00	10124.
.22	7842.82	-3946.	94113.87	12.	178816.30	7518.29	90219.52	171417.10	-7399.26	-3068.
.19	7028.94	-20569.	126520.90	18.	240389.60	6738.09	121285.50	230442.50	-9947.10	-18646.
.17	6090.67	-31215.	91359.98	15.	173584.00	5838.64	87579.59	166401.20	-7182.76	-29030.
.15	5252.00	-70072.	126048.00	24.	239491.20	5034.68	120832.30	229581.30	-9909.90	-65744.
.12	4197.24	-115259.	121719.80	29.	231267.70	4023.56	116683.20	221698.00	-9569.63	-108763.
.09	3308.08	-160498.	109166.60	33.	207416.60	3171.19	104649.40	198833.90	-8582.72	-151893.
.07	2377.63	-144851.	59440.70	25.	112937.30	2279.24	56981.10	108264.10	-4673.24	-137369.
.04	1455.97	-214902.	46591.20	32.	88523.26	1395.73	44663.29	84860.24	-3663.01	-204105.
.02	574.78	-68372.	5173.02	9.	9828.73	551.00	4958.96	9422.03	-406.70	-65007.
.00	.00	-49030.	.00	6.	.00	.00	.00	.00	.00	-46644.

TOTAL 2103945.00 3997494.00 2007241.00 3813757.00 -183737.20

NOTES:

W/O PROJECT CAPACITY (C) = 8172.
WITH PROJECT CAPACITY (W) = 7774.
YEARLY PARTICIPATION (WO) = 3614653.
YEARLY PARTICIPATION (WP) = 3465082.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 1510710.
YEARLY UNSATISFIED DEMAND (WP) = 1457842.

TABLE E-46
GASPARILLA #2
CURRENT YEAR= 2011

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	6260.02	54568.	6260.02	1.	11894.04	7774.00	7774.00	14770.60	2876.56	45409.
1.17	6260.02	48393.	6260.02	1.	11894.04	7774.00	7774.00	14770.60	2876.56	40010.
1.11	6260.02	91165.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	75104.
1.03	6260.02	126102.	18780.06	3.	35682.11	7774.00	23322.00	44311.79	8629.68	103350.
1.00	6260.02	81580.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	66724.
.98	6260.02	78907.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	64387.
.90	6260.02	36136.	6260.02	1.	11894.04	7774.00	7774.00	14770.60	2876.56	29293.
.87	6260.02	34661.	6260.02	1.	11894.04	7774.00	7774.00	14770.60	2876.56	28004.
.84	6260.02	66188.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	53267.
.82	6260.02	32173.	6260.02	1.	11894.04	7774.00	7774.00	14770.60	2876.56	25828.
.78	6260.02	60935.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	48674.
.76	6260.02	88499.	18780.06	3.	35682.11	7774.00	23322.00	44311.79	8629.68	70473.
.74	6260.02	57156.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	45370.
.72	6260.02	109704.	25040.08	4.	47576.14	7774.00	31096.00	59082.39	11506.25	86712.
.68	6260.02	51626.	12520.04	2.	23788.07	7774.00	15548.00	29541.20	5753.12	40536.
.66	6260.02	98460.	25040.08	4.	47576.14	7774.00	31096.00	59082.39	11506.25	76881.
.64	6260.02	94792.	25040.08	4.	47576.14	7774.00	31096.00	59082.39	11506.25	73674.
.61	6260.02	66656.	18780.06	3.	35682.11	7774.00	23322.00	44311.79	8629.68	51376.
.58	6260.02	83898.	25040.08	4.	47576.14	7774.00	31096.00	59082.39	11506.25	64150.
.56	6260.02	99897.	31300.10	5.	59470.18	7774.00	38870.00	73852.99	14382.81	75837.
.53	6260.02	73944.	25040.08	4.	47576.14	7774.00	31096.00	59082.39	11506.25	55447.
.51	6260.02	106861.	37560.12	6.	71364.22	7774.00	46644.00	88623.59	17259.37	79625.
.48	6260.02	48248.	18780.06	3.	35682.11	7774.00	23322.00	44311.79	8629.68	35282.
.45	6260.02	135441.	56340.18	9.	107046.30	7774.00	69966.00	132935.40	25889.05	97709.
.43	6260.02	125907.	56340.18	9.	107046.30	7774.00	69966.00	132935.40	25889.05	89374
.41	6260.02	128814.	62600.20	10.	118940.40	7774.00	77740.00	147706.00	28765.62	89615.

.38	6260.02	138056.	75120.24	12.	142728.40	7774.00	93288.00	177247.20	34518.74	93094.
.35	6260.02	82254.	50080.16	8.	95152.29	7774.00	62192.00	118164.80	23012.49	53509.
.32	6260.02	98526.	68860.22	11.	130834.40	7774.00	85514.00	162476.60	31642.18	60833.
.30	6260.02	83361.	68860.22	11.	130834.40	7774.00	85514.00	162476.60	31642.18	47574.
.27	6260.02	105654.	100160.30	16.	190304.60	7774.00	124384.00	236329.60	46024.99	55561.
.25	6260.02	73294.	87640.28	14.	166516.50	7774.00	108836.00	206788.40	40271.86	31870.
.22	6260.02	46932.	75120.24	12.	142728.40	7774.00	93288.00	177247.20	34518.74	13424.
.19	6260.02	51400.	112680.40	18.	214092.70	7774.00	139932.00	265870.80	51778.11	3524.
.17	6260.02	24581.	93900.30	15.	178410.50	6905.94	103589.10	196819.30	18408.71	-13021.
.15	6260.02	13226.	150240.50	24.	285456.90	5955.02	142920.40	271548.70	-13908.20	-43656.
.12	5443.24	-23687.	157853.90	29.	299922.30	4759.06	138012.80	262224.30	-37697.98	-87433.
.09	4290.12	-65007.	141574.10	33.	268990.80	3750.89	123779.30	235180.60	-33810.14	-132763.
.07	3083.46	-79414.	77086.41	25.	146464.20	2695.89	67397.23	128054.70	-18409.45	-126953.
.04	1888.20	-139898.	60422.37	32.	114802.50	1650.87	52827.73	100372.70	-14429.82	-195940.
.02	745.41	-49631.	6708.69	9.	12746.51	651.72	5865.46	11144.37	-1602.14	-64101.
.00	.00	-37560.	.00	6.	.00	.00	.00	.00	.00	-46644.

TOTAL 1889710.00 3590449.00 2127000.00 4041299.00 450850.90

NOTES:

W/O PROJECT CAPACITY (C) = 6260.
WITH PROJECT CAPACITY (W) = 7774.
YEARLY PARTICIPATION (WO) = 4687707.
YEARLY PARTICIPATION (WP) = 4098497.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 2797999.
YEARLY UNSATISFIED DEMAND (WP) = 1971499.

TABLE E-47
GASPARILLA #2
CURRENT YEAR= 2021

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5615.42	64141.	5615.42	1.	10669.30	7774.00	7774.00	14770.60	4101.30	55727.
1.17	5615.42	57060.	5615.42	1.	10669.30	7774.00	7774.00	14770.60	4101.30	49280.
1.11	5615.42	107672.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	92692.
1.03	5615.42	149301.	16846.26	3.	32007.89	7774.00	23322.00	44311.79	12303.91	127925.
1.00	5615.42	96680.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	82686.
.98	5615.42	93615.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	79895.
.90	5615.42	43003.	5615.42	1.	10669.30	7774.00	7774.00	14770.60	4101.30	36484.
.87	5615.42	41312.	5615.42	1.	10669.30	7774.00	7774.00	14770.60	4101.30	34945.
.84	5615.42	79030.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	66618.
.82	5615.42	38458.	5615.42	1.	10669.30	7774.00	7774.00	14770.60	4101.30	32347.
.78	5615.42	73005.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	61134.
.76	5615.42	106179.	16846.26	3.	32007.89	7774.00	23322.00	44311.79	12303.91	88670.
.74	5615.42	68672.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	57189.
.72	5615.42	132059.	22461.68	4.	42677.18	7774.00	31096.00	59082.39	16405.21	109567.
.68	5615.42	62330.	11230.84	2.	21338.59	7774.00	15548.00	29541.20	8202.60	51416.
.66	5615.42	119165.	22461.68	4.	42677.18	7774.00	31096.00	59082.39	16405.21	97829.
.64	5615.42	114958.	22461.68	4.	42677.18	7774.00	31096.00	59082.39	16405.21	94000.
.61	5615.42	81130.	16846.26	3.	32007.89	7774.00	23322.00	44311.79	12303.91	65868.
.58	5615.42	102466.	22461.68	4.	42677.18	7774.00	31096.00	59082.39	16405.21	82628.
.56	5615.42	122376.	28077.10	5.	53346.48	7774.00	38870.00	73852.99	20506.51	98091.
.53	5615.42	91051.	22461.68	4.	42677.18	7774.00	31096.00	59082.39	16405.21	72237.
.51	5615.42	131926.	33692.52	6.	64015.78	7774.00	46644.00	88623.59	24607.81	104122.
.48	5615.42	60020.	16846.26	3.	32007.89	7774.00	23322.00	44311.79	12303.91	46651.
.45	5615.42	169390.	50538.78	9.	96023.67	7774.00	69966.00	132935.40	36911.71	130240.
.43	5615.42	158457.	50538.78	9.	96023.67	7774.00	69966.00	132935.40	36911.71	120288.
.41	5615.42	163354.	56154.20	10.	106693.00	7774.00	77740.00	147706.00	41013.02	122083.

.38	5615.42	177079.	67385.04	12.	128031.60	7774.00	93288.00	177247.20	49215.62	129253.
.35	5615.42	106834.	44923.36	8.	85354.37	7774.00	62192.00	118164.80	32810.42	75956.
.32	5615.42	130184.	61769.62	11.	117362.30	7774.00	85514.00	162476.60	45114.32	89225.
.30	5615.42	112793.	61769.62	11.	117362.30	7774.00	85514.00	162476.60	45114.32	73394.
.27	5615.42	146175.	89846.72	16.	170708.70	7774.00	124384.00	236329.60	65620.84	90471.
.25	5615.42	105939.	78615.88	14.	149370.10	7774.00	108836.00	206788.40	57418.23	59168.
.22	5615.42	72582.	67385.04	12.	128031.60	7774.00	93288.00	177247.20	49215.62	34126.
.19	5615.42	87085.	101077.60	18.	192047.30	7774.00	139932.00	265870.80	73823.42	31356.
.17	5615.42	51640.	84231.30	15.	160039.40	7774.00	116610.00	221559.00	61519.53	7076.
.15	5615.42	52689.	134770.10	24.	256063.10	7110.33	170647.90	324231.00	68167.85	-15928.
.12	5615.42	18175.	162847.20	29.	309409.60	5682.35	164788.20	313097.60	3688.01	-60658.
.09	4919.79	-22956.	162353.10	33.	308470.90	4478.59	147793.30	280807.30	-27663.58	-108749.
.07	3536.02	-51985.	88400.46	25.	167960.90	3218.91	80472.74	152898.20	-15062.67	-113877.
.04	2165.33	-110403.	69290.63	32.	131652.20	1971.15	63076.66	119845.60	-11806.53	-185691.
.02	854.81	-42845.	7693.33	9.	14617.33	778.16	7003.40	13306.46	-1310.88	-62963.
.00	.00	-33693.	.00	6.	.00	.00	.00	.00	.00	-46644.

TOTAL	1787747.00	3396718.00	2243001.00	4261700.00	864981.80

NOTES:

W/O PROJECT CAPACITY (C) = 5615.
WITH PROJECT CAPACITY (W) = 7774.
YEARLY PARTICIPATION (WO) = 5375727.
YEARLY PARTICIPATION (WP) = 4893634.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 3587983.
YEARLY UNSATISFIED DEMAND (WP) = 2650635.

TABLE E-48
GASPARILLA #2
CURRENT YEAR= 2031

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	4970.82	80984.	4970.82	1.	9444.56	7774.00	7774.00	14770.60	5326.04	68009.
1.17	4970.82	72259.	4970.82	1.	9444.56	7774.00	7774.00	14770.60	5326.04	60316.
1.11	4970.82	136573.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	113628.
1.03	4970.82	189817.	14912.46	3.	28333.67	7774.00	23322.00	44311.79	15978.13	157179.
1.00	4970.82	123029.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	101686.
.98	4970.82	119252.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	98356.
.90	4970.82	54937.	4970.82	1.	9444.56	7774.00	7774.00	14770.60	5326.04	45044.
.87	4970.82	52854.	4970.82	1.	9444.56	7774.00	7774.00	14770.60	5326.04	43207.
.84	4970.82	101279.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	82511.
.82	4970.82	49337.	4970.82	1.	9444.56	7774.00	7774.00	14770.60	5326.04	40107.
.78	4970.82	93856.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	75966.
.76	4970.82	136681.	14912.46	3.	28333.67	7774.00	23322.00	44311.79	15978.13	110332.
.74	4970.82	88516.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	71258.
.72	4970.82	170521.	19883.28	4.	37778.23	7774.00	31096.00	59082.39	21304.17	136775.
.68	4970.82	80702.	9941.64	2.	18889.11	7774.00	15548.00	29541.20	10652.08	64369.
.66	4970.82	154632.	19883.28	4.	37778.23	7774.00	31096.00	59082.39	21304.17	122767.
.64	4970.82	149448.	19883.28	4.	37778.23	7774.00	31096.00	59082.39	21304.17	118196.
.61	4970.82	105816.	14912.46	3.	28333.67	7774.00	23322.00	44311.79	15978.13	83119.
.58	4970.82	134055.	19883.28	4.	37778.23	7774.00	31096.00	59082.39	21304.17	104625.
.56	4970.82	160538.	24854.10	5.	47222.78	7774.00	38870.00	73852.99	26630.21	124582.
.53	4970.82	119989.	19883.28	4.	37778.23	7774.00	31096.00	59082.39	21304.17	92224.
.51	4970.82	174254.	29824.92	6.	56667.34	7774.00	46644.00	88623.59	31956.25	133283.
.48	4970.82	79804.	14912.46	3.	28333.67	7774.00	23322.00	44311.79	15978.13	60185.
.45	4970.82	226264.	44737.38	9.	85001.01	7774.00	69966.00	132935.40	47934.38	168964.
.43	4970.82	212792.	44737.38	9.	85001.01	7774.00	69966.00	132935.40	47934.38	157087.
.41	4970.82	220774.	49708.20	10.	94445.56	7774.00	77740.00	147706.00	53260.42	160733.

.38	4970.82	241584.	59649.84	12.	113334.70	7774.00	93288.00	177247.20	63912.50	172297.
.35	4970.82	147232.	39766.56	8.	75556.45	7774.00	62192.00	118164.80	42608.33	102676.
.32	4970.82	181851.	54679.02	11.	103890.10	7774.00	85514.00	162476.60	58586.45	123024.
.30	4970.82	160421.	54679.02	11.	103890.10	7774.00	85514.00	162476.60	58586.45	104130.
.27	4970.82	211298.	79533.12	16.	151112.90	7774.00	124384.00	236329.60	85216.66	132029.
.25	4970.82	157821.	69591.48	14.	132223.80	7774.00	108836.00	206788.40	74564.59	91664.
.22	4970.82	112820.	59649.84	12.	113334.70	7774.00	93288.00	177247.20	63912.50	58771.
.19	4970.82	142383.	89474.76	18.	170002.00	7774.00	139932.00	265870.80	95868.75	64487.
.17	4970.82	92861.	74562.30	15.	141668.30	7774.00	116610.00	221559.00	79890.63	31000.
.15	4970.82	111692.	119299.70	24.	226669.30	7774.00	186576.00	354494.30	127825.00	17079.
.12	4970.82	78906.	144153.80	29.	273892.20	6781.45	196662.00	373657.70	99765.51	-28784.
.09	4970.82	36018.	164037.00	33.	311670.30	5344.84	176379.80	335121.70	23451.31	-80162.
.07	4357.16	-15342.	108928.90	25.	206965.00	3841.52	96037.96	182472.10	-24492.88	-98312.
.04	2668.17	-73685.	85381.38	32.	162224.60	2352.41	75277.09	143026.50	-19198.15	-173491.
.02	1053.32	-35257.	9479.89	9.	18011.79	928.67	8358.01	15880.22	-2131.57	-61608.
.00	.00	-29825.	.00	6.	.00	.00	.00	.00	.00	-46644.

TOTAL	1660240.00	3154456.00	2348509.00	4462166.00	1307710.00

NOTES:
W/O PROJECT CAPACITY (C) = 4971.
WITH PROJECT CAPACITY (W) = 7774.
YEARLY PARTICIPATION (WO) = 6624086.
YEARLY PARTICIPATION (WP) = 5840171.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 4963849.
YEARLY UNSATISFIED DEMAND (WP) = 3491665.

TABLE E-49
GASPARIL #2
CURRENT YEAR= 2041

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	4854.00	101176.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	82744.
1.17	4854.00	90412.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	73555.
1.11	4854.00	171024.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	138745.
1.03	4854.00	237981.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	192276.
1.00	4854.00	154317.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	124481.
.98	4854.00	149658.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	120504.
.90	4854.00	69045.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	55315.
.87	4854.00	66475.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	53120.
.84	4854.00	127488.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	101577.
.82	4854.00	62137.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	49417.
.78	4854.00	118331.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	93760.
.76	4854.00	172436.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	136320.
.74	4854.00	111744.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	88137.
.72	4854.00	215456.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	169416.
.68	4854.00	102105.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	79908.
.66	4854.00	195856.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	152684.
.64	4854.00	189462.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	147225.
.61	4854.00	134362.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	103815.
.58	4854.00	170474.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	131014.
.56	4854.00	204419.	24270.00	5.	46112.99	7774.00	38870.00	73852.99	27740.00	156364.
.53	4854.00	153123.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	116202.
.51	4854.00	222616.	29124.00	6.	55335.59	7774.00	46644.00	88623.59	33287.99	168269.
.48	4854.00	102275.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	76423.
.45	4854.00	290606.	43686.00	9.	83003.39	7774.00	69966.00	132935.40	49931.99	215422.
.43	4854.00	273988.	43686.00	9.	83003.39	7774.00	69966.00	132935.40	49931.99	201235.
.41	4854.00	285112.	48540.00	10.	92225.98	7774.00	77740.00	147706.00	55480.00	207102.

.38	4854.00	313338.	58248.00	12.	110671.20	7774.00	93288.00	177247.20	66575.98	223938.
.35	4854.00	191839.	38832.00	8.	73780.79	7774.00	62192.00	118164.80	44384.00	134734.
.32	4854.00	238376.	53394.00	11.	101448.60	7774.00	85514.00	162476.60	61027.99	163572.
.30	4854.00	211941.	53394.00	11.	101448.60	7774.00	85514.00	162476.60	61027.99	141005.
.27	4854.00	281089.	77664.00	16.	147561.60	7774.00	124384.00	236329.60	88767.99	181887.
.25	4854.00	212568.	67956.00	14.	129116.40	7774.00	108836.00	206788.40	77671.99	130650.
.22	4854.00	154501.	58248.00	12.	110671.20	7774.00	93288.00	177247.20	66575.98	88338.
.19	4854.00	198635.	87372.00	18.	166006.80	7774.00	139932.00	265870.80	99863.98	104234.
.17	4854.00	133714.	72810.00	15.	138339.00	7774.00	116610.00	221559.00	83219.98	59701.
.15	4854.00	168442.	116496.00	24.	221342.40	7774.00	186576.00	354494.30	133152.00	56678.
.12	4854.00	134388.	140766.00	29.	267455.40	7774.00	225446.00	428347.30	160892.00	9455.
.09	4854.00	86595.	160182.00	33.	304345.80	6384.10	210675.40	400283.20	95937.42	-45867.
.07	4854.00	13019.	121350.00	25.	230565.00	4588.47	114711.70	217952.20	-12612.76	-79638.
.04	3291.31	-50006.	105321.80	32.	200111.40	2809.81	89914.07	170836.70	-29274.70	-158854.
.02	1299.32	-31992.	11693.88	9.	22218.36	1109.24	9983.16	18967.99	-3250.37	-59983.
.00	.00	-29124.	.00	6.	.00	.00	.00	.00	.00	-46644.

TOTAL 1660588.00 3155117.00 2446525.00 4648395.00 1493279.00

NOTES:

W/O PROJECT CAPACITY (C) = 4854.

WITH PROJECT CAPACITY (W) = 7774.

YEARLY PARTICIPATION (WO) = 8171110.

YEARLY PARTICIPATION (WP) = 6975742.

USER DAY VALUE = 1.90

YEARLY UNSATISFIED DEMAND (WO) = 6510527.

YEARLY UNSATISFIED DEMAND (WP) = 4529221.

TABLE E-50
GASPARILLA #2
CURRENT YEAR= 2051

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	4854.00	120671.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	97723.
1.17	4854.00	107928.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	87013.
1.11	4854.00	204255.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	164276.
1.03	4854.00	284416.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	227953.
1.00	4854.00	184476.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	147653.
.98	4854.00	178960.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	143017.
.90	4854.00	82633.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	65754.
.87	4854.00	79590.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	63197.
.84	4854.00	152714.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	120959.
.82	4854.00	74455.	4854.00	1.	9222.60	7774.00	7774.00	14770.60	5548.00	58881.
.78	4854.00	141873.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	111848.
.76	4854.00	206819.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	162736.
.74	4854.00	134075.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	105294.
.72	4854.00	258641.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	202596.
.68	4854.00	122664.	9708.00	2.	18445.20	7774.00	15548.00	29541.20	11096.00	95703.
.66	4854.00	235438.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	183095.
.64	4854.00	227868.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	176733.
.61	4854.00	161744.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	124853.
.58	4854.00	205388.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	157840.
.56	4854.00	246468.	24270.00	5.	46112.99	7774.00	38870.00	73852.99	27740.00	188670.
.53	4854.00	184848.	19416.00	4.	36890.39	7774.00	31096.00	59082.39	22192.00	140576.
.51	4854.00	268903.	29124.00	6.	55335.59	7774.00	46644.00	88623.59	33287.99	203831.
.48	4854.00	123758.	14562.00	3.	27667.80	7774.00	23322.00	44311.79	16644.00	92928.
.45	4854.00	352072.	43686.00	9.	83003.39	7774.00	69966.00	132935.40	49931.99	262646.
.43	4854.00	332399.	43686.00	9.	83003.39	7774.00	69966.00	132935.40	49931.99	246112.
.41	4854.00	346460.	48540.00	10.	92225.98	7774.00	77740.00	147706.00	55480.00	254236.

.38	4854.00	381661.	58248.00	12.	110671.20	7774.00	93288.00	177247.20	66575.98	276431.
.35	4854.00	234252.	38832.00	8.	73780.79	7774.00	62192.00	118164.80	44384.00	167320.
.32	4854.00	292023.	53394.00	11.	101448.60	7774.00	85514.00	162476.60	61027.99	204790.
.30	4854.00	260728.	53394.00	11.	101448.60	7774.00	85514.00	162476.60	61027.99	178488.
.27	4854.00	347053.	77664.00	16.	147561.60	7774.00	124384.00	236329.60	88767.99	232567.
.25	4854.00	264147.	67956.00	14.	129116.40	7774.00	108836.00	206788.40	77671.99	170279.
.22	4854.00	193619.	58248.00	12.	110671.20	7774.00	93288.00	177247.20	66575.98	118392.
.19	4854.00	251223.	87372.00	18.	166006.80	7774.00	139932.00	265870.80	99863.98	144638.
.17	4854.00	171687.	72810.00	15.	138339.00	7774.00	116610.00	221559.00	83219.98	88876.
.15	4854.00	220833.	116496.00	24.	221342.40	7774.00	186576.00	354494.30	133152.00	96931.
.12	4854.00	184980.	140766.00	29.	267455.40	7774.00	225446.00	428347.30	160892.00	48326.
.09	4854.00	131969.	160182.00	33.	304345.80	7440.52	245537.00	466520.30	162174.50	-11005.
.07	4854.00	37725.	121350.00	25.	230565.00	5347.75	133693.70	254018.00	23452.98	-60656.
.04	3896.47	-30641.	124687.10	32.	236905.50	3274.77	104792.60	199106.00	-37799.50	-143975.
.02	1538.22	-29842.	13844.00	9.	26303.61	1292.79	11635.12	22106.73	-4196.88	-58331.
.00	.00	-29124.	.00	6.	.00	.00	.00	.00	.00	-46644.

TOTAL 1682103.00 3195996.00 2516899.00 4782106.00 1586111.00

NOTES:

W/O PROJECT CAPACITY (C) = 4854.
WITH PROJECT CAPACITY (W) = 7774.
YEARLY PARTICIPATION (WO) = 9673516.
YEARLY PARTICIPATION (WP) = 8130056.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 7991416.
YEARLY UNSATISFIED DEMAND (WP) = 5613162.

TABLE E-51
GASPARILLA #3
CURRENT YEAR= 2001

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	3003.93	14238.	3003.93	1.	5707.46	3166.00	3166.00	6015.40	307.94	15146.
1.17	3003.93	12488.	3003.93	1.	5707.46	3166.00	3166.00	6015.40	307.94	13287.
1.11	3003.93	23382.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	24881.
1.03	3003.93	32056.	9011.78	3.	17122.38	3166.00	9498.00	18046.20	923.82	34117.
1.00	3003.93	20665.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	21995.
.98	3003.93	19908.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	21191.
.90	3003.93	9013.	3003.93	1.	5707.46	3166.00	3166.00	6015.40	307.94	9597.
.87	3003.93	8595.	3003.93	1.	5707.46	3166.00	3166.00	6015.40	307.94	9153.
.84	3003.93	16302.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	17362.
.82	3003.93	7890.	3003.93	1.	5707.46	3166.00	3166.00	6015.40	307.94	8404.
.78	3003.93	14813.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	15781.
.76	3003.93	21397.	9011.78	3.	17122.38	3166.00	9498.00	18046.20	923.82	22797.
.74	3003.93	13742.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	14643.
.72	3003.93	26178.	12015.70	4.	22829.83	3166.00	12664.00	24061.60	1231.76	27899.
.68	3003.93	12175.	6007.85	2.	11414.92	3166.00	6332.00	12030.80	615.88	12978.
.66	3003.93	22991.	12015.70	4.	22829.83	3166.00	12664.00	24061.60	1231.76	24514.
.64	3003.93	21951.	12015.70	4.	22829.83	3166.00	12664.00	24061.60	1231.76	23410.
.61	3003.93	15206.	9011.78	3.	17122.38	3166.00	9498.00	18046.20	923.82	16221.
.58	3003.93	18863.	12015.70	4.	22829.83	3166.00	12664.00	24061.60	1231.76	20130.
.56	3003.93	22169.	15019.63	5.	28537.29	3166.00	15830.00	30077.00	1539.70	23665.
.53	3003.93	16042.	12015.70	4.	22829.83	3166.00	12664.00	24061.60	1231.76	17134.
.51	3003.93	22914.	18023.56	6.	34244.75	3166.00	18996.00	36092.39	1847.64	24480.
.48	3003.93	9988.	9011.78	3.	17122.38	3166.00	9498.00	18046.20	923.82	10680.
.45	3003.93	27326.	27035.33	9.	51367.13	3166.00	28494.00	54138.59	2771.46	29239.
.43	3003.93	24624.	27035.33	9.	51367.13	3166.00	28494.00	54138.59	2771.46	26369.
.41	3003.93	24218.	30039.26	10.	57074.59	3166.00	31660.00	60153.99	3079.41	25963.

.38	3003.93	24379.	36047.11	12.	68489.51	3166.00	37992.00	72184.79	3695.28	26182.
.35	3003.93	13479.	24031.41	8.	45659.67	3166.00	25328.00	48123.19	2463.53	14509.
.32	3003.93	14403.	33043.19	11.	62782.05	3166.00	34826.00	66169.39	3387.34	15563.
.30	3003.93	10105.	33043.19	11.	62782.05	3166.00	34826.00	66169.39	3387.34	10998.
.27	3003.93	10276.	48062.82	16.	91319.34	3166.00	50656.00	96246.38	4927.05	11302.
.25	3003.93	3563.	42054.96	14.	79904.42	3166.00	44324.00	84215.59	4311.17	4123.
.22	2883.04	-1451.	34596.50	12.	65733.34	3061.86	36742.35	69810.45	4077.11	-1250.
.19	2583.85	-7561.	46509.39	18.	88367.83	2744.12	49394.14	93848.85	5481.03	-7594.
.17	2238.94	-11475.	33584.16	15.	63809.89	2377.81	35667.22	67767.71	3957.81	-11823.
.15	1930.65	-25759.	46335.58	24.	88037.59	2050.40	49209.55	93498.13	5460.55	-26774.
.12	1542.91	-42369.	44744.52	29.	85014.59	1638.61	47519.80	90287.62	5273.03	-44294.
.09	1216.06	-59000.	40129.94	33.	76246.87	1291.48	42619.00	80976.09	4729.22	-61859.
.07	874.02	-53248.	21850.55	25.	41516.04	928.23	23205.84	44091.08	2575.04	-55944.
.04	535.22	-78999.	17127.04	32.	32541.37	568.42	18189.35	34559.75	2018.38	-83123.
.02	211.29	-25134.	1901.61	9.	3613.07	224.40	2019.56	3837.17	224.10	-26474.
.00	.00	-18024.	.00	6.	.00	.00	.00	.00	.00	-18996.
TOTAL			773415.40		1469489.00		817458.90	1553172.00	83682.65	

NOTES:

W/O PROJECT CAPACITY (C) = 3004.
WITH PROJECT CAPACITY (W) = 3166.
YEARLY PARTICIPATION (WO) = 1328756.
YEARLY PARTICIPATION (WP) = 1411172.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 555341.
YEARLY UNSATISFIED DEMAND (WP) = 593714.

TABLE E-52
GASPARILLA #3
CURRENT YEAR= 2011

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	2572.37	22423.	2572.37	1.	4887.49	3166.00	3166.00	6015.40	1127.90	18493.
1.17	2572.37	19886.	2572.37	1.	4887.49	3166.00	3166.00	6015.40	1127.90	16294.
1.11	2572.37	37461.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	30587.
1.03	2572.37	51818.	7717.10	3.	14662.48	3166.00	9498.00	18046.20	3383.71	42090.
1.00	2572.37	33523.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	27174.
.98	2572.37	32424.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	26222.
.90	2572.37	14849.	2572.37	1.	4887.49	3166.00	3166.00	6015.40	1127.90	11930.
.87	2572.37	14243.	2572.37	1.	4887.49	3166.00	3166.00	6015.40	1127.90	11405.
.84	2572.37	27198.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	21693.
.82	2572.37	13220.	2572.37	1.	4887.49	3166.00	3166.00	6015.40	1127.90	10519.
.78	2572.37	25039.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	19823.
.76	2572.37	36366.	7717.10	3.	14662.48	3166.00	9498.00	18046.20	3383.71	28701.
.74	2572.37	23487.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	18477.
.72	2572.37	45080.	10289.46	4.	19549.98	3166.00	12664.00	24061.60	4511.62	35314.
.68	2572.37	21214.	5144.73	2.	9774.99	3166.00	6332.00	12030.80	2255.81	16508.
.66	2572.37	40459.	10289.46	4.	19549.98	3166.00	12664.00	24061.60	4511.62	31310.
.64	2572.37	38952.	10289.46	4.	19549.98	3166.00	12664.00	24061.60	4511.62	30004.
.61	2572.37	27390.	7717.10	3.	14662.48	3166.00	9498.00	18046.20	3383.71	20923.
.58	2572.37	34475.	10289.46	4.	19549.98	3166.00	12664.00	24061.60	4511.62	26125.
.56	2572.37	41050.	12861.83	5.	24437.47	3166.00	15830.00	30077.00	5639.52	30885.
.53	2572.37	30385.	10289.46	4.	19549.98	3166.00	12664.00	24061.60	4511.62	22581.
.51	2572.37	43911.	15434.20	6.	29324.97	3166.00	18996.00	36092.39	6767.43	32428.
.48	2572.37	19826.	7717.10	3.	14662.48	3166.00	9498.00	18046.20	3383.71	14369.
.45	2572.37	55655.	23151.29	9.	43987.45	3166.00	28494.00	54138.59	10151.14	39793.
.43	2572.37	51738.	23151.29	9.	43987.45	3166.00	28494.00	54138.59	10151.14	36398.
.41	2572.37	52932.	25723.66	10.	48874.95	3166.00	31660.00	60153.99	11279.04	36496.

.38	2572.37	56730.	30868.39	12.	58649.93	3166.00	37992.00	72184.79	13534.86	37913.
.35	2572.37	33800.	20578.93	8.	39099.96	3166.00	25328.00	48123.19	9023.24	21792.
.32	2572.37	40486.	28296.03	11.	53762.44	3166.00	34826.00	66169.39	12406.95	24775.
.30	2572.37	34255.	28296.03	11.	53762.44	3166.00	34826.00	66169.39	12406.95	19375.
.27	2572.37	43415.	41157.86	16.	78199.91	3166.00	50656.00	96246.38	18046.47	22627.
.25	2572.37	30118.	36013.13	14.	68424.93	3166.00	44324.00	84215.59	15790.66	12979.
.22	2572.37	19285.	30868.39	12.	58649.93	3166.00	37992.00	72184.79	13534.86	5467.
.19	2572.37	21121.	46302.59	18.	87974.90	3166.00	56988.00	108277.20	20302.29	1435.
.17	2572.37	10101.	38585.49	15.	73312.41	2812.48	42187.18	80155.63	6843.21	-5303.
.15	2572.37	5435.	61736.78	24.	117299.90	2425.21	58205.03	110589.50	-6710.32	-17779.
.12	2236.73	-9733.	64865.28	29.	123244.00	1938.15	56206.41	106792.20	-16451.85	-35608.
.09	1762.90	-26712.	58175.60	33.	110533.60	1527.57	50409.73	95778.48	-14755.14	-54068.
.07	1267.05	-32633.	31676.33	25.	60185.02	1097.91	27447.86	52150.92	-8034.10	-51702.
.04	775.90	-57487.	24828.74	32.	47174.61	672.32	21514.35	40877.27	-6297.34	-79798.
.02	306.30	-20395.	2756.73	9.	5237.79	265.42	2388.74	4538.60	-699.19	-26105.
.00	.00	-15434.	.00	6.	.00	.00	.00	.00	.00	-18996.

TOTAL 776519.20 1475386.00 866231.40 1645839.00 170453.00

NOTES:

W/O PROJECT CAPACITY (C) = 2572.

WITH PROJECT CAPACITY (W) = 3166.

YEARLY PARTICIPATION (WO) = 1926271.

YEARLY PARTICIPATION (WP) = 1669133.

USER DAY VALUE = 1.90

YEARLY UNSATISFIED DEMAND (WO) = 1149753.

YEARLY UNSATISFIED DEMAND (WP) = 802903.

TABLE E-53
GASPARILLA #3
CURRENT YEAR= 2021

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	2185.72	24966.	2185.72	1.	4152.86	3166.00	3166.00	6015.40	1862.54	22695.
1.17	2185.72	22210.	2185.72	1.	4152.86	3166.00	3166.00	6015.40	1862.54	20070.
1.11	2185.72	41910.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	37749.
1.03	2185.72	58113.	6557.15	3.	12458.58	3166.00	9498.00	18046.20	5587.62	52098.
1.00	2185.72	37631.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	33674.
.98	2185.72	36438.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	32538.
.90	2185.72	16738.	2185.72	1.	4152.86	3166.00	3166.00	6015.40	1862.54	14858.
.87	2185.72	16080.	2185.72	1.	4152.86	3166.00	3166.00	6015.40	1862.54	14231.
.84	2185.72	30761.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	27130.
.82	2185.72	14969.	2185.72	1.	4152.86	3166.00	3166.00	6015.40	1862.54	13173.
.78	2185.72	28416.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	24897.
.76	2185.72	41328.	6557.15	3.	12458.58	3166.00	9498.00	18046.20	5587.62	36111.
.74	2185.72	26729.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	23291.
.72	2185.72	51402.	8742.86	4.	16611.44	3166.00	12664.00	24061.60	7450.16	44622.
.68	2185.72	24261.	4371.43	2.	8305.72	3166.00	6332.00	12030.80	3725.08	20940.
.66	2185.72	46383.	8742.86	4.	16611.44	3166.00	12664.00	24061.60	7450.16	39842.
.64	2185.72	44746.	8742.86	4.	16611.44	3166.00	12664.00	24061.60	7450.16	38282.
.61	2185.72	31578.	6557.15	3.	12458.58	3166.00	9498.00	18046.20	5587.62	26825.
.58	2185.72	39883.	8742.86	4.	16611.44	3166.00	12664.00	24061.60	7450.16	33651.
.56	2185.72	47633.	10928.58	5.	20764.29	3166.00	15830.00	30077.00	9312.70	39948.
.53	2185.72	35440.	8742.86	4.	16611.44	3166.00	12664.00	24061.60	7450.16	29419.
.51	2185.72	51350.	13114.29	6.	24917.15	3166.00	18996.00	36092.39	11175.24	42404.
.48	2185.72	23362.	6557.15	3.	12458.58	3166.00	9498.00	18046.20	5587.62	18999.
.45	2185.72	65932.	19671.44	9.	37375.73	3166.00	28494.00	54138.59	16762.86	53041.
.43	2185.72	61677.	19671.44	9.	37375.73	3166.00	28494.00	54138.59	16762.86	48988.
.41	2185.72	63583.	21857.16	10.	41528.59	3166.00	31660.00	60153.99	18625.40	49719.

.38	2185.72	68925.	26228.59	12.	49834.30	3166.00	37992.00	72184.79	22350.48	52639.
.35	2185.72	41583.	17485.72	8.	33222.87	3166.00	25328.00	48123.19	14900.32	30933.
.32	2185.72	50672.	24042.87	11.	45681.45	3166.00	34826.00	66169.39	20487.94	36338.
.30	2185.72	43903.	24042.87	11.	45681.45	3166.00	34826.00	66169.39	20487.94	29890.
.27	2185.72	56896.	34971.45	16.	66445.74	3166.00	50656.00	96246.38	29800.64	36845.
.25	2185.72	41235.	30600.02	14.	58140.02	3166.00	44324.00	84215.59	26075.56	24097.
.22	2185.72	28251.	26228.59	12.	49834.30	3166.00	37992.00	72184.79	22350.48	13898.
.19	2185.72	33896.	39342.88	18.	74751.46	3166.00	56988.00	108277.20	33525.72	12770.
.17	2185.72	20100.	32785.73	15.	62292.89	3166.00	47490.00	90230.98	27938.10	2882.
.15	2185.72	20508.	52457.17	24.	99668.61	2895.72	69497.20	132044.70	32376.05	-6487.
.12	2185.72	7074.	63385.75	29.	120432.90	2314.17	67110.82	127510.50	7077.64	-24703.
.09	1914.95	-8935.	63193.45	33.	120067.50	1823.93	60189.56	114360.20	-5707.39	-44288.
.07	1376.34	-20234.	34408.52	25.	65376.18	1310.92	32772.92	62268.54	-3107.64	-46377.
.04	842.82	-42973.	26970.31	32.	51243.58	802.76	25688.28	48807.73	-2435.85	-75624.
.02	332.72	-16677.	2994.51	9.	5689.57	316.91	2852.17	5419.12	-270.45	-25642.
.00	.00	-13114.	.00	6.	.00	.00	.00	.00	.00	-18996.

TOTAL	695852.80	1322120.00	913472.90	1735598.00	413478.20

NOTES:

W/O PROJECT CAPACITY (C) = 2186.
WITH PROJECT CAPACITY (W) = 3166.
YEARLY PARTICIPATION (WO) = 2092419.
YEARLY PARTICIPATION (WP) = 1992956.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 1396567.
YEARLY UNSATISFIED DEMAND (WP) = 1079484.

TABLE E-54
GASPARILLA #3
CURRENT YEAR= 2031

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	749.80	12216.	749.80	1.	1424.62	3166.00	3166.00	6015.40	4590.78	27697.
1.17	749.80	10900.	749.80	1.	1424.62	3166.00	3166.00	6015.40	4590.78	24564.
1.11	749.80	20601.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	46275.
1.03	749.80	28632.	2249.40	3.	4273.86	3166.00	9498.00	18046.20	13772.34	64012.
1.00	749.80	18558.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	41412.
.98	749.80	17988.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	40056.
.90	749.80	8287.	749.80	1.	1424.62	3166.00	3166.00	6015.40	4590.78	18345.
.87	749.80	7972.	749.80	1.	1424.62	3166.00	3166.00	6015.40	4590.78	17596.
.84	749.80	15277.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	33603.
.82	749.80	7442.	749.80	1.	1424.62	3166.00	3166.00	6015.40	4590.78	16334.
.78	749.80	14157.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	30937.
.76	749.80	20617.	2249.40	3.	4273.86	3166.00	9498.00	18046.20	13772.34	44933.
.74	749.80	13352.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	29020.
.72	749.80	25721.	2999.20	4.	5698.48	3166.00	12664.00	24061.60	18363.12	55702.
.68	749.80	12173.	1499.60	2.	2849.24	3166.00	6332.00	12030.80	9181.56	26214.
.66	749.80	23325.	2999.20	4.	5698.48	3166.00	12664.00	24061.60	18363.12	49997.
.64	749.80	22543.	2999.20	4.	5698.48	3166.00	12664.00	24061.60	18363.12	48136.
.61	749.80	15961.	2249.40	3.	4273.86	3166.00	9498.00	18046.20	13772.34	33851.
.58	749.80	20221.	2999.20	4.	5698.48	3166.00	12664.00	24061.60	18363.12	42609.
.56	749.80	24216.	3749.00	5.	7123.10	3166.00	15830.00	30077.00	22953.90	50737.
.53	749.80	18099.	2999.20	4.	5698.48	3166.00	12664.00	24061.60	18363.12	37559.
.51	749.80	26284.	4498.80	6.	8547.72	3166.00	18996.00	36092.39	27544.68	54280.
.48	749.80	12038.	2249.40	3.	4273.86	3166.00	9498.00	18046.20	13772.34	24511.
.45	749.80	34130.	6748.20	9.	12821.58	3166.00	28494.00	54138.59	41317.02	68811.
.43	749.80	32098.	6748.20	9.	12821.58	3166.00	28494.00	54138.59	41317.02	63974.
.41	749.80	33302.	7498.00	10.	14246.20	3166.00	31660.00	60153.99	45907.79	65459.

.38	749.80	36441.	8997.60	12.	17095.44	3166.00	37992.00	72184.79	55089.35	70169.
.35	749.80	22208.	5998.40	8.	11396.96	3166.00	25328.00	48123.19	36726.23	41815.
.32	749.80	27430.	8247.80	11.	15670.82	3166.00	34826.00	66169.39	50498.57	50102.
.30	749.80	24198.	8247.80	11.	15670.82	3166.00	34826.00	66169.39	50498.57	42408.
.27	749.80	31872.	11996.80	16.	22793.92	3166.00	50656.00	96246.38	73452.47	53770.
.25	749.80	23806.	10497.20	14.	19944.68	3166.00	44324.00	84215.59	64270.91	37331.
.22	749.80	17018.	8997.60	12.	17095.44	3166.00	37992.00	72184.79	55089.35	23935.
.19	749.80	21477.	13496.40	18.	25643.16	3166.00	56988.00	108277.20	82634.03	26263.
.17	749.80	14007.	11247.00	15.	21369.30	3166.00	47490.00	90230.98	68861.69	12625.
.15	749.80	16848.	17995.20	24.	34190.88	3166.00	75984.00	144369.60	110178.70	6956.
.12	749.80	11902.	21744.20	29.	41313.97	2761.78	80091.55	152173.90	110860.00	-11722.
.09	749.80	5433.	24743.40	33.	47012.45	2176.71	71831.56	136480.00	89467.50	-32646.
.07	657.23	-2314.	16430.88	25.	31218.66	1564.48	39111.93	74312.66	43094.00	-40038.
.04	402.47	-11115.	12878.95	32.	24470.01	958.03	30656.97	58248.23	33778.22	-70655.
.02	158.88	-5318.	1429.95	9.	2716.90	378.2 0	3403.84	6467.30	3750.39	-25090.
.00	.00	-4499.	.00	6.	.00	.00	.00	.00	. 00	-18996.

TOTAL	250431.20	475819.20	956441.80	1817239.00	1341420.00

NOTES:

W/O PROJECT CAPACITY (C) = 750.
WITH PROJECT CAPACITY (W) = 3166.
YEARLY PARTICIPATION (WO) = 999179.
YEARLY PARTICIPATION (WP) = 2378439.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 748748.
YEARLY UNSATISFIED DEMAND (WP) = 1421998.

TABLE E-55
GASPARILLA #3
CURRENT YEAR= 2041

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)		PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	186.00	3877.	186.00	1.	353.40	3166.00	3166.00	6015.40	5662.00	33698.	
1.17	186.00	3464.	186.00	1.	353.40	3166.00	3166.00	6015.40	5662.00	29956.	
1.11	186.00	6553.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	56504.	
1.03	186.00	9119.	557.99	3.	1060.19	3166.00	9498.00	18046.20	16986.01	78306.	
1.00	186.00	5913.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	50696.	
.98	186.00	5735.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	49076.	
.90	186.00	2646.	186.00	1.	353.40	3166.00	3166.00	6015.40	5662.00	22527.	
.87	186.00	2547.	186.00	1.	353.40	3166.00	3166.00	6015.40	5662.00	21633.	
.84	186.00	4885.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	41368.	
.82	186.00	2381.	186.00	1.	353.40	3166.00	3166.00	6015.40	5662.00	20125.	
.78	186.00	4534.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	38184.	
.76	186.00	6607.	557.99	3.	1060.19	3166.00	9498.00	18046.20	16986.01	55517.	
.74	186.00	4282.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	35894.	
.72	186.00	8256.	743.99	4.	1413.59	3166.00	12664.00	24061.60	22648.01	68996.	
.68	186.00	3913.	372.00	2.	706.79	3166.00	6332.00	12030.80	11324.00	32543.	
.66	186.00	7505.	743.99	4.	1413.59	3166.00	12664.00	24061.60	22648.01	62181.	
.64	186.00	7260.	743.99	4.	1413.59	3166.00	12664.00	24061.60	22648.01	59958.	
.61	186.00	5149.	557.99	3.	1060.19	3166.00	9498.00	18046.20	16986.01	42279.	
.58	186.00	6532.	743.99	4.	1413.59	3166.00	12664.00	24061.60	22648.01	53356.	
.56	186.00	7833.	929.99	5.	1766.98	3166.00	15830.00	30077.00	28310.01	63680.	
.53	186.00	5867.	743.99	4.	1413.59	3166.00	12664.00	24061.60	22648.01	47324.	
.51	186.00	8530.	1115.99	6.	2120.38	3166.00	18996.00	36092.39	33972.02	68528.	
.48	186.00	3919.	557.99	3.	1060.19	3166.00	9498.00	18046.20	16986.01	31124.	
.45	186.00	11136.	1673.98	9.	3180.57	3166.00	28494.00	54138.59	50958.02	87732.	
.43	186.00	10499.	1673.98	9.	3180.57	3166.00	28494.00	54138.59	50958.02	81954.	
.41	186.00	10925.	1859.98	10	3533.96	3166.00	31660.00	60153.99	56620.03	84343.	

TABLE E-59 (continued)

.38	186.00	12007.	2231.98	12.	4240.76	3166.00	37992.00	72184.79	67944.03	91200.
.35	186.00	7351.	1487.99	8.	2827.17	3166.00	25328.00	48123.19	45296.02	54871.
.32	186.00	9134.	2045.98	11.	3887.36	3166.00	34826.00	66169.39	62282.03	66616.
.30	186.00	8121.	2045.98	11.	3887.36	3166.00	34826.00	66169.39	62282.03	57425.
.27	186.00	10771.	2975.97	16.	5654.34	3166.00	50656.00	96246.38	90592.04	74074.
.25	186.00	8145.	2603.97	14.	4947.55	3166.00	44324.00	84215.59	79268.04	53208.
.22	186.00	5920.	2231.98	12.	4240.76	3166.00	37992.00	72184.79	67944.03	35976.
.19	186.00	7611.	3347.97	18.	6361.14	3166.00	56988.00	108277.20	101916.00	42450.
.17	186.00	5124.	2789.97	15.	5300.95	3166.00	47490.00	90230.98	84930.04	24314.
.15	186.00	6454.	4463.96	24.	8481.52	3166.00	75984.00	144369.60	135888.10	23082.
.12	186.00	5150.	5393.95	29.	10248.50	3166.00	91814.00	174446.60	164198.10	3851.
.09	186.00	3318.	6137.94	33.	11662.08	2599.96	85798.61	163017.30	151355.30	-18679.
.07	186.00	499.	4649.95	25.	8834.91	1868.68	46716.91	88762.13	79927.22	-32433.
.04	126.12	-1916.	4035.78	32.	7667.98	1144.31	36617.96	69574.11	61906.13	-64694.
.02	49.79	-1226.	448.09	9.	851.37	451.74	4065.69	7724.81	6873.43	-24428.
.00	.00	-1116.	.00	6.	.00	.00	.00	.00	.00	-18996.
TOTAL			63631.29		120899.40		996359.20	1893082.00	1772183.00	

NOTES:

W/O PROJECT CAPACITY (C) = 186.
WITH PROJECT CAPACITY (W) = 3166.
YEARLY PARTICIPATION (WO) = 313105.
YEARLY PARTICIPATION (WP) = 2840906.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 249474.
YEARLY UNSATISFIED DEMAND (WP) = 1844548.

TABLE E-56
GASPARILLA #3
CURRENT YEAR= 2051

GROUP DAILY % OF TOTAL	CURRENT (WO) PARTICIPATION (U)	XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (WITH) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOT AL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00	1.	.00	3166.00	3166.00	6015.40	6015.40	39798.
1.17	.00	0.	.00	1.	.00	3166.00	3166.00	6015.40	6015.40	35437.
1.11	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	66902.
1.03	.00	0.	.00	3.	.00	3166.00	9498.00	18046.20	18046.20	92835.
1.00	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	60132.
.98	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	58244.
.90	.00	0.	.00	1.	.00	3166.00	3166.00	6015.40	6015.40	26779.
.87	.00	0.	.00	1.	.00	3166.00	3166.00	6015.40	6015.40	25737.
.84	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	49261.
.82	.00	0.	.00	1.	.00	3166.00	3166.00	6015.40	6015.40	23980.
.78	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	45550.
.76	.00	0.	.00	3.	.00	3166..00	9498.00	18046.20	18046.20	66275.
.74	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	42882.
.72	.00	0.	.00	4.	.00	3166.00	12664.00	24061.60	24061.60	82508.
.68	.00	0.	.00	2.	.00	3166.00	6332.00	12030.80	12030.80	38976.
.66	.00	0.	.00	4.	.00	3166.00	12664.00	24061.60	24061.60	74566.
.64	.00	0.	.00	4.	.00	3166.00	12664.00	24061.60	24061.60	71975.
.61	.00	0.	.00	3.	.00	3166.00	9498.00	18046.20	18046.20	50847.
.58	.00	0.	.00	4.	.00	3166.00	12664.00	24061.60	24061.60	64281.
.56	.00	0.	.00	5.	.00	3166.00	15830.00	30077.00	30077.00	76837.
.53	.00	0.	.00	4.	.00	3166.00	12664.00	24061.60	24061.60	57250.
.51	.00	0.	.00	6.	.00	3166.00	18996.00	36092.39	36092.39	83011.
.48	.00	0.	.00	3.	.00	3166.00	9498.00	18046.20	18046.20	37845.
.45	.00	0.	.00	9.	.00	3166.00	28494.00	54138.59	54138.59	106964.
.43	.00	0.	.00	9.	.00	3166.00	28494.00	54138.59	54138.59	100231.
.41	.00	0.	.00	10.	.00	3166.00	31660.00	60153.99	60153.99	103539.

.38	.00	0.	.00	12.	.00	3166.00	37992.00	72184.79	72184.79	112578.
.35	.00	0.	.00	8.	.00	3166.00	25328.00	48123.19	48123.19	68142.
.32	.00	0.	.00	11.	.00	3166.00	34826.00	66169.39	66169.39	83402.
.30	.00	0.	.00	11.	.00	3166.00	34826.00	66169.39	66169.39	72690.
.27	.00	0.	.00	16.	.00	3166.00	50656.00	96246.38	96246.38	94714.
.25	.00	0.	.00	14.	.00	3166.00	44324.00	84215.59	84215.59	69347.
.22	.00	0.	.00	12.	.00	3166.00	37992.00	72184.79	72184.79	48216.
.19	.00	0.	.00	18.	.00	3166.00	56988.00	108277.20	108277.20	58905.
.17	.00	0.	.00	15.	.00	3166.00	47490.00	90230.98	90230.98	36195.
.15	.00	0.	.00	24.	.00	3166.00	75984.00	144369.60	144369.60	39475.
.12	.00	0.	.00	29.	.00	3166.00	91814.00	174446.60	174446.60	19681.
.09	.00	0.	.00	33.	.00	3030.19	99996.17	189992.70	189992.70	-4482.
.07	.00	0.	.00	25.	.00	2177.90	54447.42	103450.10	103450.10	-24703.
.04	.00	0.	.00	32.	.00	1333.67	42677.33	81086.91	81086.91	-58635.
.02	.00	0.	.00	9.	.00	526.50	4738.46	9003.08	9003.08	-23756.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.00	-18996.
TOTAL			.00		.00	1025019.00	1947537.00	1947537.00		

NOTES:
W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 3166.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 3311006.
USER DAY VALUE = 1.90
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 2285988.

TABLE E-57
ESTERO #1
CURRENT YEAR= 2001

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5140.08	71673.	5140.08	1.	6322.30	5266.80	5266.80	6478.16	155.87	67750.
1.17	5140.08	63875.	5140.08	1.	6322.30	5266.80	5266.80	6478.16	155.87	60338.
1.11	5140.08	120651.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	113927.
1.03	5140.08	167535.	15420.24	3.	18966.89	5266.80	15800.40	19434.49	467.60	158113.
1.00	5140.08	108547.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	102422.
.98	5140.08	105172.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	99213.
.90	5140.08	48396.	5140.08	1.	6322.30	5266.80	5266.80	6478.16	155.87	45624.
.87	5140.08	46534.	5140.08	1.	6322.30	5266.80	5266.80	6478.16	155.87	43854.
.84	5140.08	89111.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	83946.
.82	5140.08	43392.	5140.08	1.	6322.30	5266.80	5266.80	6478.16	155.87	40867.
.78	5140.08	82477.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	77640.
.76	5140.08	120050.	15420.24	3.	18966.89	5266.80	15800.40	19434.49	467.60	112975.
.74	5140.08	77706.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	73104.
.72	5140.08	149592.	20560.32	4.	25289.19	5266.80	21067.20	25912.65	623.46	140677.
.68	5140.08	70723.	10280.16	2.	12644.59	5266.80	10533.60	12956.33	311.73	66466.
.66	5140.08	135394.	20560.32	4.	25289.19	5266.80	21067.20	25912.65	623.46	127180.
.64	5140.08	130761.	20560.32	4.	25289.19	5266.80	21067.20	25912.65	623.46	122776.
.61	5140.08	92467.	15420.24	3.	18966.89	5266.80	15800.40	19434.49	467.60	86755.
.58	5140.08	117005.	20560.32	4.	25289.19	5266.80	21067.20	25912.65	623.46	109700.
.56	5140.08	139973.	25700.40	5.	31611.48	5266.80	26334.00	32390.81	779.33	131152.
.53	5140.08	104436.	20560.32	4.	25289.19	5266.80	21067.20	25912.65	623.46	97752.
.51	5140.08	151532.	30840.48	6.	37933.78	5266.80	31600.80	38868.98	935.19	141760.
.48	5140.08	69222.	15420.24	3.	18966.89	5266.80	15800.40	19434.49	467.60	64659.
.45	5140.08	195917.	46260.71	9.	56900.67	5266.80	47401.20	58303.46	1402.80	182808.
.43	5140.08	183878.	46260.71	9.	56900.67	5266.80	47401.20	58303.46	1402.80	171365.
.41	5140.08	190313.	51400.80	10.	63222.97	5266.80	52668.00	64781.63	1558.66	177101.

.38	5140.08	207514.	61680.95	12.	75867.56	5266.80	63201.60	77737.95	1870.39	192690.
.35	5140.08	125989.	41120.64	8.	50578.38	5266.80	42134.40	51825.30	1246.93	116717.
.32	5140.08	154832.	56540.88	11.	69545.27	5266.80	57934.80	71259.79	1714.52	142992.
.30	5140.08	135681.	56540.88	11.	69545.27	5266.80	57934.80	71259.79	1714.52	124788.
.27	5140.08	177657.	82241.27	16.	101156.80	5266.80	84268.80	103650.60	2493.85	162786.
.25	5140.08	131264.	71961.12	14.	88512.16	5266.80	73735.20	90694.27	2182.12	119447.
.22	5140.08	92445.	61680.95	12.	75867.56	5266.80	63201.60	77737.95	1870.39	83308.
.19	5140.08	114676.	92521.43	18.	113801.30	5266.80	94802.40	116606.90	2805.59	102156.
.17	5140.08	72515.	77101.20	15.	94834.45	5266.80	79002.00	97172.44	2337.99	63220.
.15	5140.08	83061.	123361.90	24.	151735.10	5266.80	126403.20	155475.90	3740.78	69819.
.12	5140.08	50273.	149062.30	29.	183346.60	5266.80	152737.20	187866.70	4520.11	36747.
.09	5140.08	9155.	169622.60	33.	208635.80	5149.77	169942.30	209029.00	393.25	-3862.
.07	3893.73	-31159.	97343.33	25.	119732.30	3701.31	92532.77	113815.30	-5916.99	-39137.
.04	2384.38	-88182.	76300.27	32.	93849.32	2266.55	72529.63	89211.43	-4637.89	-96008.
.02	941.29	-37789.	8471.62	9.	10420.09	894.77	8052.96	9905.14	-514.95	-39348.
.00	.00	-30840.	.00	6.	.00	.00	.00	.00	.00	-31601.

TOTAL 1688158.00 2076435.00 1712426.00 2106283.00 29848.54

NOTES:

W/O PROJECT CAPACITY (C) = 5140.
WITH PROJECT CAPACITY (W) = 5267.
YEARLY PARTICIPATION (WO) = 5919552.
YEARLY PARTICIPATION (WP) = 5627017.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 4231396.
YEARLY UNSATISFIED DEMAND (WP) = 3914594.

TABLE E-58
ESTERO #1
CURRENT YEAR= 2011

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5086.80	120684.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	81098.
1.17	5086.80	107916.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	72331.
1.11	5086.80	204208.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	136679.
1.03	5086.80	284302.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	189904.
1.00	5086.80	184389.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	123070.
.98	5086.80	178863.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	119275.
.90	5086.80	82571.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	54927.
.87	5086.80	79522.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	52833.
.84	5086.80	152566.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	101217.
.82	5086.80	74377.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	49300.
.78	5086.80	141704.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	93758.
.76	5086.80	206553.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	136515.
.74	5086.80	133891.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	88393.
.72	5086.80	258253.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	170244.
.68	5086.80	122457.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	80542.
.66	5086.80	235005.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	154279.
.64	5086.80	227420.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	149071.
.61	5086.80	161390.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	105503.
.58	5086.80	204896.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	133604.
.56	5086.80	245832.	25434.00	5.	31283.81	5266.80	26334.00	32390.81	1107.00	159941.
.53	5086.80	184315.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	119472.
.51	5086.80	268088.	30520.80	6.	37540.57	5266.80	31600.80	38868.98	1328.40	173450.
.48	5086.80	123329.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	79367.
.45	5086.80	350749.	45781.20	9.	56310.86	5266.80	47401.20	58303.46	1992.60	224890.
.43	5086.80	331038.	45781.20	9.	56310.86	5266.80	47401.20	58303.46	1992.60	211355.
.41	5086.80	344904.	50868.00	10.	62567.63	5266.80	52668.00	64781.63	2214.00	219103.

.38	5086.80	379726.	61041.60	12.	75081.15	5266.80	63201.60	77737.95	2656.80	239467.
.35	5086.80	232923.	40694.40	8.	50054.10	5266.80	42134.40	51825.30	1771.20	145754.
.32	5086.80	290137.	55954.80	11.	68824.39	5266.80	57934.80	71259.79	2435.40	179721.
.30	5086.80	258781.	55954.80	11.	68824.39	5266.80	57934.80	71259.79	2435.40	158190.
.27	5086.80	344157.	81388.80	16.	100108.20	5266.80	84268.80	103650.60	3542.40	207947.
.25	5086.80	261537.	71215.20	14.	87594.67	5266.80	73735.20	90694.27	3099.60	154761.
.22	5086.80	191317.	61041.60	12.	75081.15	5266.80	63201.60	77737.95	2656.80	110090.
.19	5086.80	247693.	91562.40	18.	112621.70	5266.80	94802.40	116606.90	3985.20	138160.
.17	5086.80	168673.	76302.00	15.	93851.45	5266.80	79002.00	97172.44	3320.99	89218.
.15	5086.80	215905.	122083.20	24.	150162.30	5266.80	126403.20	155475.90	5313.61	105688.
.12	5086.80	178865.	147517.20	29.	181446.10	5266.80	152737.20	187866.70	6420.61	71385.
.09	5086.80	124857.	167864.40	33.	206473.20	5266.80	173804.40	213779.40	7306.21	27203.
.07	5086.80	32216.	127170.00	25.	156419.10	4377.91	109447.70	134620.70	-21798.39	-22222.
.04	3904.08	-37847.	124930.60	32.	153664.70	2680.88	85788.02	105519.20	-48145.41	-82750.
.02	1541.23	-31910.	13871.04	9.	17061.38	1058.34	9525.04	11715.80	-5345.58	-37876.
.00	.00	-30521.	.00	6.	.00	.00	.00	.00	.00	-31601.

TOTAL 1756404.00 2160377.00 1747933.00 2149957.00 -10419.18

NOTES:

W/O PROJECT CAPACITY (C) = 5087.
WITH PROJECT CAPACITY (W) = 5267.
YEARLY PARTICIPATION (WO) = 9692408.
YEARLY PARTICIPATION (WP) = 6655633.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 7936009.
YEARLY UNSATISFIED DEMAND (WP) = 4907702.

TABLE E-59
ESTERO #1
CURRENT YEAR= 2021

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5086.80	177576.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	97853.
1.17	5086.80	159033.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	87385.
1.11	5086.80	301184.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	165239.
1.03	5086.80	419810.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	229813.
1.00	5086.80	272401.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	148990.
.98	5086.80	264375.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	144459.
.90	5086.80	122224.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	66605.
.87	5086.80	117796.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	64105.
.84	5086.80	226181.	10173.60	2.	12513.53	5266.80	10533.60	2956.33	442.80	122897.
.82	5086.80	110323.	5086.80	1.	6256.76	5266.80	5266.80	6478.16	221.40	59886.
.78	5086.80	210406.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	113992.
.76	5086.80	306891.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	166066.
.74	5086.80	199059.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	107586.
.72	5086.80	384279.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	207359.
.68	5086.80	182453.	10173.60	2.	12513.53	5266.80	10533.60	12956.33	442.80	98211.
.66	5086.80	350514.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	188298.
.64	5086.80	339498.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	182079.
.61	5086.80	241298.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	129036.
.58	5086.80	306786.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	163611.
.56	5086.80	368541.	25434.00	5.	31283.81	5266.80	26334.00	32390.81	1107.00	196079.
.53	5086.80	276896.	20347.20	4.	25027.05	5266.80	21067.20	25912.65	885.60	146737.
.51	5086.80	403166.	30520.80	6.	37540.57	5266.80	31600.80	38868.98	1328.40	213231.
.48	5086.80	186021.	15260.40	3.	18770.29	5266.80	15800.40	19434.49	664.20	97830.
.45	5086.80	530122.	45781.20	9.	56310.86	5266.80	47401.20	58303.46	1992.60	277717.
.43	5086.80	501494.	45781.20	9.	56310.86	5266.80	47401.20	58303.46	1992.60	261555.
.41	5086.80	523933.	50868.00	10.	62567.63	5266.80	52668.00	64781.63	2214.00	271828.

.38	5086.80	579110.	61041.60	12.	75081.15	5266.80	63201.60	77737.95	2656.80	298187.
.35	5086.80	356695.	40694.40	8.	50054.10	5266.80	42134.40	51825.30	1771.20	182206.
.32	5086.80	446693.	55954.80	11.	68824.39	5266.80	57934.80	71259.79	2435.40	225828.
.30	5086.80	401153.	55954.80	11.	68824.39	5266.80	57934.80	71259.79	2435.40	200119.
.27	5086.80	536655.	81388.80	16.	100108.20	5266.80	84268.80	103650.60	3542.40	264639.
.25	5086.80	412059.	71215.20	14.	87594.67	5266.80	73735.20	90694.27	3099.60	199090.
.22	5086.80	305473.	61041.60	12.	75081.15	5266.80	63201.60	77737.95	2656.80	143709.
.19	5086.80	401157.	91562.40	18.	112621.70	5266.80	94802.40	116606.90	3985.20	183356.
.17	5086.80	279488.	76302.00	15.	93851.45	5266.80	79002.00	97172.44	3320.99	121854.
.15	5086.80	368795.	122083.20	24.	150162.30	5266.80	126403.20	155475.90	5313.61	150715.
.12	5086.80	326506.	147517.20	29.	181446.10	5266.80	152737.20	187866.70	6420.61	114866.
.09	5086.80	257272.	167864.40	33.	206473.20	5266.80	173804.40	213779.40	7306.21	66200.
.07	5086.80	104314.	127170.00	25.	156419.10	5227.25	130681.30	160738.00	4318.92	-989.
.04	5086.80	18666.	162777.60	32.	200216.40	3200.98	102431.50	125990.70	-74225.72	-66106.
.02	2238.41	-25636.	20145.68	9.	24779.18	1263.66	11372.96	13988.74	-10790.44	-36028.
.00	.00	-30521.	.00	6.	.00	.00	.00	.00	.00	-31601.

TOTAL 1800526.00 2214646.00 1787658.00 2198819.00 -15827.03

NOTES:

W/O PROJECT CAPACITY (C) = 5087.
WITH PROJECT CAPACITY (W) = 5267.
YEARLY PARTICIPATION (WO) = 14076820.
YEARLY PARTICIPATION (WP) = 7946871.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 12276300.
YEARLY UNSATISFIED DEMAND (WP) = 6159216.

TABLE E-60
ESTERO #1
CURRENT YEAR= 2031

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5046.80	213895.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	117799.
1.17	5046.80	191669.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	105306.
1.11	5046.80	363103.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	199237.
1.03	5046.80	506340.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	277320.
1.00	5046.80	328603.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	179845.
.98	5046.80	318983.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	174438.
.90	5046.80	147549.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	80506.
.87	5046.80	142242.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	77523.
.84	5046.80	273204.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	148706.
.82	5046.80	133285.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	72488.
.78	5046.80	254296.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	138077.
.76	5046.80	370994.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	201243.
.74	5046.80	240695.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	130433.
.72	5046.80	464803.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	251542.
.68	5046.80	220791.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	119245.
.66	5046.80	424332.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	228793.
.64	5046.80	411128.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	221372.
.61	5046.80	292374.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	157051.
.58	5046.80	371918.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	199332.
.56	5046.80	446989.	25234.00	5.	31037.81	5266.80	26334.00	32390.81	1353.00	239099.
.53	5046.80	336092.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	179194.
.51	5046.80	489541.	30280.80	6.	37245.38	5266.80	31600.80	38868.98	1623.60	260587.
.48	5046.80	226118.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	119809.
.45	5046.80	644863.	45421.20	9.	55868.07	5266.80	47401.20	58303.46	2435.40	340602.
.43	5046.80	610549.	45421.20	9.	55868.07	5266.80	47401.20	58303.46	2435.40	321314.
.41	5046.80	638495.	50468.00	10.	62075.63	5266.80	52668.00	64781.63	2706.00	334593.

.38	5046.80	706731.	60561.60	12.	74490.75	5266.80	63201.60	77737.95	3247.20	368088.
.35	5046.80	435941.	40374.40	8.	49660.50	5266.80	42134.40	51825.30	2164.80	225599.
.32	5046.80	546965.	55514.80	11.	68283.19	5266.80	57934.80	71259.79	2976.60	280714.
.30	5046.80	492380.	55514.80	11.	68283.19	5266.80	57934.80	71259.79	2976.60	250033.
.27	5046.80	660046.	80748.80	16.	99321.00	5266.80	84268.80	103650.60	4329.60	332126.
.25	5046.80	508603.	70655.20	14.	86905.88	5266.80	73735.20	90694.27	3788.40	251861.
.22	5046.80	378747.	60561.60	12.	74490.75	5266.80	63201.60	77737.95	3247.20	183730.
.19	5046.80	499737.	90842.40	18.	111736.10	5266.80	94802.40	116606.90	4870.79	237158.
.17	5046.80	350752.	75702.00	15	93113.45	5266.80	79002.00	97172.44	4058.99	160704.
.15	5046.80	467250.	121123.20	24.	148981.50	5266.80	126403.20	155475.90	6494.40	204316.
.12	5046.80	421812.	146357.20	29.	180019.30	5266.80	152737.20	187866.70	7847.40	166626.
.09	5046.80	343029.	166544.40	33.	204849.60	5266.80	173804.40	213779.40	8929.80	112622.
.07	5046.80	151290.	126170.00	25.	155189.10	5266.80	131670.00	161954.10	6765.00	24288.
.04	5046.80	55983.	161497.60	32.	198642.00	3820.13	122244.00	150360.10	-48281.90	-46294.
.02	2682.98	-21274.	24146.85	9.	29700.62	1508.08	13572.75	16694.47	-13006.14	-33828.
.00	.00	-30281.	.00	6.	.00	.00	.00	.00	.00	-31601.

TOTAL 1790527.00 2202347.00 1810659.00 2227110.00 24762.76

NOTES:

W/O PROJECT CAPACITY (C) = 5047.
WITH PROJECT CAPACITY (W) = 5267.
YEARLY PARTICIPATION (WO) = 16872640.
YEARLY PARTICIPATION (WP) = 9483973.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 15082120.
YEARLY UNSATISFIED DEMAND (WP) = 7673318.

TABLE E-61
ESTERO #1
CURRENT YEAR= 2041

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT PARTICIPATION (PA)	(W) PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5046.80	256467.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	141728.
1.17	5046.80	229919.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	126806.
1.11	5046.80	435668.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	240026.
1.03	5046.80	607738.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	334314.
1.00	5046.80	394460.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	216863.
.98	5046.80	382969.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	210404.
.90	5046.80	177220.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	97184.
.87	5046.80	170881.	5046.80	1.	6207.56	5266.80	5266.80	12956.33	541.20	179669.
.82	5046.80	160182.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	87607.
.78	5046.80	305704.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	166974.
.76	5046.80	446075.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	243445.
.74	5046.80	289458.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	157842.
.72	5046.80	559105.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	304548.
.68	5046.80	265684.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	144479.
.66	5046.80	510765.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	277377.
.64	5046.80	494994.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	268512.
.61	5046.80	352167.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	190660.
.58	5046.80	448160.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	242187.
.56	5046.80	538809.	25234.00	5.	31037.81	5266.80	26334.00	32390.81	1353.00	290710.
.53	5046.80	405367.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	218133.
.51	5046.80	590616.	30280.80	6.	37245.38	5266.80	31600.80	38868.98	1623.60	317400.
.48	5046.80	273029.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	146177.
.45	5046.80	779083.	45421.20	9.	55868.07	5266.80	47401.20	58303.46	2435.40	416046.
.43	5046.80	738097.	45421.20	9.	55868.07	5266.80	47401.20	58303.46	2435.40	393008.
.41	5046.80	772458.	50468.00	10.	62075.63	5266.80	52668.00	64781.63	2706.00	409892.

.38	5046.80	855925.	60561.60	12.	74490.75	5266.80	63201.60	77737.95	3247.20	451948.
.35	5046.80	528557.	40374.40	8.	49660.50	5266.80	42134.40	51825.30	2164.80	277657.
.32	5046.80	664112.	55514.80	11.	68283.19	5266.80	57934.80	71259.79	2976.60	346562.
.30	5046.80	598914.	55514.80	11.	68283.19	5266.80	57934.80	71259.79	2976.60	309914.
.27	5046.80	804088.	80748.80	16.	99321.00	5266.80	84268.80	103650.60	4329.60	413090.
.25	5046.80	621235.	70655.20	14.	86905.88	5266.80	73735.20	90694.27	3788.40	315170.
.22	5046.80	464167.	60561.60	12.	74490.75	5266.80	63201.60	77737.95	3247.20	231744.
.19	5046.80	614571.	90842.40	18.	111736.10	5266.80	94802.40	116606.90	4870.79	301704.
.17	5046.80	433673.	75702.00	15.	93113.45	5266.80	79002.00	97172.44	4058.99	207313.
.15	5046.80	581654.	121123.20	24.	148981.50	5266.80	126403.20	155475.90	6494.40	268622.
.12	5046.80	532288.	146357.20	29.	180019.30	5266.80	152737.20	187866.70	7847.40	228724.
.09	5046.80	442111.	166544.40	33.	204849.60	5266.80	173804.40	213779.40	8929.80	168316.
.07	5046.80	205240.	126170.00	25.	155189.10	5266.80	131670.00	161954.10	6765.00	54613.
.04	5046.80	98270.	161497.60	32.	198642.00	4562.92	146013.30	179596.30	19045.70	-22524.
.02	3204.67	-16579.	28842.00	9.	35475.65	1801.32	16211.85	19940.57	-15535.08	-31189.
.00	.00	-30281.	.00	6.	.00	.00	.00	.00	. 00	-31601.
TOTAL			1795222.00		2208123.00		1837068.00	2259593.00	51470.02	

NOTES:

W/O PROJECT CAPACITY (C) = 5047.
WITH PROJECT CAPACITY (W) = 5267.
YEARLY PARTICIPATION (WO) = 20153380.
YEARLY PARTICIPATION (WP) = 11328050.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 18358170.
YEARLY UNSATISFIED DEMAND (WP) = 9490987.

TABLE E-62
ESTERO #1
CURRENT YEAR= 2051

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	5046.80	299741.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	166052.
1.17	5046.80	268800.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	148660.
1.11	5046.80	509431.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	281487.
1.03	5046.80	710809.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	392250.
1.00	5046.80	461404.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	254491.
.98	5046.80	448012.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	246964.
.90	5046.80	207381.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	114137.
.87	5046.80	199992.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	109984.
.84	5046.80	384283.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	211142.
.82	5046.80	187524.	5046.80	1.	6207.56	5266.80	5266.80	6478.16	270.60	102975.
.78	5046.80	357961.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	196347.
.76	5046.80	522394.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	286344.
.74	5046.80	339027.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	185704.
.72	5046.80	654964.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	358430.
.68	5046.80	311319.	10093.60	2.	12415.13	5266.80	10533.60	12956.33	541.20	170130.
.66	5046.80	598624.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	326762.
.64	5046.80	580243.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	316430.
.61	5046.80	412948.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	224825.
.58	5046.80	525660.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	285749.
.56	5046.80	632144.	25234.00	5.	31037.81	5266.80	26334.00	32390.81	1353.00	343173.
.53	5046.80	475786.	20187.20	4.	24830.25	5266.80	21067.20	25912.65	1082.40	257715.
.51	5046.80	693359.	30280.80	6.	37245.38	5266.80	31600.80	38868.98	1623.60	375151.
.48	5046.80	320713.	15140.40	3.	18622.69	5266.80	15800.40	19434.49	811.80	172980.
.45	5046.80	915518.	45421.20	9.	55868.07	5266.80	47401.20	58303.46	2435.40	492735.
.43	5046.80	867750.	45421.20	9.	55868.07	5266.80	47401.20	58303.46	2435.40	465885.
.41	5046.80	908632.	50468.00	10.	62075.63	5266.80	52668.00	64781.63	2706.00	486434.

.38	5046.80	1007581.	60561.60	12.	74490.75	5266.80	63201.60	77737.95	3247.20	537193.
.35	5046.80	622701.	40374.40	8.	49660.50	5266.80	42134.40	51825.30	2164.80	330575.
.32	5046.80	783193.	55514.80	11.	68283.19	5266.80	57934.80	71259.79	2976.60	413496.
.30	5046.80	707206.	55514.80	11.	68283.19	5266.80	57934.80	71259.79	2976.60	370784.
.27	5046.80	950506.	80748.80	16.	99321.00	5266.80	84268.80	103650.60	4329.60	495391.
.25	5046.80	735725.	70655.20	14.	86905.88	5266.80	73735.20	90694.27	3788.40	379525.
.22	5046.80	550997.	60561.60	12.	74490.75	5266.80	63201.60	77737.95	3247.20	280551.
.19	5046.80	731299.	90842.40	18.	111736.10	5266.80	94802.40	116606.90	4870.79	367317.
.17	5046.80	517962.	75702.00	15.	93113.45	5266.80	79002.00	97172.44	4058.99	254691.
.15	5046.80	697946.	121123.20	24.	148981.50	5266.80	126403.20	155475.90	6494.40	333989.
.12	5046.80	644587.	146357.20	29.	180019.30	5266.80	152737.20	187866.70	7847.40	291846.
.09	5046.80	542828.	166544.40	33.	204849.60	5266.80	173804.40	213779.40	8929.80	224928.
.07	5046.80	260080.	126170.00	25.	155189.10	5266.80	131670.00	161954.10	6765.00	85438.
.04	5046.80	141255.	161497.60	32.	198642.00	5266.80	168537.60	207301.20	8659.20	1637.
.02	3734.96	-11807.	33614.64	9.	41346.00	2099.39	18894.51	23240.25	-18105.75	-28507.
.00	.00	-30281.	.00	6.	.00	.00	.00	.00	.00	-31601.

TOTAL 1799995.00 2213993.00 1862275.00 2290597.00 76604.25

NOTES:

W/O PROJECT CAPACITY (C) = 5047.
WITH PROJECT CAPACITY (W) = 5267.
YEARLY PARTICIPATION (WO) = 23488270.
YEARLY PARTICIPATION (WP) = 13202560.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 21688290.
YEARLY UNSATISFIED DEMAND (WP) = 11340300.

TABLE E-63
Estero #2
CURRENT YEAR= 2001

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)		PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	437.39	6099.	437.39	1.	537.99	525.00	525.00	645.75	107.76	6753.	
1.17	437.39	5435.	437.39	1.	537.99	525.00	525.00	645.75	107.76	6015.	
1.11	437.39	10267.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	11356.	
1.03	437.39	14256.	1312.17	3.	1613.97	525.00	1575.00	1937.25	323.28	15761.	
1.00	437.39	9237.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	10209.	
.98	437.39	8950.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	9890.	
.90	437.39	4118.	437.39	1.	537.99	525.00	525.00	645.75	107.76	4548.	
.87	437.39	3960.	437.39	1.	537.99	525.00	525.00	645.75	107.76	4371.	
.84	437.39	7583.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	8368.	
.82	437.39	3692.	437.39	1.	537.99	525.00	525.00	645.75	107.76	4074.	
.78	437.39	7018.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	7739.	
.76	437.39	10216.	1312.17	3.	1613.97	525.00	1575.00	1937.25	323.28	11261.	
.74	437.39	6612.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	7287.	
.72	437.39	12729.	1749.56	4.	2151.96	525.00	2100.00	2583.00	431.04	14023.	
.68	437.39	6018.	874.78	2.	1075.98	525.00	1050.00	1291.50	215.52	6625.	
.66	437.39	11521.	1749.56	4.	2151.96	525.00	2100.00	2583.00	431.04	12677.	
.64	437.39	11127.	1749.56	4.	2151.96	525.00	2100.00	2583.00	431.04	12238.	
.61	437.39	7868.	1312.17	3.	1613.97	525.00	1575.00	1937.25	323.28	8648.	
.58	437.39	9956.	1749.56	4.	2151.96	525.00	2100.00	2583.00	431.04	10935.	
.56	437.39	11911.	2186.95	5.	2689.95	525.00	2625.00	3228.75	538.80	13073.	
.53	437.39	8887.	1749.56	4.	2151.96	525.00	2100.00	2583.00	431.04	9744.	
.51	437.39	12895.	2624.34	6.	3227.94	525.00	3150.00	3874.50	646.56	14131.	
.48	437.39	5890.	1312.17	3.	1613.97	525.00	1575.00	1937.25	323.28	6445.	
.45	437.39	16671.	3936.51	9.	4841.91	525.00	4725.00	5811.75	969.84	18223.	
.43	437.39	15647.	3936.51	9.	4841.91	525.00	4725.00	5811.75	969.84	17082.	
.41	437.39	16195.	4373.90	10.	5379.90	525.00	5250.00	6457.50	1077.60	17654.	

.38	437.39	17658.	5248.69	12.	6455.88	525.00	6300.00	7749.00	1293.12	19208.
.35	437.39	10721.	3499.12	8.	4303.92	525.00	4200.00	5166.00	862.08	11634.
.32	437.39	13175.	4811.29	11.	5917.89	525.00	5775.00	7103.25	1185.36	14254.
.30	437.39	11546.	4811.29	11.	5917.89	525.00	5775.00	7103.25	1185.36	12439.
.27	437.39	15118.	6998.25	16.	8607.84	525.00	8400.00	10332.00	1724.16	16227.
.25	437.39	11170.	6123.47	14.	7531.86	525.00	7350.00	9040.50	1508.64	11907.
.22	437.39	7867.	5248.69	12.	6455.88	525.00	6300.00	7749.00	1293.12	8304.
.19	437.39	9758.	7873.03	18.	9683.82	525.00	9450.00	11623.50	1939.68	10183.
.17	437.39	6171.	6560.86	15.	8069.85	525.00	7875.00	9686.25	1616.40	6302.
.15	437.39	7068.	10497.37	24.	12911.76	525.00	12600.00	15498.00	2586.23	6960.
.12	437.39	4278.	12684.32	29.	15601.71	525.00	15225.00	18726.75	3125.03	3663.
.09	437.39	779.	14433.88	33.	17753.67	513.33	16940.03	20836.23	3082.56	-385.
.07	331.33	-2651.	8283.34	25.	10188.51	368.95	9223.76	11345.22	1156.72	-3901.
.04	202.90	-7504.	6492.70	32.	7986.02	225.93	7229.83	8892.69	90669.	-9570.
.02	80.10	-3216.	720.88	9.	886.69	89.19	802.73	987.35	100.67	-3922.
.00	.00	-2624.	.00	6.	.00	.00	.00	.00	.00	-3150.
TOTAL			143652.30		176692.30		170696.40	209956.50	33264.14	

NOTES:

W/O PROJECT CAPACITY (C) = 437.
WITH PROJECT CAPACITY (W) = 525.
YEARLY PARTICIPATION (WO) = 503719.
YEARLY PARICIPATION (WP) = 560907.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 360067.
YEARLY UNSATISFIED DEMAND (WP) = 390211.

TABLE E-64
Estero #2
CURRENT YEAR= 2011

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)		PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	176.98	4199.	176.98	1.	217.68	525.00	525.00	645.75	428.07	8084.	
1.17	176.98	3755.	176.98	1.	217.68	525.00	525.00	645.75	428.07	7210.	
1.11	176.98	7105.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	13624.	
1.03	176.98	9891.	530.94	3.	653.05	525.00	1575.00	1937.25	1284.20	18930.	
1.00	176.98	6415.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	12268.	
.98	176.98	6223.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	11889.	
.90	176.98	2873.	176.98	1.	217.68	525.00	525.00	645.75	428.07	5475.	
.87	176.98	2767.	176.98	1.	217.68	525.00	525.00	645.75	428.07	5266.	
.84	176.98	5308.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	10089.	
.82	176.98	2588.	176.98	1.	217.68	525.00	525.00	645.75	428.07	4914.	
.78	176.98	4930.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	9346.	
.76	176.98	7186.	530.94	3.	653.05	525.00	1575.00	1937.25	1284.20	13608.	
.74	176.98	4658.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	8811.	
.72	176.98	8985.	707.91	4.	870.73	525.00	2100.00	2583.00	1712.27	16970.	
.68	176.98	4260.	353.96	2.	435.37	525.00	1050.00	1291.50	856.13	8028.	
.66	176.98	8176.	707.91	4.	870.73	525.00	2100.00	2583.00	1712.27	15379.	
.64	176.98	7912.	707.91	4.	870.73	525.00	2100.00	2583.00	1712.27	14860.	
.61	176.98	5615.	530.94	3.	653.05	525.00	1575.00	1937.25	1284.20	10517.	
.58	176.98	7129.	707.91	4.	870.73	525.00	2100.00	2583.00	1712.27	13318.	
.56	176.98	8553.	884.89	5.	1088.42	525.00	2625.00	3228.75	2140.33	15943.	
.53	176.98	6413.	707.91	4.	870.73	525.00	2100.00	2583.00	1712.27	11909.	
.51	176.98	9327.	1061.87	6.	1306.10	525.00	3150.00	3874.50	2568.40	17290.	
.48	176.98	4291.	530.94	3.	653.05	525.00	1575.00	1937.25	1284.20	7911.	
.45	176.98	12203.	1592.81	9.	1959.15	525.00	4725.00	5811.75	3852.60	22417.	
.43	176.98	11517.	1592.81	9.	1959.15	525.00	4725.00	5811.75	3852.60	21068.	
.41	176.98	12000.	1769.78	10.	2176.83	525.00	5250.00	6457.50	4280.67	21840.	

.38	176.98	13211.	2123.74	12.	2612.20	525.00	6300.00	7749.00	5136.80	23870.
.35	176.98	8104.	1415.83	8.	1741.47	525.00	4200.00	5166.00	3424.53	14529.
.32	176.98	10094.	1946.76	11.	2394.52	525.00	5775.00	7103.25	4708.73	17915.
.30	176.98	9003.	1946.76	11.	2394.52	525.00	5775.00	7103.25	4708.73	15768.
.27	176.98	11974.	2831.65	16.	3482.93	525.00	8400.00	10332.00	6849.06	20728.
.25	176.98	9099.	2477.70	14.	3047.57	525.00	7350.00	9040.50	5992.93	15427.
.22	176.98	6656.	2123.74	12.	2612.20	525.00	6300.00	7749.00	5136.80	10974.
.19	176.98	8618.	3185.61	18.	3918.30	525.00	9450.00	11623.50	7705.20	13772.
.17	176.98	5868.	2654.68	15.	3265.25	525.00	7875.00	9686.25	6421.00	8893.
.15	176.98	7512.	4247.48	24.	5224.40	525.00	12600.00	15498.00	10273.60	10535.
.12	176.98	6223.	5132.37	29.	6312.82	525.00	15225.00	18726.75	12413.93	7116.
.09	176.98	4344.	5840.29	33.	7183.55	525.00	17325.00	21309.75	14126.19	2712.
.07	176.98	1121.	4424.46	25.	5442.09	436.39	10909.86	13419.13	7977.04	-2215.
.04	135.83	-1317.	4346.55	32.	5346.25	267.23	8551.44	10518.26	5172.01	-8249.
.02	53.62	-1110.	482.60	9.	593.59	105.50	949.47	1167.84	574.25	-3776.
.00	.00	-1062.	.00	6.	.00	.00	.00	.00	.00	-3150.

TOTAL	61108.28	75163.17	174235.80	214310.00	139146.80

NOTES:

W/O PROJECT CAPACITY (C) = 177.
WITH PROJECT CAPACITY (W) = 525.
YEARLY PARTICIPATION (WO) = 337215.
YEARLY PARTICIPATION (WP) = 663440.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 276107.
YEARLY UNSATISFIED DEMAND (WP) = 489205.

TABLE E-65
Estero #2
CURRENT YEAR= 2021

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	22.12	772.	22.12 1.	27.21	525.00	525.00	645.75	618.54	9754.	
1.17	22.12	692.	22.12 1.	27.21	525.00	525.00	645.75	618.54	8711.	
1.11	22.12	1310.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	16471.	
1.03	22.12	1826.	66.36 3.	81.62	525.00	1575.00	1937.25	1855.63	22908.	
1.00	22.12	1185.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	14851.	
.98	22.12	1150.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	14400.	
.90	22.12	531.	22.12 1.	27.21	525.00	525.00	645.75	618.54	6639.	
.87	22.12	512.	22.12 1.	27.21	525.00	525.00	645.75	618.54	6390.	
.84	22.12	984.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	12251.	
.82	22.12	480.	22.12 1.	27.21	525.0 0	525.00	645.75	618.54	5970.	
.78	22.12	915.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	11363.	
.76	22.12	1335.	66.36 3.	81.62	525.00	1575.00	1937.25	1855.63	16554.	
.74	22.12	866.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	10724.	
.72	22.12	1671.	88.48 4.	108.83	525.00	2100.00	2583.00	2474.17	20670.	
.68	22.12	793.	44.24 2.	54.42	525.00	1050.00	1291.50	1237.08	9790.	
.66	22.12	1524.	88.48 4.	108.83	525.00	2100.00	2583.00	2474.17	18770.	
.64	22.12	1476.	88.48 4.	108.83	525.00	2100.00	2583.00	2474.17	18150.	
.61	22.12	1049.	66.36 3.	81.62	525.00	1575.00	1937.25	1855.63	12862.	
.58	22.12	1334.	88.48 4.	108.83	525.00	2100.00	2583.00	2474.17	16309.	
.56	22.12	1603.	110.60 5.	136.04	525.00	2625.00	3228.75	3092.71	19545.	
.53	22.12	1204.	88.48 4.	108.83	525.00	2100.00	2583.00	2474.17	14627.	
.51	22.12	1753.	132.72 6.	163.25	525.00	3150.00	3874.50	3711.25	21255.	
.48	22.12	809.	66.36 3.	81.62	525.00	1575.00	1937.25	1855.63	9752.	
.45	22.12	2305.	199.08 9.	244.87	525.00	4725.00	5811.75	5566.88	27683.	
.43	22.12	2181.	199.08 9.	244.87	525.00	4725.00	5811.75	5566.88	26072.	
.41	22.12	2278.	221.20 10.	272.08	525.00	5250.00	6457.50	6185.42	27096.	

.38	22.12	2518.	265.44	12.	326.49	525.00	6300.00	7749.00	7422.51	29724.
.35	22.12	1551.	176.96	8.	217.66	525.00	4200.00	5166.00	4948.34	18162.
.32	22.12	1942.	243.32	11.	299.28	525.00	5775.00	7103.25	6803.97	22511.
.30	22.12	1744.	243.32	11.	299.28	525.00	5775.00	7103.25	6803.97	19948.
.27	22.12	2334.	353.92	16.	435.32	525.00	8400.00	10332.00	9896.68	26380.
.25	22.12	1792.	309.68	14.	380.91	525.00	7350.00	9040.50	8659.59	19846.
.22	22.12	1328.	265.44	12.	326.49	525.00	6300.00	7749.00	7422.51	14325.
.19	22.12	1744.	398.16	18.	489.74	525.00	9450.00	11623.50	11133.76	18277.
.17	22.12	1215.	331.80	15.	408.11	525.00	7875.00	9686.25	9278.13	12147.
.15	22.12	1604.	530.88	24.	652.98	525.00	12600.00	15498.00	14845.01	15023.
.12	22.12	1420.	641.48	29.	789.02	525.00	15225.00	18726.75	17937.73	11450.
.09	22.12	1119.	729.96	33.	897.85	525.00	17325.00	21309.75	20411.90	6599.
.07	22.12	454.	553.00	25.	680.19	521.06	13026.45	16022.52	15342.33	-99.
.04	22.12	81.	707.84	32.	870.64	319.08	10210.47	12558.88	11688.24	-6590.
.02	9.73	-111.	87.60	9.	107.75	125.96	1133.67	1394.41	1286.66	-3591.
.00	.00	-133.	.00	6.	.00	.00	.00	.00	.00	-3150.
TOTAL			7829.60		9630.41		178195.60	219180.50	209550.10	

NOTES:

W/O PROJECT CAPACITY (C) = 22.
WITH PROJECT CAPACITY (W) = 525.
YEARLY PARTICIPATION (WO) = 61213.
YEARLY PARTICIPATION (WP) = 792152.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 53384.
YEARLY UNSATISFIED DEMAND (WP) = 613957.

TABLE E-66
Estero #2
CURRENT YEAR= 2031

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	11742.
1.17	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	10497.
1.11	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	19860.
1.03	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	27643.
1.00	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	17927.
.98	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	17388.
.90	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	8025.
.87	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	7728.
.84	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	14823.
.82	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	7226.
.78	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	13764.
.76	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	20060.
.74	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	13002.
.72	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	25074.
.68	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	11886.
.66	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	22806.
.64	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	22067.
.61	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	15655.
.58	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	19870.
.56	.00	0.	.00	5.	.00	525.00	2625.00	3228.75	3228.75	23834.
.53	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	17862.
.51	.00	0.	.00	6.	.00	525.00	3150.00	3874.50	3874.50	25976.
.48	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	11943.
.45	.00	0.	.00	9.	.00	525.00	4725.00	5811.75	5811.75	33952.
.43	.00	0.	.00	9.	.00	525.00	4725.00	5811.75	5811.75	32029.
.41	.00	0.	.00	10.	.00	525.00	5250.00	6457.50	6457.50	33353.

.38	.00	0.	.00	12.	.00	525.00	6300.00	7749.00	7749.00	36691.
.35	.00	0.	.00	8.	.00	525.00	4200.00	5166.00	5166.00	22488.
.32	.00	0.	.00	11.	.00	525.00	5775.00	7103.25	7103.25	27982.
.30	.00	0.	.00	11.	.00	525.00	5775.00	7103.25	7103.25	24923.
.27	.00	0.	.00	16.	.00	525.00	8400.00	10332.00	10332.00	33107.
.25	.00	0.	.00	14.	.00	525.00	7350.00	9040.50	9040.50	25106.
.22	.00	0.	.00	12.	.00	525.00	6300.00	7749.00	7749.00	18314.
.19	.00	0.	.00	18.	.00	525.00	9450.00	11623.50	11623.50	23640.
.17	.00	0.	.00	15.	.00	525.00	7875.00	9686.25	9686.25	16019.
.15	.00	0.	.00	24.	.00	525.00	12600.00	15498.00	15498.00	20366.
.12	.00	0.	.00	29.	.00	525.00	15225.00	18726.75	18726.75	16609.
.09	.00	0.	.00	33.	.00	525.00	17325.00	21309.75	21309.75	11226.
.07	.00	0.	.00	25.	.00	525.00	13125.00	16143.75	16143.75	2421.
.04	.00	0.	.00	32.	.00	380.79	12185.41	14988.05	14988.05	-4615.
.02	.00	0.	.00	9.	.00	150.33	1352.95	1664.12	1664.12	-3372.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.00	-3150.

TOTAL	.00	.00	180488.30	222000.70	222000.70

NOTES:

W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 525.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 945372.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 764884.

TABLE E-67
Estero #2
CURRENT YEAR= 2041

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTA L WITHOUT VALUE (PA)	CURRENT (W) PARTICIPATION	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00 1.	.00	525.00	525.00	645.75	645.75	14128.	
1.17	.00	0.	.00 1.	.00	525.00	525.00	645.75	645.75	12640.	
1.11	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	23926.	
1.03	.00	0.	.00 3.	.00	525.00	1575.00	1937.25	1937.25	33325.	
1.00	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	21617.	
.98	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	20973.	
.90	.00	0.	.00 1.	.00	525.00	525.00	645.75	645.75	9687.	
.87	.00	0.	.00 1.	.00	525.00	525.00	645.75	645.75	9332.	
.84	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	17910.	
.82	.00	0.	.00 1.	.00	525.00	525.00	645.75	645.75	8733.	
.78	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	16644.	
.76	.00	0.	.00 3.	.00	525.00	1575.00	1937.25	1937.25	24267.	
.74	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	15734.	
.72	.00	0.	.00 4.	.00	525.00	2100.00	2583.00	2583.00	30358.	
.68	.00	0.	.00 2.	.00	525.00	1050.00	1291.50	1291.50	14402.	
.66	.00	0.	.00 4.	.00	525.00	2100.00	2583.00	2583.00	27649.	
.64	.00	0.	.00 4.	.00	525.00	2100.00	2583.00	2583.00	26766.	
.61	.00	0.	.00 3.	.00	525.00	1575.00	1937.25	1937.25	19005.	
.58	.00	0.	.00 4.	.00	525.00	2100.00	2583.00	2583.00	24141.	
.56	.00	0.	.00 5.	.00	525.00	2625.00	3228.75	3228.75	28978.	
.53	.00	0.	.00 4.	.00	525.00	2100.00	2583.00	2583.00	21744.	
.51	.00	0.	.00 6.	.00	525.00	3150.00	3874.50	3874.50	31639.	
.48	.00	0.	.00 3.	.00	525.00	1575.00	1937.25	1937.25	14571.	
.45	.00	0.	.00 9.	.00	525.00	4725.00	5811.75	5811.75	41472.	
.43	.00	0.	.00 9.	.00	525.00	4725.00	5811.75	5811.75	39175.	
.41	.00	0.	.00 10.	.00	525.00	5250.00	6457.50	6457.50	40858.	

.38	.00	0.	.00	12.	.00	525.00	6300.00	7749.00	7749.00	45051.
.35	.00	0.	.00	8.	.00	525.00	4200.00	5166.00	5166.00	27677.
.32	.00	0.	.00	11.	.00	525.00	5775.00	7103.25	7103.25	34546.
.30	.00	0.	.00	11.	.00	525.00	5775.00	7103.25	7103.25	30893.
.27	.00	0.	.00	16.	.00	525.00	8400.00	10332.00	10332.00	41177.
.25	.00	0.	.00	14.	.00	525.00	7350.00	9040.50	9040.50	31417.
.22	.00	0.	.00	12.	.00	525.00	6300.00	7749.00	7749.00	23100.
.19	.00	0.	.00	18.	.00	525.00	9450.00	11623.50	11623.50	30074.
.17	.00	0.	.00	15.	.00	525.00	7875.00	9686.25	9686.25	20665.
.15	.00	0.	.00	24.	.00	525.00	12600.00	15498.00	15498.00	26777.
.12	.00	0.	.00	29.	.00	525.00	15225.00	18726.75	18726.75	22799.
.09	.00	0.	.00	33.	.00	525.00	17325.00	21309.75	21309.75	16778.
.07	.00	0.	.00	25.	.00	525.00	13125.00	16143.75	16143.75	5444.
.04	.00	0.	.00	32.	.00	454.84	14554.75	17902.34	17902.34	-2245.
.02	.00	0.	.00	9.	.00	179.56	1616.01	1987.70	1987.70	-3109.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.0 0	-3150.
TOTAL			.00		.00		183120.80	225238.50	225238.50	

NOTES:

W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 525.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 1129192.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 946071.

TABLE E-68
Estero #2
CURRENT YEAR= 2051

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)		(WO)XTRA DEMAND (WO)		U(DAYS) NO. C(DAYS) DAYS		TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	16552.		
1.17	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	14819.		
1.11	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	28059.		
1.03	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	39100.		
1.00	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	25368.		
.98	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	24618.		
.90	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	11377.		
.87	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	10963.		
.84	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	21047.		
.82	.00	0.	.00	1.	.00	525.00	525.00	645.75	645.75	10265.		
.78	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	19572.		
.76	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	28543.		
.74	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	18511.		
.72	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	35729.		
.68	.00	0.	.00	2.	.00	525.00	1050.00	1291.50	1291.50	16959.		
.66	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	32572.		
.64	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	31542.		
.61	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	22411.		
.58	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	28484.		
.56	.00	0.	.00	5.	.00	525.00	2625.00	3228.75	3228.75	34208.		
.53	.00	0.	.00	4.	.00	525.00	2100.00	2583.00	2583.00	25689.		
.51	.00	0.	.00	6.	.00	525.00	3150.00	3874.50	3874.50	37395.		
.48	.00	0.	.00	3.	.00	525.00	1575.00	1937.25	1937.25	17243.		
.45	.00	0.	.00	9.	.00	525.00	4725.00	5811.75	5811.75	49116.		
.43	.00	0.	.00	9.	.00	525.00	4725.00	5811.75	5811.75	46440.		
.41	.00	0.	.00	10.	.00	525.00	5250.00	6457.50	6457.50	48488.		

.38	.00	0.	.00	12.	.00	525.00	6300.00	7749.00	7749.00	53548.
.35	.00	0.	.00	8.	.00	525.00	4200.00	5166.00	5166.00	32952.
.32	.00	0.	.00	11.	.00	525.00	5775.00	7103.25	7103.25	41218.
.30	.00	0.	.00	11.	.00	525.00	5775.00	7103.25	7103.25	36960.
.27	.00	0.	.00	16.	.00	525.00	8400.00	10332.00	10332.00	49381.
.25	.00	0.	.00	14.	.00	525.00	7350.00	9040.50	9040.50	37831.
.22	.00	0.	.00	12.	.00	525.00	6300.00	7749.00	7749.00	27966.
.19	.00	0.	.00	18.	.00	525.00	9450.00	11623.50	11623.50	36615.
.17	.00	0.	.00	15.	.00	525.00	7875.00	9686.25	9686.25	25388.
.15	.00	0.	.00	24.	.00	525.00	12600.00	15498.00	15498.00	33292.
.12	.00	0.	.00	29.	.00	525.00	15225.00	18726.75	18726.75	29092.
.09	.00	0.	.00	33.	.00	525.00	17325.00	21309.75	21309.75	22421.
.07	.00	0.	.00	25.	.00	525.00	13125.00	16143.75	16143.75	8517.
.04	.00	0.	.00	32.	.00	525.00	16800.00	20664.00	20664.00	163.
.02	.00	0.	.00	9.	.00	209.27	1883.42	2316.61	2316.61	-2842.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.00	-3150.
TOTAL					.00	.00	185633.40	228329.10	228329.10	

NOTES:
W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 525.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 1316045.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 1130413.

TABLE E-69
Estero #3
CURRENT YEAR= 2001

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS) VALUE	NO. DAYS (PA)	TOTAL WITHOUT	CURRENT (W) PARTICIPATION VALUE	PA(DAYS) W(DAYS) (WP)	TOTAL WITH	TOTAL BENEFIT	XTRA DEMAND
1.30	3115.18	43438.	3115.18	1.	3831.67	3578.20	3578.20	4401.19	569.52	46029.
1.17	3115.18	38712.	3115.18	1.	3831.67	3578.20	3578.20	4401.19	569.52	40993.
1.11	3115.18	73121.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	77401.
1.03	3115.18	101535.	9345.53	3.	11495.00	3578.20	10734.60	13203.56	1708.56	107420.
1.00	3115.18	65786.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	69584.
.98	3115.18	63740.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	67404.
.90	3115.18	29331.	3115.18	1.	3831.67	3578.20	3578.20	4401.19	569.52	30996.
.87	3115.18	28202.	3115.18	1.	3831.67	3578.20	3578.20	4401.19	569.52	29794.
.84	3115.18	54006.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	57032.
.82	3115.18	26298.	3115.18	1.	3831.67	3578.20	3578.20	4401.19	569.52	27764.
.78	3115.18	49986.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	52748.
.76	3115.18	72757.	9345.53	3.	11495.00	3578.20	10734.60	13203.56	1708.56	76754.
.74	3115.18	47094.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	49666.
.72	3115.18	90661.	12460.70	4.	15326.66	3578.20	14312.80	17604.74	2278.08	95574.
.68	3115.18	42862.	6230.35	2.	7663.33	3578.20	7156.40	8802.37	1139.04	45156.
.66	3115.18	82056.	12460.70	4.	15326.66	3578.20	14312.80	17604.74	2278.08	86404.
.64	3115.18	79249.	12460.70	4.	15326.66	3578.20	14312.80	17604.74	2278.08	83413.
.61	3115.18	56040.	9345.53	3.	11495.00	3578.20	10734.60	13203.56	1708.56	58941.
.58	3115.18	70912.	12460.70	4.	15326.66	3578.20	14312.80	17604.74	2278.08	74529.
.56	3115.18	84832.	15575.88	5.	19158.33	3578.20	17891.00	22005.93	2847.60	89103.
.53	3115.18	63294.	12460.70	4.	15326.66	3578.20	14312.80	17604.74	2278.08	66411.
.51	3115.18	91837.	18691.05	6.	22989.99	3578.20	21469.20	26407.11	3417.12	96310.
.48	3115.18	41953.	9345.53	3.	11495.00	3578.20	10734.60	13203.56	1708.56	43929.
.45	3115.18	118737.	28036.58	9.	34484.99	3578.20	32203.80	39610.67	5125.68	124198.
.43	3115.18	111440.	28036.58	9.	34484.99	3578.20	32203.80	39610.67	5125.68	116423.
.41	3115.18	115340.	31151.76	10.	38316.66	3578.20	35782.00	44011.85	5695.20	120320.

.38	3115.18	125765.	37382.11	12.	45979.99	3578.20	42938.40	52814.22	6834.23	130911.
.35	3115.18	76356.	24921.41	8.	30653.32	3578.20	28625.60	35209.48	4556.16	79296.
.32	3115.18	93837.	34266.93	11.	42148.32	3578.20	39360.20	48413.04	6264.72	97147.
.30	3115.18	82230.	34266.93	11.	42148.32	3578.20	39360.20	48413.04	6264.72	84779.
.27	3115.18	107670.	49842.81	16.	61306.65	3578.20	57251.20	70418.96	9112.31	110595.
.25	3115.18	79553.	43612.46	14.	53643.32	3578.20	50094.80	61616.59	7973.28	81151.
.22	3115.18	56027.	37382.11	12.	45979.99	3578.20	42938.40	52814.22	6834.23	56598.
.19	3115.18	69500.	56073.16	18.	68969.98	3578.20	64407.60	79221.34	10251.36	69403.
.17	3115.18	43948.	46727.64	15.	57474.98	3578.20	53673.00	66017.77	8542.79	42951.
.15	3115.18	50340.	74764.22	24.	91959.98	3578.20	85876.80	105628.40	13668.47	47434.
.12	3115.18	30468.	90340.09	29.	111118.30	3578.20	103767.80	127634.40	16516.07	24965.
.09	3115.18	5548.	102800.80	33.	126445.00	3498.69	115456.80	142011.80	15566.84	-2624.
.07	2359.82	-18884.	58995.50	25.	72564.45	2514.63	62865.64	77324.73	4760.28	-26589.
.04	1445.07	-53443.	46242.23	32.	56877.94	1539.87	49275.75	60609.17	3731.23	-65227.
.02	570.47	-22902.	5134.27	9.	6315.15	607.90	5471.08	6729.43	414.28	-26733.
.00	.00	-18691.	.00	6.	.00	.00	.00	.00	.00	-21469.

TOTAL 1023119.00 1258436.00 1163401.00 1430983.00 172547.80

NOTES:

W/O PROJECT CAPACITY (C) = 3115.
WITH PROJECT CAPACITY (W) = 3578.
YEARLY PARTICIPATION (WO) = 3587580.
YEARLY PARTICIPATION (WP) = 3822927.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 2564462.
YEARLY UNSATISFIED DEMAND (WP) = 2659528.

TABLE E-70
Estero #3
CURRENT YEAR= 2011

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	950.56	22552.	950.56	1.	1169.19	3578.20	3578.20	4401.19	3231.99	55097.
1.17	950.56	20166.	950.56	1.	1169.19	3578.20	3578.20	4401.19	3231.99	49140.
1.11	950.56	38160.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	92858.
1.03	950.56	53127.	2851.69	3.	3507.58	3578.20	10734.60	13203.56	9695.98	129019.
1.00	950.56	34457.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	83612.
.98	950.56	33424.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	81034.
.90	950.56	1 430.	950.56	1.	1169.19	3578.20	3578.20	4401.19	3231.99	37317.
.87	950.56	14860.	950.56	1.	1169.19	3578.20	3578.20	4401.19	3231.99	35894.
.84	950.56	28510.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	68766.
.82	950.56	13899.	950.56	1.	1169.19	3578.20	3578.20	4401.19	3231.99	33494.
.78	950.56	26480.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	63698.
.76	950.56	38598.	2851.69	3.	3507.58	3578.20	10734.60	13203.56	9695.98	92747.
.74	950.56	25020.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	60053.
.72	950.56	48259.	3802.26	4.	4676.77	3578.20	14312.80	17604.74	12927.97	115661.
.68	950.56	22883.	1901.13	2.	2338.39	3578.20	7156.40	8802.37	6463.98	54719.
.66	950.56	43915.	3802.26	4.	4676.77	3578.20	14312.80	17604.74	12927.97	104815.
.64	950.56	42498.	3802.26	4.	4676.77	3578.20	14312.80	17604.74	12927.97	101277.
.61	950.56	30159.	2851.69	3.	3507.58	3578.20	10734.60	13203.56	9695.98	71677.
.58	950.56	38289.	3802.26	4.	4676.77	3578.20	14312.80	17604.74	12927.97	90769.
.56	950.56	45938.	4752.82	5.	5845.97	3578.20	17891.00	22005.93	16159.96	108662.
.53	950.56	34443.	3802.26	4.	4676.77	3578.20	14312.80	17604.74	12927.97	81168.
.51	950.56	50097.	5703.38	6.	7015.16	3578.20	21469.20	26407.11	19391.95	117840.
.48	950.56	23046.	2851.69	3.	3507.58	3578.20	10734.60	13203.56	9695.98	53921.
.45	950.56	65544.	8555.08	9.	10522.74	3578.20	32203.80	39610.67	29087.92	152788.
.43	950.56	61861.	8555.08	9.	10522.74	3578.20	32203.80	39610.67	29087.92	143592.
.41	950.56	64452.	9505.64	10.	11691.93	3578.20	35782.00	44011.85	32319.92	148856.

.38	950.56	70959.	11406.77	12.	14030.32	3578.20	42938.40	52814.22	38783.90	162691.
.35	950.56	43526.	7604.51	8.	9353.55	3578.20	28625.60	35209.48	25855.93	99024.
.32	950.56	54218.	10456.20	11.	12861.13	3578.20	39360.20	48413.04	35551.91	122100.
.30	950.56	48358.	10456.20	11.	12861.13	3578.20	39360.20	48413.04	35551.91	107472.
.27	950.56	64312.	15209.02	16.	18707.10	3578.20	57251.20	70418.96	51711.87	141277.
.25	950.56	48873.	13307.90	14.	16368.71	3578.20	50094.80	61616.59	45247.88	105143.
.22	950.56	35751.	11406.77	12.	14030.32	3578.20	42938.40	52814.22	38783.90	74794.
.19	950.56	46286.	17110.15	18.	21045.48	3578.20	64407.60	79221.34	58175.85	93864.
.17	950.56	31520.	14258.46	15.	17537.90	3578.20	53673.00	66017.77	48479.88	60614.
.15	950.56	40346.	22813.54	24.	28060.64	3578.20	85876.80	105628.40	77567.80	71803.
.12	950.56	33424.	27566.36	29.	33906.61	3578.20	103767.80	127634.40	93727.76	48498.
.09	950.56	23332.	31368.61	33.	38583.39	3578.20	118080.60	145239.10	106655.70	18482.
.07	950.56	6020.	23764.10	25.	29229.84	2974.30	74357.45	91459.65	62229.81	-15098.
.04	729.55	-7072.	23345.63	32.	28715.12	1821.35	58283.34	71688.49	42973.37	-56219.
.02	288.01	-5963.	2592.06	9.	3188.24	719.02	6471.20	7959.57	4771.33	-25733.
.00	.00	-5703.	.00	6.	.00	.00	.00	.00	.00	-21469.

TOTAL 328217.00 403706.90 1187525.00 1460655.00 1056948.00

NOTES:

W/O PROJECT CAPACITY (C) = 951.
WITH PROJECT CAPACITY (W) = 3578.
YEARLY PARTICIPATION (WO) = 1811208.
YEARLY PARTICIPATION (WP) = 4521757.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 1482992.
YEARLY UNSATISFIED DEMAND (WP) = 3334234.

TABLE E-71
Estero #3
CURRENT YEAR= 2021

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT PARTICIPATION (PA)	(W) PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	66480.	
1.17	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	59368.	
1.11	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	112261.	
1.03	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	156132.	
1.00	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	101222.	
.98	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	98144.	
.90	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	45250.	
.87	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	43552.	
.84	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	83495.	
.82	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	40686.	
.78	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	77444.	
.76	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	112823.	
.74	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	73092.	
.72	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	140877.	
.68	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	66723.	
.66	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	127927.	
.64	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	123702.	
.61	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	87666.	
.58	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	111155.	
.56	.00	0.	.00 5.	.00	3578.20	17891.00	22005.93	22005.93	133214.	
.53	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	99691.	
.51	.00	0.	.00 6.	.00	3578.20	21469.20	26407.11	26407.11	144867.	
.48	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	66465.	
.45	.00	0.	.00 9.	.00	3578.20	32203.80	39610.67	39610.67	188677.	
.43	.00	0.	.00 9.	.00	3578.20	32203.80	39610.67	39610.67	177698.	
.41	.00	0.	.00 10.	.00	3578.20	35782.00	44011.85	44011.85	184677.	

.38	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	202585.
.35	.00	0.	.00	8.	.00	3578.20	28625.60	35209.48	35209.48	123789.
.32	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	153425.
.30	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	135958.
.27	.00	0.	.00	16.	.00	3578.20	57251.20	70418.96	70418.96	179793.
.25	.00	0.	.00	14.	.00	3578.20	50094.80	61616.59	61616.59	135260.
.22	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	97634.
.19	.00	0.	.00	18.	.00	3578.20	64407.60	79221.34	79221.34	124570.
.17	.00	0.	.00	15.	.00	3578.20	53673.00	66017.77	66017.77	82786.
.15	.00	0.	.00	24.	.00	3578.20	85876.80	105628.40	105628.40	102394.
.12	.00	0.	.00	29.	.00	3578.20	103767.80	127634.40	127634.40	78038.
.09	.00	0.	.00	33.	.00	3578.20	118080.60	145239.10	145239.10	44976.
.07	.00	0.	.00	25.	.00	3551.33	88783.30	109203.40	109203.40	-672.
.04	.00	0.	.00	32.	.00	2174.71	69590.70	85596.54	85596.54	-44912.
.02	.00	0.	.00	9.	.00	858.52	7726.6 5	9503. 78	9503.78	-24477.
.00	.00	0.	.00	6.	.00	.00	.00	.0 0	.00	-21469.
TOTAL					.00	.00	1214513.00	1493851.00	1493851.00	

NOTES:

W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 3578.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 5399008.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 4184497.

TABLE E-72
Estero #3
CURRENT YEAR= 2031

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	80031.	
1.17	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	71543.	
1.11	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	135359.	
1.03	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	188408.	
1.00	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	122185.	
.98	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	118511.	
.90	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	54695.	
.87	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	52668.	
.84	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	101029.	
.82	.00	0.	.00 1.	.00	3578.20	3578.20	4401.19	4401.19	49248.	
.78	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	93808.	
.76	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	136722.	
.74	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	88614.	
.72	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	170894.	
.68	.00	0.	.00 2.	.00	3578.20	7156.40	8802.37	8802.37	81013.	
.66	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	155439.	
.64	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	150397.	
.61	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	106698.	
.58	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	135424.	
.56	.00	0.	.00 5.	.00	3578.20	17891.00	22005.93	22005.93	162441.	
.53	.00	0.	.00 4.	.00	3578.20	14312.80	17604.74	17604.74	121742.	
.51	.00	0.	.00 6.	.00	3578.20	21469.20	26407.11	26407.11	177040.	
.48	.00	0.	.00 3.	.00	3578.20	10734.60	13203.56	13203.56	81397.	
.45	.00	0.	.00 9.	.00	3578.20	32203.80	39610.67	39610.67	231401.	
.43	.00	0.	.00 9.	.00	3578.20	32203.80	39610.67	39610.67	218297.	
.41	.00	0.	.00 10.	.00	3578.20	35782.00	44011.85	44011.85	227318.	

.38	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	250074.
.35	.00	0.	.00	8.	.00	3578.20	28625.60	35209.48	35209.48	153269.
.32	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	190714.
.30	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	169869.
.27	.00	0.	.00	16.	.00	3578.20	57251.20	70418.96	70418.96	225642.
.25	.00	0.	.00	14.	.00	3578.20	50094.80	61616.59	61616.59	171111.
.22	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	124824.
.19	.00	0.	.00	18.	.00	3578.20	64407.60	79221.34	79221.34	161122.
.17	.00	0.	.00	15.	.00	3578.20	53673.00	66017.77	66017.77	109181.
.15	.00	0.	.00	24.	.00	3578.20	85876.80	105628.40	105628.40	138810.
.12	.00	0.	.00	29.	.00	3578.20	103767.80	127634.40	127634.40	113204.
.09	.00	0.	.00	33.	.00	3578.20	118080.60	145239.10	145239.10	76514.
.07	.00	0.	.00	25.	.00	3578.20	89455.00	110029.60	110029.60	16501.
.04	.00	0.	.00	32.	.00	2595.35	83051.10	102152.80	102152.80	-31451.
.02	.00	0.	.00	9.	.00	1024.57	9221.16	11342.02	11342.02	-22983.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.00	-21469.
TOTAL			.00		.00		1230140.00	1513072.00	1513072.00	

NOTES:
W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 3578.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 6443297.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 5213160.

TABLE E-73
Estero #3
CURRENT YEAR= 2041

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)		(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT (WP)	XTRA DEMAND
1.30	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	96288.	
1.17	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	86150.	
1.11	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	163070.	
1.03	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	227129.	
1.00	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	147334.	
.98	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	142946.	
.90	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	66026.	
.87	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	63605.	
.84	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	122065.	
.82	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	59519.	
.78	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	113440.	
.76	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	165393.	
.74	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	107236.	
.72	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	206906.	
.68	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	98157.	
.66	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	188446.	
.64	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	182424.	
.61	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	129532.	
.58	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	164539.	
.56	.00	0.	.00	5.	.00	3578.20	17891.00	22005.93	22005.93	197505.	
.53	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	148197.	
.51	.00	0.	.00	6.	.00	3578.20	21469.20	26407.11	26407.11	215638.	
.48	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	99311.	
.45	.00	0.	.00	9.	.00	3578.20	32203.80	39610.67	39610.67	282656.	
.43	.00	0.	.00	9.	.00	3578.20	32203.80	39610.67	39610.67	267005.	
.41	.00	0.	.00	10.	.00	3578.20	35782.00	44011.85	44011.85	278476.	

.38	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	307048.
.35	.00	0.	.00	8.	.00	3578.20	28625.60	35209.48	35209.48	188637.
.32	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	235450.
.30	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	210552.
.27	.00	0.	.00	16.	.00	3578.20	57251.20	70418.96	70418.96	280649.
.25	.00	0.	.00	14.	.00	3578.20	50094.80	61616.59	61616.59	214123.
.22	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	157444.
.19	.00	0.	.00	18.	.00	3578.20	64407.60	79221.34	79221.34	204974.
.17	.00	0.	.00	15.	.00	3578.20	53673.00	66017.77	66017.77	140846.
.15	.00	0.	.00	24.	.00	3578.20	85876.80	105628.40	105628.40	182498.
.12	.00	0.	.00	29.	.00	3578.20	103767.80	127634.40	127634.40	155392.
.09	.00	0.	.00	33.	.00	3578.20	118080.60	145239.10	145239.10	114352.
.07	.00	0.	.00	25.	.00	3578.20	89455.00	110029.60	110029.60	37103.
.04	.00	0.	.00	32.	.00	3099.99	99199.66	122015.60	122015.60	-15303.
.02	.00	0.	.00	9.	.00	1223.79	11014.13	13547.38	13547.38	-21190.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.0 0	-21469.
TOTAL			.00		.00		1248081.00	1535140.00	1535140.00	

NOTES:
W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 3578.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 7696139.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 6448061.

TABLE E-74
Estero #3
CURRENT YEAR= 2051

GROUP DAILY % OF TOTAL	CURRENT PARTICIPATION (U)	(WO)XTRA DEMAND (WO)	U(DAYS) C(DAYS)	NO. DAYS	TOTAL WITHOUT VALUE	CURRENT (W) PARTICIPATION (PA)	PA(DAYS) W(DAYS)	TOTAL WITH VALUE	TOTAL BENEFIT	XTRA DEMAND (WP)
1.30	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	112814.
1.17	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	100998.
1.11	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	191239.
1.03	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	266490.
1.00	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	172898.
.98	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	167784.
.90	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	77543.
.87	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	74722.
.84	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	143448.
.82	.00	0.	.00	1.	.00	3578.20	3578.20	4401.19	4401.19	69960.
.78	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	133396.
.76	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	194538.
.74	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	126165.
.72	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	243513.
.68	.00	0.	.00	2.	.00	3578.20	7156.40	8802.37	8802.37	115584.
.66	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	221998.
.64	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	214979.
.61	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	152743.
.58	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	194134.
.56	.00	0.	.00	5.	.00	3578.20	17891.00	22005.93	22005.93	233147.
.53	.00	0.	.00	4.	.00	3578.20	14312.80	17604.74	17604.74	175089.
.51	.00	0.	.00	6.	.00	3578.20	21469.20	26407.11	26407.11	254873.
.48	.00	0.	.00	3.	.00	3578.20	10734.60	13203.56	13203.56	117521.
.45	.00	0.	.00	9.	.00	3578.20	32203.80	39610.67	39610.67	334758.
.43	.00	0.	.00	9.	.00	3578.20	32203.80	39610.67	39610.67	316517.
.41	.00	0.	.00	10.	.00	3578.20	35782.00	44011.85	44011.85	330478.

.38	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	364962.
.35	.00	0.	.00	8.	.00	3578.20	28625.60	35209.48	35209.48	224588.
.32	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	280924.
.30	.00	0.	.00	11.	.00	3578.20	39360.20	48413.04	48413.04	251906.
.27	.00	0.	.00	16.	.00	3578.20	57251.20	70418.96	70418.96	336563.
.25	.00	0.	.00	14.	.00	3578.20	50094.80	61616.59	61616.59	257844.
.22	.00	0.	.00	12.	.00	3578.20	42938.40	52814.22	52814.22	190603.
.19	.00	0.	.00	18.	.00	3578.20	64407.60	79221.34	79221.34	249550.
.17	.00	0.	.00	15.	.00	3578.20	53673.00	66017.77	66017.77	173034.
.15	.00	0.	.00	24.	.00	3578.20	85876.80	105628.40	105628.40	226908.
.12	.00	0.	.00	29.	.00	3578.20	103767.80	127634.40	127634.40	198277.
.09	.00	0.	.00	33.	.00	3578.20	118080.60	145239.10	145239.10	152813.
.07	.00	0.	.00	25.	.00	3578.20	89455.00	110029.60	110029.60	58045.
.04	.00	0.	.00	32.	.00	3578.20	114502.40	140837.90	140837.90	1112.
.02	.00	0.	.00	9.	.00	1426.30	12836.7 0	15789.14	15789.14	-19367.
.00	.00	0.	.00	6.	.00	.00	.00	.00	.00	-21469.

TOTAL .00 .00 1265207.00 1556204.00 1556204.00

NOTES:

W/O PROJECT CAPACITY (C) = 0.
WITH PROJECT CAPACITY (W) = 3578.
YEARLY PARTICIPATION (WO) = 0.
YEARLY PARTICIPATION (WP) = 8969662.
USER DAY VALUE = 1.23
YEARLY UNSATISFIED DEMAND (WO) = 0.
YEARLY UNSATISFIED DEMAND (WP) = 7704459.

TABLE E-75
AVERAGE ANNUAL BENEFIT SUMMARY
INITIAL ANALYSIS 1998 TO 2051
MARKET AREA ANALYSIS @ 6.625 %

	1998	2001	2011	2021	2031	2041	2051	AVG ANN
GASPARILLA MARKET AREAS								
Market Area #1	--- --- --- ----	-7864.21	-10504.28	-11962.75	-45497.64	-49469.28	-29637.22	-16285.65
Market Area #2	--- --- --- ----	-5609.55	-9420.64	-9641.66	-32583.86	-34639.91	-20752.9 0	-12531.82
Market Area #3	--- --- --- ----	45975.15	132687.80	203195.50	977493.40	1210225.00	1237142.00	293183.30
TOTAL ALL MARKET AREAS		32501.39	112762.80	181591.10	899411.90	1126116.00	1186752.00	264365.80

TABLE E-76
AVERAGE ANNUAL BENEFIT SUMMARY
INITIAL ANALYSIS 1998 TO 2051
MARKET AREA ANALYSIS @ 6.625 %

	1998	2001	2011	2021	2031	2041	2051	AVG ANN
ESTERO MARKET AREAS								
Market Area #1 --- --- ---	----	32476.04	45265.39	49355.03	56958.85	56768.13	56540.43	44966.46
Market Area #2 --- --- ---	----	26173.05	108750.30	161447.60	169969.40	170126.50	170314.20	109617.00
Market Area #3 --- --- ---	----	6219.95	22640.58	36064.97	36260.13	36293.66	36333.70	23653.69
TOTAL ALL MARKET AREAS		64869.04	176656.20	246867.60	263188.30	263188.30	263188.30	178237.20