DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310-0103

REPLY TO ATTENTION OF

8 FEB 1992

MEMORANDUM FOR THE DIRECTOR OF CIVIL WORKS

SUBJECT: Duval County, Florida, Shore Protection Project, from St. Johns River to the Duval - St. Johns County Line, Section 934 (PL 99-662) Reevaluation Study

This is in response to the memorandum of January 14, 1992, concerning the subject project.

In accordance with Section 934 of the Water Resources Development Act of 1986, I approve extension of Federal participation in periodic nourishment of the shore protection for Duval County in accordance with your recommendation.

Nancy P. Dorn
Assistant Secretary of the Army
(Civil Works)

DUVAL COUNTY, FLORIDA
SHORE PROTECTION PROJECT
SECTION 934 STUDY

SUPPLEMENT TO REEVALUATION REPORT

JANUARY 1992

DUVAL COUNTY, FLORIDA
SHORE PROTECTION PROJECT
SECTION 934 STUDY

SUPPLEMENT TO REEVALUATION REPORT

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DUVAL COUNTY, FLORIDA
SHORE PROTECTION PROJECT
SECTION 934 STUDY
SUPPLEMENT TO REEVALUATION REPORT

PURPOSE

1. The purpose of this report supplement is to provide additional information to that which was presented in the October 1990 Duval County, Florida Section 934 Study Reevaluation Report. The October 1990 reevaluation report was completed prior to the publishing of the 22 November 1991 Policy Guidance Letter (PGL) No. 22, "Guidance for Placement of Materials on Beaches".

BACKGROUND

2. The project was authorized in 1965 by Public Law 89-298. The authorized project provided for a protective and recreational beach with a level 60 feet wide berm at 11 feet above mean low water along 53,000 feet of shore between the St. Johns River and the Duval - St. Johns County line. Periodic nourishment was authorized for the first 10 years of project life. The recommended plan presented in the October 1990 reevaluation report which is also the current NED plan provided for a 75 foot beach berm width at 11 feet above mean low water and periodic nourishment at four year intervals. Provisions for project fencing and grassing were also recommended.

3. Section 156 of the 1976 Water Resources Development Act (PL 94-587), as amended by Section 934 of the 1986 Water Resources Development Act (PL 99-662), allows the Secretary of the Army, acting through the Chief of Engineers, to extend periodic beach nourishment at authorized shore protection projects for a period of fifty years from initiation of the project. As per PGL No. 22, Section 934 of PL 99-662 can only be used to extend Federal participation in the existing authorized project. Project changes, such as changes in berm width from 60 to 75 feet, are not implementable under the authority of Section 934.

PROPOSED PLAN

4. The District has determined that the extension of Federal participation in the authorized Duval County, Florida project to 50 years from initiation of construction is warranted. The authorized project provides for a protective and recreational beach and periodic nourishment along 53,000 feet of shore between the St. Johns River jetties and the Duval - St. Johns County line. The authorized project consists of a level berm 60 feet wide at elevation 11 feet above mean low water and a natural slope seaward as would be shaped by wave action. The annual net benefits for the authorized project including recreation benefits is $1.6 million. The benefit to cost ratio for the authorized project is 1.4. Therefore, the project meets current budgetary guidelines and policy. The Federal share of construction costs to date for the authorized project has been 58.4 percent. Based on a current evaluation of shoreline ownership, the Federal cost sharing rate for remaining applicable project construction features has been estimated to be 61.6 percent. The Federal share of all construction costs for the next renourishment project is estimated to be 60.3 percent.

MODIFICATIONS TO THE 1990 REEVALUATION REPORT

5. In the October 1990 reevaluation report, Federal participation in the construction of the 75 foot project, sand fencing and grassing, and future periodic nourishment was recommended. The recommended plan has been changed to recommend Federal participation in continued nourishment of the authorized project. Upon request of sponsor, authority will be sought for any appropriate design changes. Maintenance of existing sand fencing and grassing will be treated as OMRR&R and will be a non-Federal responsibility.

WLRC REVIEW FINDINGS RESOLUTION

6. All issues raised by Washington Level Review Center concerning compliance with the directions in Policy Guidance Letter No. 22 (PGL 22) have been resolved. The existing project was economically justified based on current evaluation guidelines and policies. In response to WLRC concerns regarding Federal participation in the operation, maintenance, repair, replacement and rehabilitation (OMRR&R) of sand fencing and grassing, sand fencing and grassing will be treated as OMRR&R and will be a non-Federal responsibility. WLRC and the District agreed that the disposal of maintenance material at the Navy's Mayport property is expected in the future and will provide additional beach fill. All environmental concerns raised by WLRC have been resolved. The documentation is in compliance with PGL No. 22. Coordination with Fish and Wildlife in accordance with the Fish and Wildlife Coordination Act and coordination with the State Historic Preservation Officer have been provided.

RECOMMENDATION

7. It is recommended that extension of Federal participation in the authorized shore protection project for Duval County, Florida be approved. An extension of 50 years from the date of initiation of construction is recommended.

TABLE 1

ECONOMIC SUMMARY FOR
AUTHORIZED PROJECT

ITEM	WITH 60-FT PROJECT i=8.875%
ANNUAL PROJECT COSTS	$4,227,900
PRIMARY BENEFITS	
Prevention of Damage to Development	$3,670,000
TOTAL PRIMARY BENEFITS	$3,670,000
NET PRIMARY BENEFITS	-$557,900
INCIDENTAL BENEFITS	
Recreation Benefits	$2,108,000
TOTAL PROJECT BENEFITS	$5,778,000
NET BENEFITS	$1,550,100
BENEFIT-TO-COST RATIO	1.4

ASSUMING INITIAL CONSTRUCTION AND PAST RENOURISHMENT
HAVE NOT BEEN CONSTRUCTED

DUVAL COUNTY STORM DAMAGE BENEFIT CALCULATIONS

ANNUAL COST SUMMARY TABLE
ANNUAL COST FOR AUTHORIZED 60 FOOT PROJECT
INCLUDING 75 AND 100 FT FROM 1990 REEVALUATION REPORT
FROM 1978 SHORELINE

					INTEREST RATE EQUALS		8.875%
					CAPITAL RECOVERY		0.090032
					ANALYSIS PERIOD		50
PROJECT YEAR		60 FT *PROJECT COSTS	PRESENT WORTH FACTOR	PRESENT WORTH	60 FT ANNUAL VALUE	**75 FT ANNUAL VALUE	**100 FT ANNUAL VALUE
0	1978	$14,600,000	1	$14,600,000	$1,314,472	$1,314,472	$1,314,472
2	1980	$14,100,000	0.8436137	$11,894,954	$1,070,930	$1,070,930	$1,070,930
7	1985	$1,910,000	0.5514457	$1,053,261	$94,828	$94,828	$94,828
8	1986	$3,980,000	0.5064944	$2,015,848	$181,491	$181,491	$181,491
9	1987	$9,988,000	0.4652072	$4,646,490	$418,334	$418,334	$418,334
14	1992	$10,636,000	0.3040924	$3,234,327	$291,194	$313,466	$364,841
15	1993	$10,636,000	0.2793042	$2,970,680	$267,457	$287,914	$335,101
18	1996	$9,068,800	0.2164177	$1,962,650	$176,702	$176,702	$176,702
22	2000	$9,705,000	0.1540211	$1,494,775	$134,578	$134,578	$134,578
26	2004	$9,068,800	0.1096144	$994,071	$89,499	$89,499	$89,499
30	2008	$9,705,000	0.0780108	$757,095	$68,163	$68,163	$68,163
34	2012	$9,068,800	0.0555190	$503,491	$45,330	$45,330	$45,330
38	2016	$9,705,000	0.0395120	$383,464	$34,524	$34,524	$34,524
42	2020	$9,068,800	0.0281201	$255,016	$22,960	$22,960	$22,960
46	2024	$9,705,000	0.0200126	$194,223	$17,486	$17,486	$17,486

TOTAL ANNUAL COSTS 60 FT PROJECT	$4,227,948		
TOTAL ANNUAL COSTS 75 FT PROJECT		$4,270,677	
TOTAL ANNUAL COSTS 100 FT PROJECT			$4,369,239

JANUARY 1990 PRICE LEVELS FOR COSTS
ANNUAL COSTS FOR 75 AND 100 FT PROJECT WERE DEVELOPED
BY ADDING BEACH WIDTH TO ANALYSIS IN YEAR 14 (1992)

DUVAL COUNTY, FLORIDA REEVALUATION REPORT
SUPPLEMENTAL INFORMATION
DAMAGE PREVENTION BENEFIT SUMMARY TABLE
(computed at 8 7/8% & a 50 year project life)

	Annual Expected Damage						
	Structures	Backfill	Armor	Condemned	Mod Structures	Total Damages	Annual Prevented (From 1978)
	Existing Conditions (1978) Shoreline						
Damages	$2,849,600	$276,800	$1,048,000	$105,000	$75,000	$4,354,400	
	+60 Feet of Shoreline						
Damages	$438,300	$67,300	$178,400	$0	$0	$684,000	$3,670,400
Annual Costs							$4,227,948
Net Benefits							-$557,548
	+75 Feet of Shoreline						
Damages	$381,500	$60,500	$166,400	$0	$0	$608,400	$3,746,000
Annual Costs							$4,270,677
Net Benefits							-$524,677
	+100 Feet of Shoreline						
Damages	$328,900	$54,100	$143,800	$0	$0	$526,800	$3,827,600
Annual Costs							$4,369,239
Net Benefits							-$541,639

SUMMARY OF DUVAL COUNTY, FLORIDA ESTIMATED CONSTRUCTION COSTS FOR DETERMINATION OF ANNUAL COSTS IN SECTION 934 STUDY ASSUMING 1978 INITIAL CONSTRUCTION STARTS IN 1992 AND PAST RENOURISHMENT FOLLOW IN SEQUENCE

DUVAL COUNTY, FLORIDA COST ESTIMATES – 60 FOOT PROJECT (10 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost
17.–.–.–	DREDGING – INITIAL CONSTRUCTION (1978 VOLUME) (Primary Offshore Borrow Area)							
17.0.A.–	Mob/Demob	1	Job/ls	$400,000	$400,000	20.00%	$80,000	$480,000
	Monthly Production Rate	155,000	Cubic yards					
17.0.3.–	Hopper Dredging							
17.0.3.B	Excavation and Disposal	1,267,800	Cubic yards	$8.00	10,142,400	20.00%	$2,028,000	$12,170,400
	(Construction Time =	8.2	Months)					
17.0.R.–	Associated General Items							
	Turbidity Mon.	1	Job/ls	$57,300	$57,300	20.00%	$11,500	$68,800
	Subtotal, Construction Costs				$10,599,700			
17.0.Z.–	Contingencies						$2,119,500	
17.–.–.–	Dredging Total:							$12,719,200
30.–.–.–	Planning, Engineering & Design				$848,000	20.00%	$170,000	$1,018,000
31.–.–.–	Construction Management				$742,000	20.00%	$148,000	$890,000
			SUBTOTALS		$12,190,000		$2,438,000	
	TOTAL ESTIMATED FIRST COST OF INITIAL RESTORATION							$14,600,000
	INTEREST AND AMORTIZATION OF INITIAL RESTORATION							$1,314,000

DUVAL COUNTY, FLORIDA COST ESTIMATES – 60 FOOT PROJECT (10 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost
17.–.–.–	DREDGING – INITIAL CONSTRUCTION (1980 VOLUME) (Primary Offshore Borrow Area)							
17.0.A.–	Mob/Demob	1	Job/ls	$400,000	$400,000	20.00%	$80,000	$480,000
	Monthly Production Rate	155,000	Cubic yards					
17.0.3.–	Hopper Dredging							
17.0.3.B	Excavation and Disposal	1,218,000	Cubic yards	$8.00	9,744,000	20.00%	$1,949,000	$11,693,000
	(Construction Time =	7.9	Months)					
17.0.R.–	Associated General Items							
	Turbidity Mon.	1	Job/ls	$55,000	$55,000	20.00%	$11,000	$66,000
	Subtotal, Construction Costs				$10,199,000			
17.0.Z.–	Contingencies						$2,040,000	
17.–.–.–	Dredging Total:							$12,239,000
30.–.–.–	Planning, Engineering & Design				$816,000	20.00%	$163,000	$979,000
31.–.–.–	Construction Management				$714,000	20.00%	$143,000	$857,000
			SUBTOTALS		$11,729,000		$2,346,000	
TOTAL ESTIMATED FIRST COST OF INITIAL RESTORATION								$14,100,000
INTEREST AND AMORTIZATION OF INITIAL RESTORATION								$1,071,000

DUVAL COUNTY, FLORIDA COST ESTIMATES – 60 FOOT PROJECT (10 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost
17.–.–.–	DREDGING – 1986 1ST RENOURISHMENT (1986 VOLUME) (Primary Offshore Borrow Area)							
17.0.A.–	Mob/Demob	1	Job/ls	$400,000	$400,000	20.00%	$80,000	$480,000
	Monthly Production Rate	155,000	Cubic yards					
17.0.3.–	Hopper Dredging							
17.0.3.B	Excavation and Disposal	308,700	Cubic yards	$8.00	2,469,600	20.00%	$494,000	$2,963,600
	(Construction Time =	2.0	Months)					
17.0.R.–	Associated General Items							
	Turbidity Mon.	1	Job/ls	$13,900	$13,900	20.00%	$2,800	$16,700
	Subtotal, Construction Costs				$2,883,500			
17.0.Z.–	Contingencies						$576,800	
17.–.–.–	Dredging Total:							$3,460,300
30.–.–.–	Planning, Engineering & Design				$231,000	20.00%	$46,000	$277,000
31.–.–.–	Construction Management				$202,000	20.00%	$40,000	$242,000
			SUBTOTALS		$3,317,000		$663,000	
TOTAL ESTIMATED FIRST COST OF FIRST RENOURISHMENT								$3,979,000
ANNUAL COST								$181,000

DUVAL COUNTY, FLORIDA COST ESTIMATES – 60 FOOT PROJECT (10 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost
17.–.–.–	DREDGING – 1987 1ST RENOURISHMENT (1987 VOLUME) (Primary Offshore Borrow Area)							
17.0.A.–	Mob/Demob	1	Job/ls	$400,000	$400,000	20.00%	$80,000	$480,000
	Monthly Production Rate	155,000	Cubic yards					
17.0.3.–	Hopper Dredging							
17.0.3.B	Excavation and Disposal	849,800	Cubic yards	$8.00	6,798,400	20.00%	$1,360,000	$8,158,400
	(Construction Time =	5.5	Months)					
17.0.R.–	Associated General Items							
	Turbidity Mon.	1	Job/ls	$38,400	$38,400	20.00%	$7,700	$46,100
	Subtotal, Construction Costs				$7,236,800			
17.0.Z.–	Contingencies						$1,447,700	
17.–.–.–	Dredging Total:							$8,684,500
30.–.–.–	Planning, Engineering & Design				$579,000	20.00%	$116,000	$695,000
31.–.–.–	Construction Management				$507,000	20.00%	$101,000	$608,000
			SUBTOTALS		$8,323,000		$1,665,000	
TOTAL ESTIMATED COST OF FIRST RENOURISHMENT								$9,988,000
ANNUAL COST FIRST RENOURISHMENT								$418,000

DUVAL COUNTY, FLORIDA COST ESTIMATES – START OF NEW RENOURISHMENT 60 FOOT PROJECT (10 MILES) Interest Rate = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost	PERCENT FEDERAL	AMOUNT FEDERAL
17.–.–.–	DREDGING – NEXT RESTORATION AND ADVANCE NOURISHMENT (Primary Offshore Borrow Area)									
17.0.A.–	Mob/Demob	2	Job/ls	$400,000	$800,000	20.00%	$160,000	$960,000	61.6%	$591,400
	Monthly Production Rate	155,000	Cubic yards							
17.0.3.–	Hopper Dredging									
17.0.3.B	Excavation and Disposal	1,672,000	Cubic yards	$8.00	13,376,000	20.00%	$2,675,000	$16,051,000	61.6%	$9,887,400
	(Construction Time =	10.8	Months)							
17.0.R.–	Associated General Items									
	Turbidity Mon.	1	Job/ls	$84,000	$84,000	20.00%	$16,800	$100,800	61.6%	$62,100
	Turtle Monitoring	1	Job/ls	$180,000	$180,000	20.00%	$36,000	$216,000	61.6%	$133,100
	Sand Fencing	33,800	LF	$5.00	$169,000	20.00%	$33,800	$202,800	0.0%	$0
	Planting	33,800	LF	$6.00	$202,800	20.00%	$40,600	$243,400	0.0%	$0
	Subtotal, Construction Costs				$14,811,800					
17.0.Z.–	Contingencies						$2,962,200			
17.–.–.–	Dredging Total:							$17,774,000	60.1%	$10,674,000
01.–.–.–	Lands and Damages (Admin costs)				$10,000	20.00%	$2,000	$12,000	61.6%	$7,400
30.–.–.–	Planning, Engineering & Design				$1,185,000	20.00%	$237,000	$1,422,000	61.6%	$876,000
31.–.–.–	Construction Management				$1,037,000	20.00%	$207,000	$1,244,000	61.6%	$766,300
			SUBTOTALS		$17,044,000		$3,408,000	$20,452,000		
	INTEREST DURING CONSTRUCTION							$820,000	61.6%	$505,100
	TOTAL ESTIMATED COST RENOURISHMENT							$21,272,000	60.3%	$12,828,800
	ANNUAL COST FOR 1992/1993 RENOURISHMENT ASSUMING BASED ON PROJECT YEAR 14 AND 15							$559,000		

DUVAL COUNTY, FLORIDA COST ESTIMATES – 60 FOOT PROJECT (10 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost	PERCENT FEDERAL	AMOUNT FEDERAL
17.–.–.–	DREDGING – COST OF FUTURE RENOURISHMENT (Primary Offshore Borrow Area)									
17.0.A.–	Mob/Demob	1	Job/ls	$400,000	$400,000	20.00%	$80,000	$480,000	61.6%	$295,700
	Monthly Production Rate	155,000	Cubic yards							
17.0.3.–	Hopper Dredging									
17.0.3.B	Excavation and Disposal	748,000	Cubic yards	$8.00	5,984,000	20.00%	$1,197,000	$7,181,000	61.6%	$4,423,500
	(Construction Time =	4.8	Months)							
17.0.R.–	Associated General Items									
	Turbidity Mon.	1	Job/ls	$35,000	$35,000	20.00%	$7,000	$42,000	61.6%	$25,900
	Turtle Monitoring	1	Job/ls	$75,000	$75,000	20.00%	$15,000	$90,000	61.6%	$55,400
	Sand Fencing	48,200	LF	$5.00	$241,000	20.00%	$48,200	$289,200	0.0%	$0
	Planting	48,200	LF	$6.00	$289,200	20.00%	$57,800	$347,000	0.0%	$0
	Subtotal, Construction Costs				$7,024,200					
17.0.Z.–	Contingencies						$1,405,000			
17.–.–.–	Dredging Total:							$8,429,200	57.0%	$4,800,500
01.–.–.–	Lands and Damages (Admin costs)				$10,000	20.00%	$2,000	$12,000	61.6%	$7,400
30.–.–.–	Planning, Engineering & Design				$562,000	20.00%	$112,000	$674,000	61.6%	$415,200
31.–.–.–	Construction Management				$492,000	20.00%	$98,000	$590,000	61.6%	$363,400
			SUBTOTALS		$8,088,000		$1,617,000	$9,705,000		
TOTAL ESTIMATED COST FUTURE RENOURISHMENT WITH FENCING/GRASSING								$9,705,000	57.6%	$5,586,500
TOTAL ESTIMATED COST FUTURE RENOURISHMENT WITHOUT FENCING/GRASS								$9,068,800	61.6%	$5,586,500
TOTAL ANNUAL COST 60 FOOT PROJECT ASSUMING 1978 CONSTRUCTION STARTS 1992								**$4,227,900**		
(Includes annual cost of 1985 maintenance disposal project costs at current price levels = $1,053,000)										

NOTE: ACTUAL ANNUAL COST OF REMAINING WORK STARTING 1992 FOR 36 REMAINING YEARS= $3,903,900

60' - 11.0 mcu

OCTOBER 1990

DUVAL COUNTY, FLORIDA, FROM ST. JOHNS RIVER TO THE DUVAL - ST. JOHNS COUNTY LINE, SHORE PROTECTION PROJECT

SECTION 934 STUDY REEVALUATION REPORT WITH ENVIRONMENTAL ASSESSMENT

to extend periodic beach nourishment at authorized shore protection projects for a period of 50 years from initiation of the project.

US Army Corps of Engineers
Jacksonville District

CESAJ-PD-PC (CESAD-PD-P/25 SEP 90) (1105-2-10b) 2nd End Smith/1698
SUBJECT: Final Report Duval County, Florida, Shore Protection Project, Reevaluation Study

Cdr, Jacksonville District, Corps of Engineers, P.O. Box 4970
Jacksonville, FL 32232-0019 7 November 1990

FOR COMMANDER, SOUTH ATLANTIC DIVISION, ATTN: CESAD-PD-P

1. The revised subject report is forwarded herewith for your review and approval. The responses to SAD comments are enclosed.

2. The Report has been signed by the District Commander.

3. A Letter of Intent has been requested from the local sponsor to show support for the report recommendations. The response will be forwarded.

FOR THE COMMANDER:

A. J. SALEM
Chief, Planning Division

4 Encls
1-2 nc
Added 2 Encls
3. Final Report (10 cys)
4. Response to SAD Comments

DUVAL COUNTY, FLORIDA

SHORE PROTECTION PROJECT

REEVALUATION STUDY

OCTOBER 1990

PREPARED BY

JACKSONVILLE DISTRICT
SOUTH ATLANTIC DIVISION
U.S. ARMY CORPS OF ENGINEERS

DUVAL COUNTY, FLORIDA
SHORE PROTECTION PROJECT
SECTION 934
REEVALUATION STUDY
PERTINENT DATA

PHYSICAL DATA	
Project Length	10.0 Miles
2ND PERIODIC NOURISHMENT FILL QUANTITY	**1,819,000 Cubic Yards**
Borrow Area	7.5 miles offshore
Berm Height	11.0 Feet (MLW)
Beach Width (from Erosion Control Line)	75 Feet*
FUTURE RENOURISHMENT QUANTITIES	**748,000 Cubic Yards**
Nourishment Interval	4 Years
FINANCIAL DATA	
First Cost	
2nd Periodic Nourishment	$15,987,800
Contingencies	3,197,600
Engineering and Design	1,496,000
Construction Management	1,309,000
Lands and Damages (admin. cost)	12,500
Interest During Construction	820,000
TOTAL FIRST COST	**$22,823,000**
Cost of Future Renourishment/(with fencing/grassing)	$ 9,705,500
Cost Future Renourishment/(without fencing/grassing)	$ 9,069,300
Interest Rate	8 7/8 Percent
Annual Cost	
2nd Periodic Nourishment	1,779,100
Future Nourishments	1,654,500
TOTAL ANNUAL COST	**$ 3,433,600**
Benefits	
Storm Damage Reduction	$ 3,772,500
Recreation	2,108,500
TOTAL ANNUAL BENEFITS	**$ 5,881,000**
NET PRIMARY BENEFITS	$ 338,900
NET TOTAL PROJECT BENEFITS	$ 2,447,400
BENEFIT-TO-COST RATIO	1.7

* Project changes, such as changes in berm width from 65 to 75 feet are not implementable under the Section 934 authority. — The previous design was 65' berm at 11.0 MLW.

COST APPORTIONMENT

FEDERAL COST - 2ND PERIODIC NOURISHMENT	Percent	Amount
Fill Behind Erosion Control Line	0.0	$ 0
Initial Restoration	61.6	9,848,500
Contingencies	61.6	1,969,700
Lands and Damages (Dredging)	61.6	7,700
Planning, Engineering, and Design	61.6	921,500
Construction Management	61.6	806,300
TOTAL FEDERAL COST - INITIAL WORK	**61.6**	**$14,059,000**

FEDERAL COST - FUTURE RENOURISHMENT (with fencing/grassing)	**61.6**	**$ 5,979,000**

NON-FEDERAL COST - 2ND PER. NOURISHMENT	Percent	Amount
Fill Behind Erosion Control Line	100.0	$ 0
Initial Restoration	38.4	6,139,300
Contingencies	38.4	1,227,900
Lands and Damages (Dredging)	38.4	4,800
Planning, Engineering and Design	38.4	574,500
Construction Management	38.4	502,700
TOTAL NON-FEDERAL COST - INITIAL WORK	**38.4**	**$ 8,764,000**

NON-FEDERAL COST - **FUTURE RENOURISHMENT** (with fencing/grassing)	38.4	$ 3,727,000

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DUVAL COUNTY, FLORIDA
SHORE PROTECTION PROJECT
REEVALUATION REPORT

INTRODUCTION

1. The authority for Federal participation in the cost of periodic nourishment for the Duval County, Florida shore protection project will expire in December of 1990. This report evaluates the Federal interest in extending Federal participation in the cost of the future nourishment of the Duval County beaches.

PROJECT LOCATION

2. Duval County is located on the upper east coast of Florida within 20 miles of the Florida-Georgia state line. The Duval County shore is a barrier beach with a low tidal marsh with a lagoon behind it. It is separated from the mainland by the Intracoastal Waterway. The County shore is bounded on the north by the Nassau Sound and extends southerly to the St. Johns County line. Below Nassau Sound, the shore is interrupted by Fort George Inlet and the mouth of the St. Johns River. The project area extends about 10 miles south from the south side of the St. Johns River to the St. Johns County line along the Atlantic Ocean shoreline.

3. The Duval County project includes the ocean frontage of the United States Naval Station at Mayport, Kathyrn Abbey Hanna Park, and the towns of Atlantic Beach, Neptune Beach, and Jacksonville Beach. Atlantic Beach, Neptune Beach, and Jacksonville Beach are highly developed with homes, apartment houses, resort motels and condominiums, and concession facilities throughout. Figure 1 shows the location of the Duval County project for shore protection.

STUDY AUTHORITY

4. The Reevaluation report is being prepared according to the authority provided by Section 156 of the Water Resources Development Act of 1976, (Public Law 94-587) as amended by Section 934 of the 1986 Water Resource Development Act (Public Law 99-662). Under this authority, the Chief of Engineers was granted discretionary authority to extend Federal participation in the authorized project to the fiftieth year after the date of initial construction.

5. The 10 miles of the Atlantic shoreline of Duval County between the St. Johns River and the Duval County - St. Johns County line was authorized as a beach erosion control project. The project was authorized by Section 301 of the River and Harbor Act of 1965 (Public Law 89-298) on 27 October and is described in House Document 273/89/1. Section 301 projects are prosecuted under the direction of the Secretary of the Army and supervision of the Chief of Engineers.

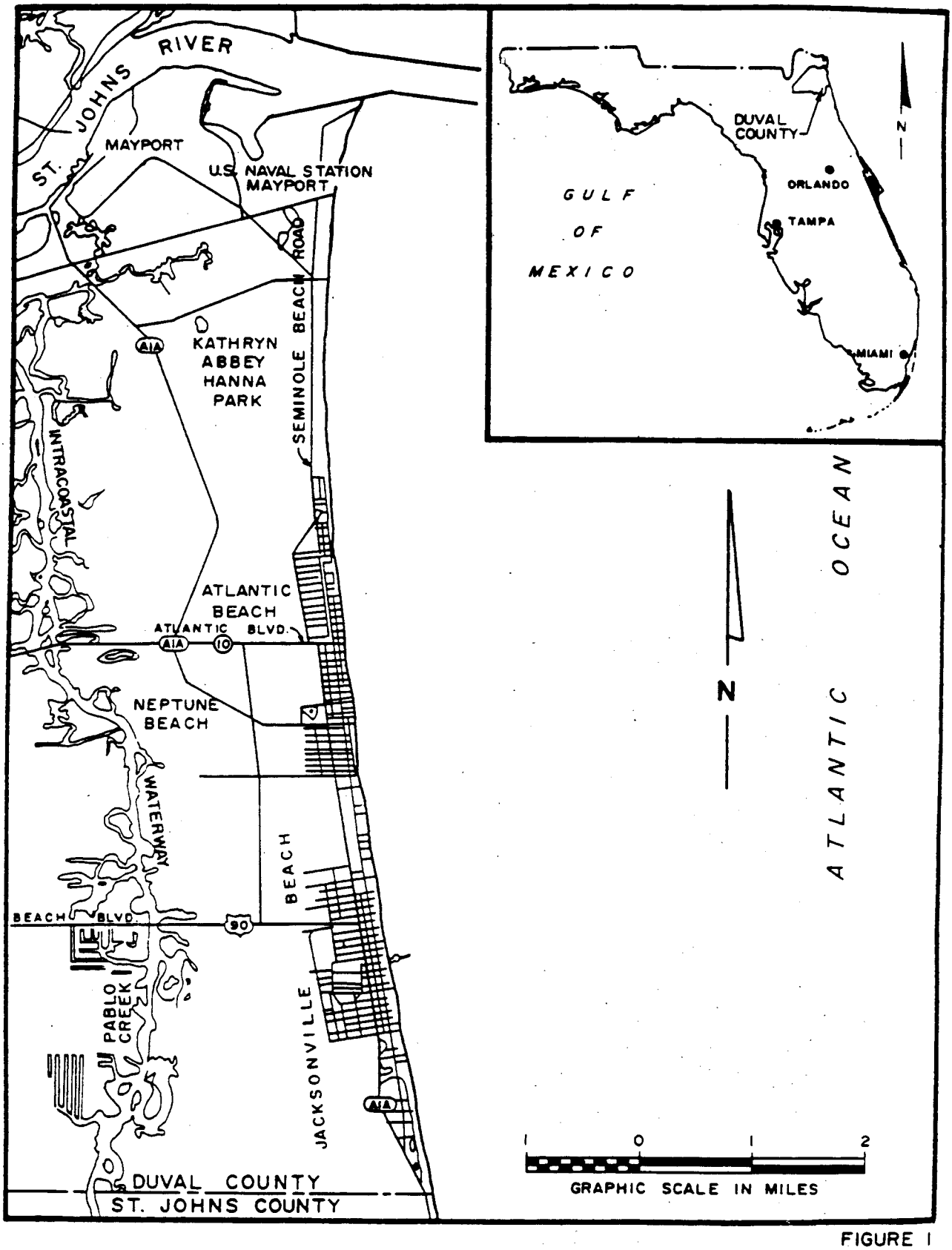

FIGURE 1

LOCATION MAP

6. The original authority provided for the Federal participation in the construction of the initial fill and periodic nourishment for the first 10 years of project life following completion of the initial fill. There were two contracts for the initial fill placement. The initiation of the first contract was in May of 1978. The date of final acceptance for the completed initial fill was in October of 1980. The Federal participation in the project will expire December 31, 1990. The authorization of any time extension by the Chief of Engineers would constitute a new investment decision. This decision requires the prior approval of the Assistant Secretary of the Army for Civil Works ASA(CW). This report, using current Federal criteria, serves as the basis for this new investment decision.

PURPOSE AND SCOPE

7. The objective of this reevaluation report is to demonstrate the economic feasibility of extending Federal participation in beach nourishment for Duval County to 50 years from the date of the initiation of the construction of the project (1978 to 2028), a 38 year period after 1990. Guidelines and management responsibility for accomplishing the report are provided in Engineering Circular 1105-2-172 dated November 17, 1987. The reevaluation will be made using current policies and cost apportionment, and cost sharing will be in accordance with the Water Resources Development Act of 1986.

AUTHORIZED PROJECT

PROJECT AUTHORIZATION

8. The project for the Atlantic shoreline of Duval County from the St. Johns River to the Duval County - St. Johns County line was authorized 27 October 1965 (PL 89-298), and is described in House Document 237/89/1. Figure 2 shows the 1965 authorized project location and typical design section. The Views and Recommendations of the Board of Engineers for Rivers and Harbors, which were the basis of the above authorization, are cited in part verbatim as follows:

"VIEWS AND RECOMMENDATIONS OF THE BOARD OF ENGINEERS AND HARBORS

Views. --The Board of Engineers for Rivers and Harbors concurs in general in the views and recommendations of the reporting officers. The proposed improvements are suitable. They will provide needed protection for the shore development and restoration and continued stability of a beach for public recreation use.

The Board notes that the northerly portion of the area to be improved, constituting about 11 percent of the total shore, consists of the Federal military installation at the Mayport Naval Station. Ordinarily improvement of a military installation would be accomplished separately as a military activity. The recommended

plan, which is the most suitable, in addition to protecting and improving the shore at the Mayport Naval Station, will provide a source of supply of sand at Mayport for continued nourishment of the remainder of the shore to the south. Since the benefits to be derived cannot be confined and furthermore since it would be undesirable to confine them, the improvement and stabilization of the Mayport Naval Station is regarded as desirable as an integral part of the entire plan. ....."

"Recommendations.--Accordingly, the Board recommends the adoption of a project for improvement and protection of the shores of Duval County, Florida, by providing for:

A protective and recreational beach having a level berm 60 feet wide at elevation 11 feet above mean low water and a natural slope seaward as would be shaped by wave action along the 53,000 feet of shore between the St. Johns River jetties and the Duval - St. Johns County line; and

The periodic nourishment by the United States for the first 10 years of project life, after completion of the initial fill placement;

All generally in accordance with the plans of the District Engineer and with such modifications thereof as in the discretion of the Chief of Engineers may be advisable, at the estimated cost to the United States of $2,266,000 (100 percent of the first cost of construction applicable to the Federal shore and 50 percent of the cost applicable to the other publicly owned shore) and $222,000 annually for periodic nourishment: Provided that, prior to construction, local interests furnish assurances satisfactory to the Secretary of the Army that they will:

a. Contribute in cash one-half of the first cost (including contract price, engineering and design, and supervision and administration, and excluding the costs of lands, easements, rights-of-way, and relocations) of all items of work for protection of the non-Federal publicly owned shore to be constructed by the Corps of Engineers, the amount as presently estimated being $1,824,000, 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 costs to be made after the actual costs have been determined;

b. Contribute in cash one-half of the periodic nourishment costs, adjusted in accordance with the degree of Federal navigation benefits for the non-Federal publicly owned shores for the first 10 years of project life, now estimated at $178,000 annually, such contributions to be prior to each nourishment operation;

c. Periodically nourish the non-Federal publicly owned shores as may be required to serve the intended purpose, after the first 10 years and throughout the economic life of the project;

d. Provide without cost to the United States all lands, easements, rights-of way, and relocations required for construction and subsequent nourishment of the project, now estimated at $50,000;

e. Hold and save the United States free from damages that may be attributed to construction and maintenance of the project;

f. Control water pollution to the extent necessary to safeguard the health of bathers; and

g. Furnish assurances satisfactory to the Secretary of the Army that they will maintain continued public ownership of and free access to the shore upon which the amount of Federal participation is based, and its administration for public use during the economic life of the project".

ITEMS OF LOCAL COOPERATION

9. Existing Local Cooperation Agreement. This project was constructed under agreement between the United States Government and the City of Jacksonville, Florida, contract No. DACW17-74-A-0001 dated 22 August 1973 and the supplement to this agreement dated 23 February 1976. The supplemental agreement changed the cost sharing from a 50 percent non-Federal share to a 41.6 percent cash contribution from the non-Federal sponsor. The City agreed to maintain this project during its economic life and provide nourishment at suitable intervals, recognizing the limited 10 years of Federal participation. If project nourishment is required prior to extension of Federal participation, or if the extension of Federal participation is not recommended or approved, the local sponsor would provide this nourishment without Federal participation, as required by the existing contract.

10. Modifications to the Items of Local Cooperation. The Water Resources Development Act of 1986 (Public Law 99-662) specifies new conditions that would modify the existing items of local cooperation as developed from the original authorization. Section 103(c) and 103(d) of Public Law 99-662 specify new cost sharing for water resource projects, including shore protection. Section 103(i) specifies that the non-Federal interests shall provide all lands, easements, rights-of-way, and disposal areas necessary for construction, and perform all necessary relocations. It also states that the value of any of these contributions shall be included in the non-Federal share of the project cost. Section 103(j)1 specifies that a project shall be initiated only after non-Federal interests have entered into binding agreements with the Secretary of the Army to pay 100 percent of the operation, maintenance, and replacement and rehabilitations costs of the project, to pay the non-Federal share of the costs of construction, and to hold and save the United States free form damages due to the construction or operation and maintenance of the project, except for damages due to the fault or negligence of the United States or its contractors. Section 103(j)(2) requires the agreement in Section 103(j)(1) shall be in accordance with the requirements of Section 221 of the Flood Control Act of 1970. Other

the requirements of Section 221 of the Flood Control Act of 1970. Other non-Federal responsibilities are discussed further in the section of the report entitled "Non-Federal Responsibility".

PROJECT HISTORY

PRE-PROJECT HISTORY

11. As early as 1834, the project area suffered extensive instability and erosion. The erosion and damage to the beach, seawalls, and ocean-front property were greatly accelerated and magnified during storms, especially the storms of 1925, 1932, 1947, 1962, and Hurricane Dora in 1964. The 1947 northeast storm destroyed about 5,760 linear feet of concrete seawalls and damaged about 6,800 feet. The beach was lowered as much as five feet. The damages caused by the 1962 storm and Hurricane Dora were so extensive that emergency Federal construction was provided for parts of the project beach that were declared disaster areas. About 7,000 linear feet of granite revetment was provided at Jacksonville Beach and Neptune Beach in 1963; and 25,750 linear feet at Jacksonville Beach, Neptune Beach, and Atlantic Beach were constructed in 1964.

12. By letter of October 19, 1964, the Board of County Commissioners of Duval County concurred with local interest and Corps representatives in the need and desirability of the project and agreed to be the local sponsor of the project. Subsequent to the consolidation of Duval County and the city of Jacksonville in 1967, the consolidated city of Jacksonville became the project's local sponsor. The agreement for local cooperation between the City of Jacksonville and the United States of America was executed on 22 August 1973 by the Mayor of the City of Jacksonville and by the Secretary of the Army in November of 1973. In 1976, the Florida Department of Natural Resources finalized the location of the Erosion Control Line. This line establishes the boundary between public and private controlled lands. The location of the Erosion Control Line, generally along the top of the existing seawalls, was used as the boundary for the nourishment construction.

DESCRIPTIONS OF AUTHORIZED PROJECT STUDY AND REPORT PLANS

13. There have been four studies and/or reports prepared by the Corps of Engineers dealing with the authorization of the project. The original feasibility study, Beach Erosion Control Study on Duval County, Florida (USAED, Jacksonville 1964) was used as the basis for the authorizing document, House Document No. 273. Subsequent to that time, three design memorandums were prepared. Table 1 displays a summary of authorized project costs. A brief description of these reports and their conclusions is as follows.

14. The original feasibility study (USAED, Jacksonville 1964) was prepared to examine the beach erosion and the hurricane-induced flooding problems in Duval County. The study considered several alternative methods of correcting the erosion problems along with a program of artificial restoration and nourishment. These included groins, revetments, and a detached breakwater off the south jetty of the St. Johns River. However, none were as feasible nor would provide as much protection and benefits as restoration and nourishment of a protective beach. The study concluded that the most practical plan of improvement provided for initial beach fill and periodic nourishment for the 10 miles of shore between the St. Johns River jetties and the Duval - St. Johns County line for the first 10 years of project life. The improvement was designed to provide a beach with a level berm 60 feet wide at elevation 11 feet above mean low water. The Federal share of the total cost for the initial beach restoration was determined to be 54.7 percent. The Federal share of the periodic nourishment was 57.7 percent. This was due to the navigation benefits expected from the maintenance dredging sand source from the Federal navigation project at the Jacksonville Harbor. The source of the initial fill was expected to come from borrow areas in the Pablo Creek marshes.

15. The first design report, Duval County Beaches, Florida General Design Memorandum (USAED, Jacksonville 1975) was prepared prior to the initial phase of construction. The 1975 GDM addressed several departures from the authorized project. The sand source for the project construction and future periodic nourishment was changed to reflect an offshore borrow site. Also, due to the establishment of Kathryn Abbey Hanna Park, and the change in the location of the sand source for all beach construction, the Federal participation increased to 58.4 percent for both initial construction and future nourishment.

16. The Duval County Beaches, Florida General Design Memorandum Addendum I (USAED, Jacksonville 1984) describes the performance of the initial beach construction and develops the most effective plan for providing renourishment to the project. This report recommended the addition of sand fences and sea grasses to control wind blown sand in future nourishments.

17. The latest report developed by the Corps of Engineers is the Duval County Beaches, Florida General Design Memorandum Addendum II (USAED, Jacksonville 1989). This report examines areas within the project that are below project dimensions and develops a plan for the renourishment of a portion of the project within Atlantic Beach.

TABLE 1

AUTHORIZED PROJECT COMPARISONS

Original Authorizing Documents:	1964 Prices	Federal Share
(1) Initial Fill First Cost -(3,700,000 cubic yards)-	$4,140,000	$2,266,600 (54.7%)
(2) Periodic Nourishment Annual Costs -(270,000 cubic yards)-	$ 400,000	$ 231,000 (57.7%)
(3) Total Annual Cost	$ 565,000	$ 321,000
Annual Benefits $1,051,000	B/C Ratio 1.9	
1975 General Design Memorandum:	1972 Prices	Federal Share
(1) Initial Fill First Cost -(3,290,000 cubic yards)-	$13,804,000 *(excludes lands)	$8,062,000 (58.4%)
(2) Total Annual Cost	$ 1,581,000	$ 923,000
Annual Benefits $2,392,000	B/C Ratio 1.5	
Actual Cost Initial Construction:	Total	Federal Share
(1) Initial Fill Contract 1 (1978) -(1,267,800 cubic yards)-	$3,816,982	$2,229,100 (58.4%)
(2) Initial Fill Contract 2 (1980) -(1,218,000 cubic yards)-	$4,537,445	$2,649,900 (58.4%)
1984 General Design Memorandum:	1972 Prices	Federal Share
(1) Renourishment Fill Cost -(1,360,000 cubic yards)-	$10,912,200	$6,372,700 (58.4%)
(2) Average Annual Cost	$ 4,058,000	$ 539,000
Annual Benefits $9,025,600	B/C Ratio 2.2	
Actual Cost Renourishment :	Total	Federal Share
(1) Renourishment (1986) -(308,700 cubic yards)-	$ 2,527,800	$1,476,200 (58.4%)
(2) Renourishment (1987) -(849,800 cubic yards)-	$ 5,205,800	$3,040,200 (58.4%)

PROJECT HISTORY

18. Authorization in 1965 provided for initial beach fill and periodic nourishment for 10 miles of the Duval County beaches from the St. Johns River jetties south to the St. Johns County line for the first 10 years of project life. Figure 3 and Figure 4, Project Map 1 and Project Map 2, provide the descriptions of the project nourishments for Duval County. Prior to the initiation of the project and also during the past 10 project years, portions of the beach were also used as disposal areas for maintenance dredged material from the entrance channel of the St. Johns River. This disposal has reduced the nourishment volume required in those areas. Table 2 summarizes the history of the beach nourishment in Duval County from both the offshore sand source and maintenance dredging of the Jacksonville Harbor.

19. The initial nourishment construction was completed in two contracts from 1978 to 1980. The first phase of the initial construction, from May to September of 1978, consisted of placing 1,268,000 cubic yards of sand in a 3.7 mile segment extending from south Hanna Park to Atlantic Boulevard. The Naval Station at Mayport was not included due to the maintenance disposal of sand from the St. Johns River in earlier years. In the second phase of construction, 1.2 million cubic yards of fill was pumped on the beach from Atlantic Boulevard south to the St. Johns County line, about 5 miles. The second contract was completed in October of 1980. The construction profile along the north 3.7 miles to Atlantic Boulevard was comprised of a 145 foot berm from the Erosion Control Line (ECL) at +11 feet MLW and seaward slopes of 1 to 25. The beach south of Atlantic Boulevard was comprised of a 140 foot berm for 2.8 miles south and a 93 foot berm for 2.25 miles to the county line. Seaward slopes were 1 to 20 for both sections. The sand fill for the construction was taken from a borrow site located about 7.3 miles offshore from Hanna Park.

20. The first phase of renourishment of the project beach was accomplished in 1985 with sand from the maintenance dredging of Jacksonville Harbor. Most of this material, about 1.1 million cubic yards, was pumped to Atlantic Beach. The only cost to the project, $1.7 million, was the additional cost to pump the sand to the beach. The first renourishment of the beach south of Atlantic Boulevard was accomplished in two contracts in 1986 and 1987. Figure 4, Project Map 2, describes the locations of the 1986 and 1987 renourishment of the project from the offshore borrow source. The typical construction berm width for the 1986 and 1987 renourishment was 135 feet from the ECL. The original borrow site was used as the sand source.

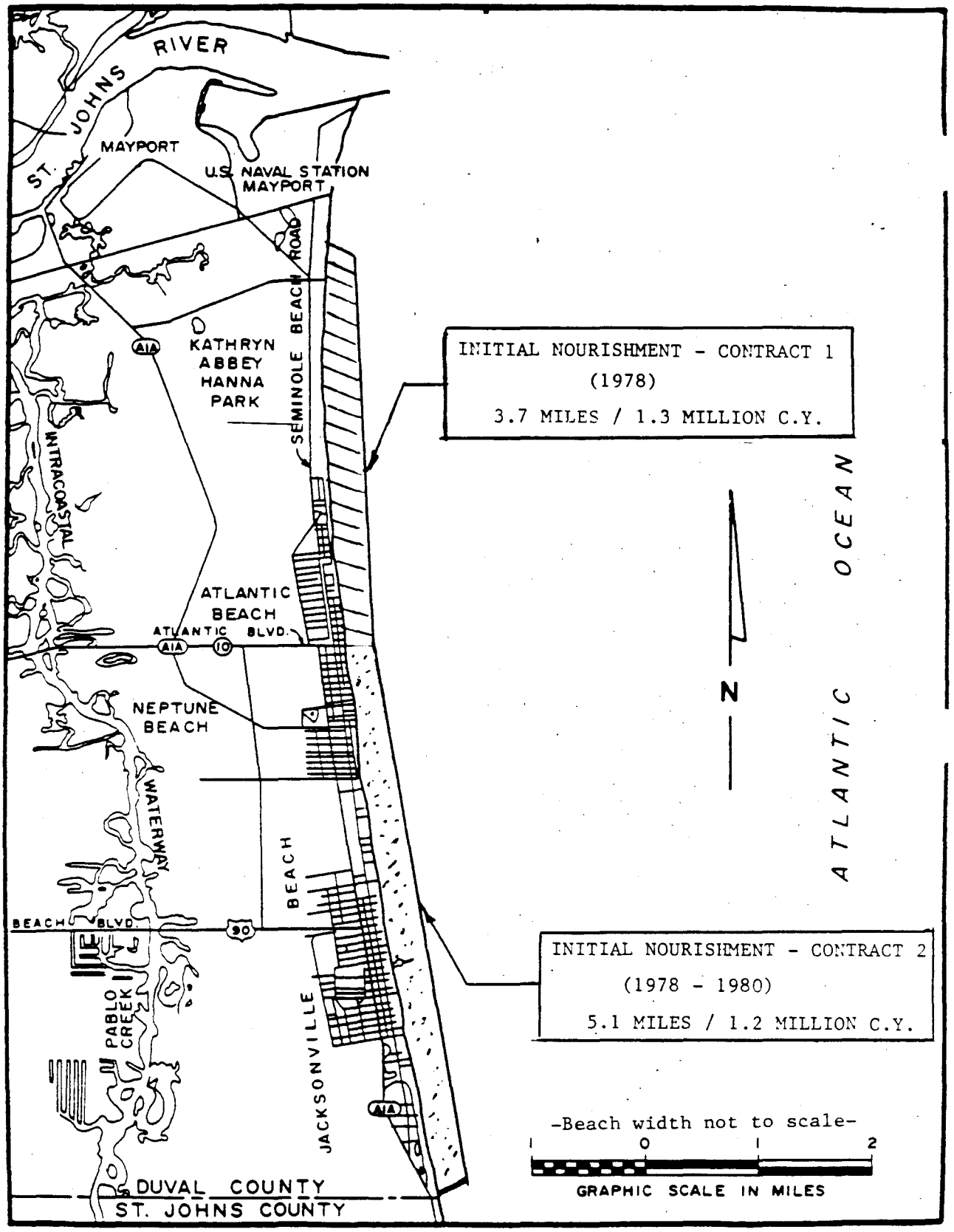

Figure 3

PROJECT MAP 1

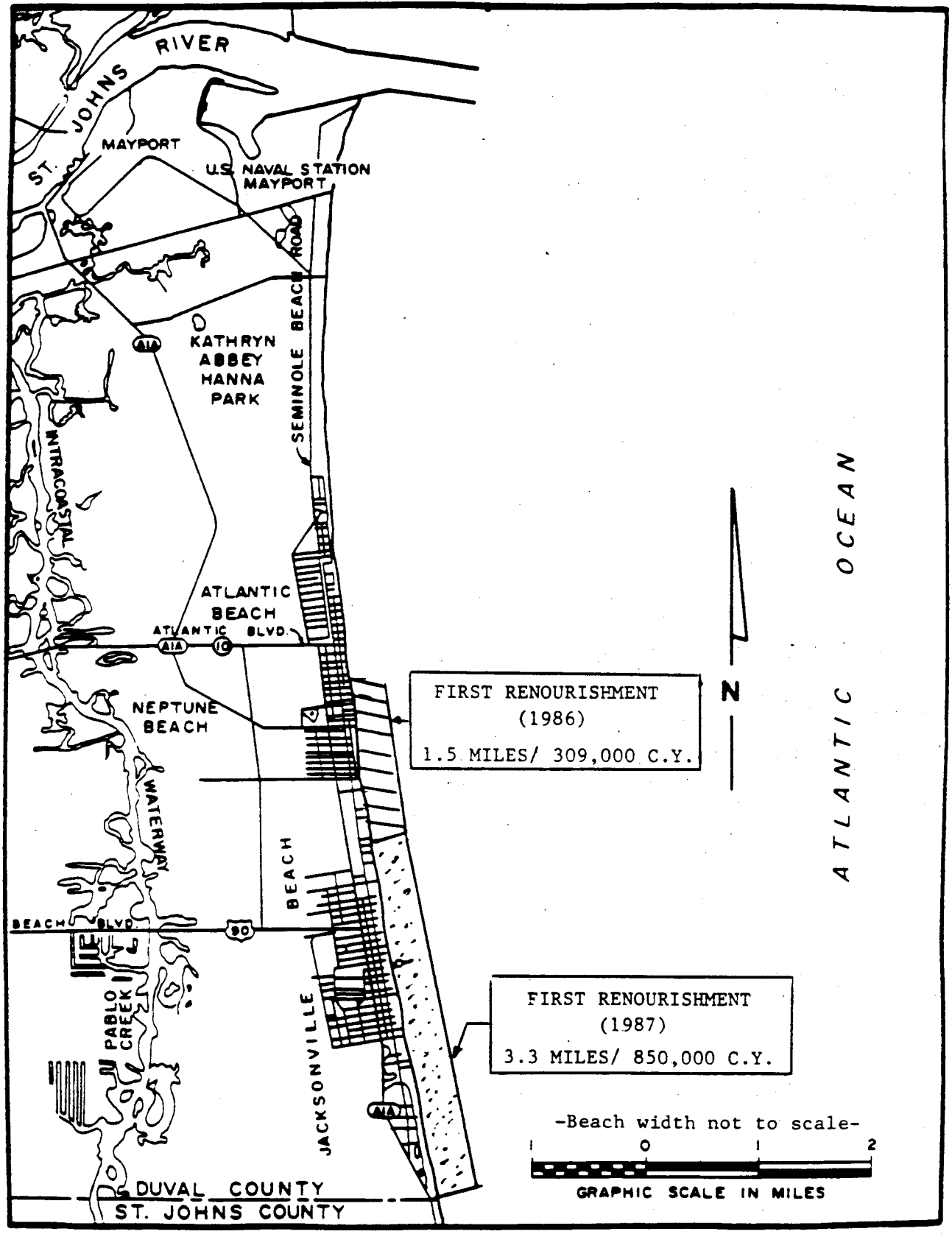

Figure 4

PROJECT MAP 2

TABLE 2

BEACH NOURISHMENT - DUVAL COUNTY BEACHES

(from dredging records unless otherwise specified)

YEAR	PROJECT	VOLUME (c.y.)	LOCATION OF FILL	SAND SOURCE
1963	Inlet Sand Transfer	320,000 *	Jax Beach and Neptune Bch	Not Available
1963	Inlet Sand Transfer	282,000 *	Mayport	"Body of water on Navy property"
1964	Inlet Sand Transfer	120,000 *	Mayport	Mayport Turning Basin
1966	Inlet Sand Transfer	226,300	Mayport	Entrance Channel (Pilot Town Cut)
1966	Inlet Sand Transfer	215,000 *	Mayport	Mayport Entrance Channel
1972	Inlet Sand Transfer	1,611,855	Mayport	Entrance Channel (New Work)
1974	Inlet Sand Transfer	347,300	Hanna Park	Entrance Channel (Pilot Town Cut)
1978	Nourishment	1,267,800	Hanna Park, Atlantic Bch	Offshore
1980	Nourishment	1,218,000	Neptune Beach, Jax Beach	Offshore
1980	Inlet Sand Transfer	822,800	Mayport, Hanna Park	Entrance Channel
1985	Inlet Sand Transfer	1,284,400	Mayport, Atlantic Beach	Entrance Channel (Pilot Town Cut)
1986	Renourishment	308,650	S. Atl. Blvd. for 1.5 mi. (Neptune Bch - N. Jax Bch)	Offshore
1987	Renourishment	849,770	N. Jax Bch - St. Johns Co. (3.3 Miles)	Offshore
1990	Inlet Sand Transfer	660,000 **	Mayport, Hanna Park	Entrance Channel
	TOTAL TO BEACH	9,533,875		

* From 1964 Feasibility Report and 1975 General Design Memorandum for Duval County

** From conversation with North Florida Area Engineer - (559,979 c.y. from Dredge History records)

EARLY EROSION HISTORY

21. The pre-project long term erosion rate was presented in the original authorizing document. The quantity was based on comparative profiles from surveys of 1923 and 1963. The average net changes from the St. Johns River to the St. Johns County line for the period were 191,000 cubic yards erosion landward of the 18-foot depth and 47,000 cubic yards erosion seaward of the 18-foot depth, or a total of 238,000 cubic yards per year of erosion to the 30-foot depth. Volumetric changes based on 1963 survey data required adjustment due to the placement of fill on the beach at Mayport Naval Station, Neptune Beach, and Jacksonville Beach. The total net computed losses for the beach from 1923 to 1963 equal 9,627,000 cubic yards. Adding 603,000 cubic yards for the fill placed in 1963, the total losses for the period of record became 10,230,000 cubic yards. This equated to an average annual erosion rate of 260,000 cubic yards. This included about 90,000 cubic yards annual loss from north Atlantic Beach (previously Seminole Beach) to the south jetty, and 170,000 cubic yards of annual loss from the 1963 boundary of Atlantic Beach south to the cities of Neptune Beach and Jacksonville Beach.

PROJECT PERFORMANCE

22. This section examines the performance of the beach over the past 10 project years. The initial construction profiles were compared with 1989 surveys to find the changes during the project life. This volume was adjusted by the fill amount that was added during the past 10 project years in order to estimate the actual losses. Tables 3 and 3a show the nonadjusted volumetric changes from 1979-1989.

23. The total measured losses since initial construction have been approximately 625,000 cubic yards. Adding the total amount of fill placement, 2,621,500 cubic yards, for both maintenance disposal and project renourishment, the adjusted volumetric loss for the period becomes 3,246,500 cubic yards. This is equivalent to an average annual erosion rate of about 325,000 cubic yards per year. This high annual rate can be explained by the unusual occurrences of Hurricane David (1979), and the northeasters of the 1980, 1981, and 1984 season. These storms created a wave climate more severe than normally would be expected during a time span of this short duration. Also, the maintenance disposal material, 1,463,000 cubic yards, placed within the project beach, is composed of a finer grain sand. This finer material would produce higher initial losses.

24. The total project losses since construction are actually much less when the fill at Mayport is removed from the analysis. The beaches at Mayport have not been nourished with project fill, and they were not part of the initial construction contracts. The volume of project beach lost over the past 10 years has been 2,424,000 cubic yards or about 240,000 cubic yards per year.

TABLE 3

FIRST CONTRACT-INITIAL CONSTRUCTION PROFILE VS 1989 SURVEY

PROFILE	EFFECTIVE DISTANCE (ft)	CROSS-SECTIONAL AREA EROSION (sq.ft.)	CROSS-SECTIONAL AREA ACCRETION (sq.ft.)	* NET CROSS-SECTIONAL CHANGE (sq.ft.)	VOLUME BETWEEN STATIONS (cu.yd.)
PL7A1	780	0	1282	1282	37015
PL7C1	1386	70	825	756	38781
PL8	1164	319	173	-146	-6278
PL8B2	855	2	891	889	28144
PL8B3	813	203	472	269	8106
PL8B	937	373	488	115	3989
PL8A	1001	159	983	823	30501
PL8C	641	225	656	431	10232
PL9	755	196	743	546	15278
PL9B	1049	342	394	53	2039
PL9A1	1141	2540	0	-2540	-107339
PL9D1	840	1266	65	-1201	-37350
PL9D	592	596	489	-107	-2350
PL9E1	555	1105	183	-922	-18935
PL9E	554	950	308	-643	-13183
PL9E2	594	1495	30	-1465	-32225
PL10	811	2098	0	-2098	-63003
PL10A	857	649	290	-359	-11396
PL10B	706	1163	314	-849	-22190
PL10C	797	1754	0	-1754	-51768
PL11	935	1346	24	-1323	-45806
PL11A	858	101	712	610	19385
PL11B	671	1424	122	-1303	-32373
PL12	318	1090	110	-980	-11526

TOTAL LOSSES (cubic yards) -262,249

* The (-) signs in Table 3 indicate areas of erosion.

TABLE 3a

SECOND CONTRACT-INITIAL CONSTRUCTION PROFILE VS 1989 SURVEY

PROFILE	EFFECTIVE DISTANCE (ft)	CROSS-SECTIONAL AREA EROSION (sq.ft.)	CROSS-SECTIONAL AREA ACCRETION (sq.ft.)	NET CROSS-SECTIONAL CHANGE (sq.ft.)	VOLUME BETWEEN STATIONS (cu. yds.)
R-55	2357	493	233	-260	-22697
PL-13	463	486	94	-392	-6722
R-56	469	392	188	-204	-3544
PL-13B	452	417	196	-221	-3700
R-57	563	480	158	-322	-6714
PL-13D	695	570	168	-402	-10348
PL-14	664	444	202	-242	-5951
R-59	713	592	147	-445	-11751
R-60	607	602	105	-497	-11164
PL-14C	371	725	200	-525	-7204
PL-14D	461	661	91	-570	-9722
R-61	437	589	78	-511	-8261
PL-15	379	578	72	-506	-7103
R-62	515	708	37	-671	-12799
PL-15-2	510	664	82	-582	-10983
R-63	356	890	23	-867	-11432
PL-15A	447	697	0	-697	-11539
R-64	872	960	0	-960	-31004
PL-15A3	852	402	156	-246	-7758
PL-15A4	423	509	176	-333	-5217
R-66	484	480	164	-316	-5659
PL-16A	433	318	147	-171	-2742
R-67	461	282	155	-127	-2168
PL-16C	1010	306	135	-171	-6394
R-69	773	321	87	-234	-6695
PL-16F	513	0	104	104	1974
PL-17A	1024	428	0	-428	-16224
R-71	707	506	0	-506	-13240
PL-17C	685	567	67	-500	-12685
PL-17E	803	512	27	-485	-14415
R-73	489	918	0	-918	-16626
PL-18	391	699	0	-699	-10123
R-74	233	883	0	-883	-7604
PL-18-1	495	511	0	-511	-9368
R-75	707	470	34	-436	-11417
PL-18-4	519	241	120	-121	-2326
R-76	471	594	72	-522	-9106
PL-18-6	902	332	115	-217	-7245
R-78	884	271	57	-214	-7003
PL-18A2	464	270	180	-90	-1547
R-79	446	251	118	-133	-2197
PL-18A4	480	275	181	-94	-1671
PL-18A5	382	139	524	385	5440
R-80	133	130	505	375	1840
TOTAL LOSSES (cubic yards)					-362,813

* The (-) sign in Table 3a indicates areas of erosion.

25. The annual erosion losses per linear foot of shoreline, shows the amount of erosion experienced during the given time period and areas of erosion or accretion. Table 4 below summarizes the unit erosion rates adjusted to discount nourishment volumes from 1923 to 1963 and from 1974 to 1989.

TABLE 4

UNIT EROSION RATE
(cubic yards per year-foot)

REACH *	1923-1963	1974-1982	1978-1982	1979-1982	1982-1989	1986-1989
(depth)	-18'	-5'	-5'	-5'	-5'	-6'
Mayport-Hanna Pk	-6.7	-16.5	-8.9	-9.1	----	-----
Atlantic Beach	-4.3	-6.7	-6.4	-8.7	----	-4.4
Atlantic Blvd to Beach Blvd	-3.1	-4.5	-----	-8.1	+0.8	-5.0
Beach Blvd-County line	-2.9	-2.0	-----	-10.0	-9.3	-8.0
Composite	-4.24	-5.0	-7.8	-8.8	-4.1	-5.8

* Reaches are north to south from jetties to St. John County line in approximately 2.5 mile increments of project length.

26. Table 4 describes some of the characteristics of the project area. As shown in the table, there is a general trend of high adjusted erosion in the northern quarter of the project. This could be explained by the fact that the normally southerly littoral sand supply is blocked by the St. Johns River jetties and that finer grain sand has been used to nourish the beach in this area. The pre-project era (1923-1963) erosion from Table 4 clearly indicates this trend. The post project losses appear to be higher because they do not account for the sand seaward of the minus 5 foot contour.

PRESENT CONDITIONS

27. The present conditions of the beach berm and the height of the existing dune were examined. Table 5, on the following page, shows the existing project beach berm width measured as a lineal distance seaward from the Erosion Control line and the elevations of the dune, if existing, south of Mayport from March and June 1989 surveys.

TABLE 5

*(EXISTING CONDITIONS FROM MARCH AND JUNE 1989 SURVEYS)

LOCATION	PROFILE LINE	BERM WIDTH (ft FROM ECL)	AREA UNDER DESIGN	DUNE ELEV (FT MLW)
	-----PL6	200		
MAYPORT	PL6A	200		
	PL7	250		
	-----PL7A	300		
	PL8	150		14
HANNA PK	PL8B	175		14
	-----PL8A	225		14
	PL9	75		14
	PL9B	200		14
	PL9C	250		14
	PL9D	100		14
	PL9E1	60	**********	13
ATLANTIC	PL9E	20	**********	-
BEACH	PL9E2	30	**********	-
	PL10	60	**********	-
	PL10A	20	**********	-
	PL11	30	**********	14
	PL11A	60	**********	14
	PL11B	70	**********	13
ATL. BLVD	-----PL12	0	**********	-
	R-55	90		16
NEPTUNE	R-56	100		13.5
BEACH	R-57	90		14
	R-58	100		15
	-----R-59	80		14
	R-60	70		13
	R-61	75		13
	R-62	70		12
	R-63	30	**********	-
	R-64	10	**********	-
	R-65	90		12.5
	R-66	80		12
BEACH BLVD	R-67	80		13
	R-68	90		12
	R-69	85		12
	R-70	35	**********	-
JACKSONVILLE	R-71	10	**********	-
BEACH	R-72	0	**********	-
	R-73	0	**********	-
	R-74	10	**********	-
	R-75	25	**********	12
	R-76	40	**********	13.5
	R-77	50	**********	13
	R-78	30	**********	14
	R-79	50	**********	17
COUNTY	-----R-80	50	**********	17
LINE				

28. Presently, there are three areas below the authorized project berm width of 60 feet. These include about 1.4 miles within Atlantic Beach, about 0.2 miles within the north part of Jacksonville Beach, and about 1.9 miles in the south part of Jacksonville Beach to the St. Johns County line. The Duval County Beaches, Florida General Design Memorandum Addendum II (USAED, Jacksonville, 1989) was prepared in order to renourish the 1.4 mile section within Atlantic Beach. Addendum II identified the need for 290,000 cubic yards to restore the segment to authorized project dimensions and includes 4 years of advanced nourishment.

DUNE PERFORMANCE

29. Sand fencing and grassing for the formation of a beach dune were justified as a project feature for renourishments of the project (USAED Jacksonville, 1984). Fencing and grassing were added to control wind blown sand losses that were found to be substantial after the initial construction of the project. The elevation of the berm was lowered by 2 feet in many sections of the project one year after the initial construction. Table 6 describes the performance of the fencing and grassing from 1986 to 1989 following the 1986 renourishment. From 1986 to 1989 about 36,000 cubic yards of sand has accumulated above the design profile within this region. This corresponds to a dune formation or sand accretion rate of 1.6 cubic yards per foot per year over the area. The fencing and grassing has performed well in preventing wind blown sand losses, and the formation of the dune has lowered the back beach areas susceptibility to flooding and wave damage.

TABLE 6

CONSTRUCTION PROFILE VS JUNE 1989 SURVEY

PROFILE	EFFECTIVE DISTANCE	DUNE CROSS-SECT. AREA (S.F.)	DUNE VOLUME (CU YRDS)
PL-13	463.0	94.0	1612
R-56	469.0	188.0	3266
PL-13B	452.0	196.0	3281
R-57	563.0	158.0	3295
PL-13D	695.0	168.0	4324
PL-14	664.0	202.0	4968
R-59	713.0	147.0	3882
R-60	606.5	105.0	2359
PL-14C	370.5	200.0	2744
PL-14D	460.5	91.0	1552
R-61	436.5	78.0	1261
PL-15	379.0	72.0	1011
R-62	515.0	37.0	706
PL-15-2	509.5	82.0	1547
R-63	356.0	23.0	303
TOTAL	7652.5 (Ft)	DUNE= 36,110 (CUBIC YARDS)	

DUNE VOLUME PER FOOT (1986-1989) = 4.7 C.Y./FT
DUNE VOLUME PER FOOT PER YEAR = 1.6 C.Y./FT/YR

SAND PERFORMANCE

30. The sand used for the initial construction and renourishments was taken from a borrow area about 7.5 miles offshore. The sand in this area is gray quartz, fine to medium grain, well sorted, and ranges from clean to slightly silty or clayey. Based on data from 1977, the composite phi-mean of the borrow sand is 1.826 (0.282 mm) and the phi-sorting is 0.476. The native beach before the project was generally finer than the borrow sand. The pre-project native beach sand had a phi-mean of 2.38 (0.192 mm) and a phi-sorting of .63. The phi-mean and phi-sorting of the initial nourishment sand in 1983 were 2.4 (0.189 mm) and .85, respectively. The project beach sand redistributed itself back towards the original pre-project gradation during this period of analysis.

PROBLEM IDENTIFICATION

WINDS

31. Wind indirectly causes the littoral transport of sand by generating waves. In Duval County three principal directions account for the dominant energy which is available to move sand. These are the winds from the northeast, east, and southeast. The northeast winds dominate in the generation of waves, due to the long uninterrupted fetch.

WAVES

32. The principal cause of beach erosion is the action of waves which break on a beach and wash sand into the ocean. Waves also cause littoral movement in the alongshore direction as well as the onshore -offshore direction. Because of the general north-south bearing of the Duval County coastline, waves approaching from the north and northeast cause a southerly sand movement and waves from the south and southeast cause a northerly movement. Waves from the east create very little alongshore sand movement. The east coast of Florida experiences seasonal reversals in the direction of littoral drift (south in winter, and north in summer) due to seasonal changes in wave direction.

33. The U.S. Army Engineer Waterways Experiment Station's nearshore wave hindcast data for Duval County is shown in Figure 6. The data reflects waves corrected to 10 meters (32.8 feet) of water. The average significant wave height for all wave directions for the 20-year hindcast period is 0.69 meters (2.26 feet), with the highest significant wave predicted to be 4.62 meters (15.5 feet). The dominant wave energy comes from the northeast to east direction, similar to the distribution of the wind directions. The higher waves are associated with the northeast storms during the fall and winter and the tropical storms, especially hurricanes, associated with the summer-fall seasons.

STATION 135 20 YEARS FOR ALL DIRECTIONS
SHORELINE ANGLE = 348.0 DEGREES AZIMUTH
WATER DEPTH = 10.00 METRES
PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD FOR ALL DIRECTIONS

HEIGHT(METRES)	PERIOD(SECONDS)										TOTAL
	0.0-2.9	3.0-3.9	4.0-4.9	5.0-5.9	6.0-6.9	7.0-7.9	8.0-8.9	9.0-9.9	10.0-10.9	11.0-LONGER	
0. - 0.49	768	891	352	266	681	877	652	60	49	168	4764
0.50 - 0.99	.	411	946	246	119	396	405	96	127	67	5003
1.00 - 1.49	.	.	145	416	116	227	130	52	77	34	1197
1.50 - 1.99	.	.	.	57	149	194	68	18	33	17	536
2.00 - 2.49	.	.	.	.	42	232	58	10	9	6	357
2.50 - 2.99	.	.	.	.	.	19	71	6	2	1	99
3.00 - 3.49	.	.	.	.	.	.	3	12	2	.	17
3.50 - 3.99	.	.	.	.	.	.	.	.	2	.	2
4.00 - 4.49	.	.	.	.	.	.	.	.	.	.	0
4.50 - 4.99	.	.	.	.	.	.	.	.	.	.	0
5.00 - GREATER	.	.	.	.	.	.	.	.	.	.	0
TOTAL	768	1302	1443	985	1107	2135	1387	254	301	293	

AVE HS(M) = 0.69 LARGEST HS(M) = 4.62 TOTAL CASES = 58440

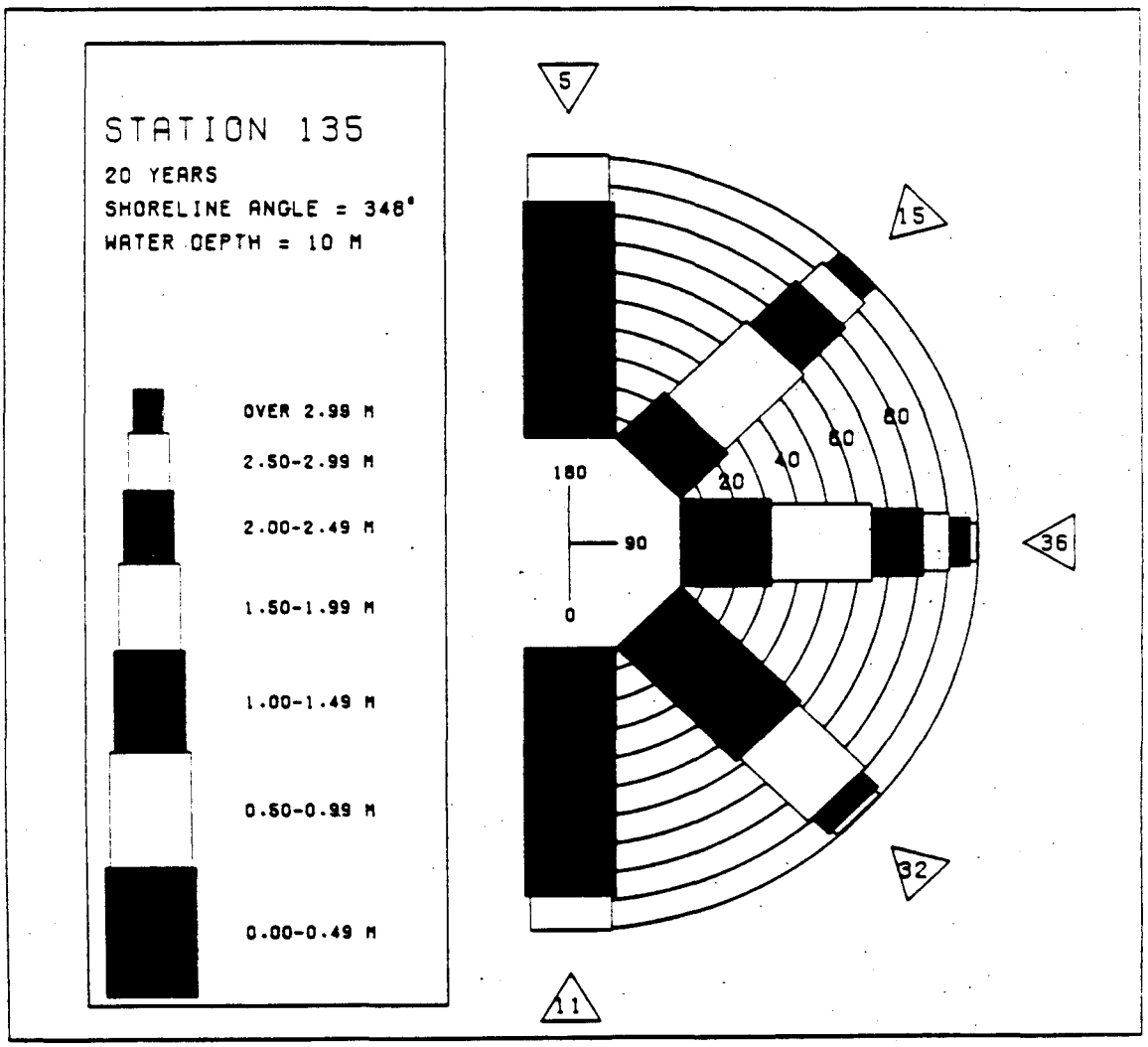

FIGURE 5: WAVE ROSE DIAGRAM

34. Some of the wave data of note include the following. Hurricane David, September 1979, was reported to have a 10.6 foot significant wave height as measured from the Marineland gage 50 miles south of the county. The 1964 feasibility report, the authorizing document, reported that 20-foot waves were reported offshore along the beaches during the 1944 hurricane, and 20 to 30 foot waves were reported offshore during Hurricane Dora in 1964.

TIDES

35. Tides are an important factor in littoral processes. The tide level dictates the point at which a wave approaching shore will break. The mean range of tide in the Duval County beach area is 5.2 feet with about 2.3 feet the difference between mean low water and mean sea level (1960-1978 Epoch). The spring tidal range is from 6.3 feet at Nassau Sound to 5.7 feet at the south jetty.

36. The highest tides occur in association with storms as a combination of wind set-up, barometric pressure set-up and normal tide peaks. The design berm elevation of 11 feet mlw was based on the estimated 1962 storm tide of 7.7 feet above mean low water plus 3.3 feet of runup.

STORM HISTORY

37. Since 1830 a storm of hurricane intensity has passed within 150 miles of Duval County at an average frequency of one every 3 years. During the same period hurricanes have passed within 50 miles of Duval County at an average frequency of one every 7 years. Specific hurricanes and their effects on the shores of Duval County are discussed briefly in the following paragraphs.

-October 13 - 21, 1944. This hurricane originated in the western Caribbean Sea and entered the west coast of Florida near Sarasota. The storm then followed a northeasterly course, passed southeast of Jacksonville into the Atlantic Ocean, and reentered the coast near Savannah. High winds extended 200 miles to the east and 100 miles to the west. Extremely high tides occurred on the southwestern and northeastern coasts of Florida. Storm damages were estimated to be about $63,000,000 in Florida. The shoreline of Duval County south of the St. Johns River eroded landward approximately 150 feet and as much as 3 feet vertically. High-water elevations up to about 10 feet were observed at Jacksonville Beach, undermining the boardwalk and flooding streets as far inland as Third Street.

-September 9 - 11, 1964. Hurricane Dora crossed the shore between St. Augustine and Jacksonville Beach on September 10. Damages were severe in Duval Counties, and the President authorized emergency repair work under Public Law 875. Because of the severe beach loss, 27,750 linear feet of granite revetment was provided for the emergency repair. High tides and waves caused damages to development and protective structures in Duval County of about $4 million. Winds caused very heavy damages to power and communication facilities.

-September 3 - 5, 1979. Hurricane David moved into the Duval County area when the initial construction of the project beach was about 75 percent complete. The maximum significant wave recorded at the Marineland wave gage was 10.6 feet and the maximum tide level recorded at Mayport was 4.9 feet m.s.l. The 11.0 foot m.l.w. authorized berm elevation was overtopped during this storm.

38. Northeasters occur along the east coast of Florida on an annual basis during the fall and winter. In the past such storms have been more damaging than hurricanes mainly because of the longer duration of the storm front. Effects of specific northeast storms are described briefly in following paragraphs.

-The 1932 northeast storm was one of the most severe to occur along the Florida coast. A damage survey made by the Jacksonville District in 1932 indicated that exceptionally heavy damage had occurred from north Florida to Palm Beach. In Duval County the storm was accompanied by unusually high tides (2 feet above normal) and large waves which reached the shore in advance of the high winds. Waves were reported to have reached a greater height than at any time during the preceding 60 years. Many houses were undermined, ramps were destroyed, and many of the timber seawalls were constructed after a 1925 northeaster were destroyed. The elevation of the beach dropped about 3 feet after the storm.

-The 1947 northeast storm began about September 24 and was accompanied by exceedingly high winds and tides and large waves. The storm was exceptional not only for its severity but for its unusual duration. Destruction and erosion during this 13-day storm was estimated at $1,400,000. About 5,760 linear feet of concrete seawalls were destroyed, and 6,800 linear feet were damaged. The beach lowered as much as 5 feet and several dwellings were lost due to the storm.

-The 1962 northeast storm was a severe coastal storm with winds of 60 to 70 miles as hour within 100 miles of the center. (The design beach berm elevation, 11 feet MLW, was based on the storm surge elevation of about 7.7 feet MLW plus 3.3 feet for wave runup. The storm remained within 300 to 500 miles of the Duval County beaches for several days.Sustained northeast winds over a fetch of several hundred miles generated waves over 20 feet high with periods of about 11 seconds in the ocean. When those waves broke in the shallow water near shore, they caused water levels to rise about 7 feet above mean low water. Damages were so severe that the area was declared an emergency disaster area and temporary relief measures were provided with Federal funds. Total damages were estimated at $2,580,000.

39. Since the project was constructed, the northeasters of the 1980 - 1981 seasons and the 1984 "Turkey Day Storm" have had the greatest impact on the project beach. From the Post-Storm Report: The Florida East Coast Thanksgiving Holiday Storm of 21-24 November 1984, Florida Department of Natural Resources (DNR, 1985), it was estimated that the unit erosion rate for Duval County for the "Turkey Day Storm" was between 8 and 12 cubic yards per foot along the beach. The combination of large

waves from the northeast and high tides for several days for these storms resulted in increased erosion of the project beach fills. At least one northeaster of the 1980-1981 season overtopped the project's berm. Table 7 list some of the known characteristics of some of the major storms that have occurred since the project was constructed. The first wave height column in the table are littoral environment observations (LEO) or nearshore observations which were recorded by a district coastal engineer.

TABLE 7

REPRESENTATIVE PROJECT STORMS 1/

Dates	LEO Wave Height Range (Ft.)	Marineland Wave Gage Significant Wave Height (Ft)	Maximum Surge Tide Height (Ft m.s.l.)	Wind Direction
3-5 Sep 79 (Hurricane David)	7.5-8.0	6.7-10.6	4.9	
30 Oct-5 Nov 79	7.0-8.0	4.1-7.7		E
26-27 Dec 80	7.0-9.0			NE
12-16 Feb 81	7.0-9.0			NE
14-17 Oct 81	7.0		3.7-4.66	NE
30 Oct 81-1 Nov 81	8.0		3.59-3.67	NE
20-23 Jan 83	7.0-12.0	6.3-9.3		NE
27-28 Feb 83	10.0-12.0	7.9-8-7		NE

1/ The heights listed are the maximum recorded on a given day.

LITTORAL TRANSPORT

40. The net direction of littoral sand movement is to the south along the Duval County shoreline. The 1984 GDM Addendum 1 reports 2.7 million cubic yards of material has moved to the north and 4.9 million cubic yards of sand has moved to the south during the 20 year period from 1956-1975. According to the 1984 GDM, the estimated net longshore transport rate for the 20 year period from 1956-1975 was 2.2 million cubic yards of sand to the south or 110,000 cubic yards per year. These rates of transport were a function of shoreline orientation and do not account for the sheltering of the St. Johns River entrance and its jetties.

YEARLY DEPTH LIMIT

41. For natural sand beaches, one depth useful in coastal engineering is the yearly limit to the very active nearshore profile. This is the depth beyond which repetitive surveys reveal little sand level change throughout the seasonal wave climate changes. Hallermeier (1978) has developed a procedure for estimating this profile close-out depth, d_s. This depth is based on the approximate extreme wave condition for nearshore significant waves, defined as that to be exceeded for 12 hours per year. For such extreme waves, the following equation is used to calculate d_s:

$$d_s = 2.28\ H_e - 68.5\ (H_e/gT_e^2)$$

where H_e and T_e are equal to the nearshore extreme significant wave height and period, respectively.

42. Review of the hindcast wave statistics for station 57 reveals that waves between 3.0 to 4.0 meters with wave periods between 7.0 to 8.9 seconds occur from the northeast direction. The limiting depth d_s was computed to be from 25 to 28 feet in depth, using a 11-foot and a 12-foot wave with an 8 second period, respectively. This correlates well with comparative profile survey comparisons which indicate merging profiles at depths of from 25 to 30 feet.

SEA LEVEL RISE

43. The National Research Council (NRC) has recently published a book titled Responding to Changes in Sea Level, Engineering Implications (NRC, 1987). The NRC concludes that (1) "The risk of accelerated mean sea level rise is sufficiently established to warrant consideration in the planning and design of coastal works," (2) "Feasibility studies for coastal projects should consider the high probability of accelerated sea level rise," (3) "Present decisions should not be based on a particular sea level rise scenario because of our inability to accurately predict future sea levels at this time," and (4) "...feasibility studies should consider the most appropriate design for a range of possible future rates of rise."

44. The Chief of Engineers recently published policy guidance for incorporating the effects of possible changes in relative sea level in Corps of Engineers feasibility studies (USACOE 1989). A summary of the recommendations contained in this guidance are as follows:

(a) Potential relative sea level change should be considered in every coastal and estuarine feasibility study that the Corps undertakes. The degree of consideration that the possible change receives will depend upon the historical record for the study site. Areas which are already experiencing relative sea level rise or where increases are predicted should undertake an analysis as part of the study. Plans should be formulated using accepted design criteria.

(b) A sensitivity analysis should be conducted to determine what effect (if any) changes in sea level would have on plan evaluation and selection. This analysis should be based on two scenarios as a minimum. The first scenario is the extrapolation of the local, historical record of relative sea level rise (low level). The second scenario is the Curve III prediction of sea level rise published in the NRC report (high level). Curve III was is used as a "high" estimate since it represents a substantial eustatic sea level rise within the range of upper limits established in other studies. The recommended "low" estimate would consist of future sea level conditions assuming a continuation of long-term land elevation change and current rates of sea level rise.

(c) If the plan selection is sensitive to sea level rise, then design considerations could allow for future modification. It may be appropriate to consider plans that are designed for today's conditions but that incorporate features to allow future changes, or plans designed for future conditions. In these cases, an evaluation of the timing (or inclusion at all) and the cost of potential changes should be conducted during the plan selection process.

45. The NRC report presents a mathematical procedure for developing 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:

$$T(t) = (0.0012 + M/1000)t + bt^2 \text{ , where}$$

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

46. The rate of subsidence, M, was obtained from a recent National Oceanic and Atmospheric Administration (NOAA) report (Lyles, Hickman, and Debaugh, 1987). The rate of subsidence for the study area is 1.9 mm/yr. The historic rate was obtained from published sea level trends from NOAA for regions along the United States (Hicks, 1973). The historic trend, or "low" estimate for 1940 through 1971 for the Mayport, Florida is a relative rise of 0.0051 feet per year. This estimate has a standard error of the trend of plus or minus 0.0020 feet per year. Using the equation above, the total "high" estimate of relative sea level rise in feet by the year 2028 would be 1.03 feet based on Curve III data. The historical trend, or "low" estimate of sea level rise from 1990 to 2028 is 0.19 feet based on 0.0051 feet per year.

47. Shoreline Recession-Sea Level Rise. Per Brunn (1962) proposed a formula for computing the rate of shoreline recession from the rate of sea level rise that takes into account local topography and bathymetry. His contention is that with a rise in sea level, the beach profile attempts to reestablish the same bottom depths relative to the surfaces of the sea that existed before the sea level rise. If the along-shore littoral transport into and out of a given shoreline is equal, then the quantity of material required to reestablish the equilibrium bottom profile must be derived from erosion of the shore. The historic estimate of relative sea level rise of 0.19 feet by the year 2028. The shoreline recession attributed to this low estimate of sea level rise along the shore of the study area would be 11 feet, or 0.3 feet per year. The shoreline recession attributed to "high" estimate of sea level rise (1.03 feet) would be 58 feet, or 1.4 feet per year. These recessions were computed using Dr. Brunn's equation (Brunn's rule) as follows:

$$x = ab/(h+d), \text{ where}$$

x = Shoreline recession (in feet) attributable to sea level rise;
h = Elevation of shoreline above Mean Sea Level (+8.7 foot berm);
d = MSL depth contour beyond which there is no significant sediment motion (26.5 feet, yearly depth limit);
b = Horizontal distance (1,975 foot average) from the beach profile berm elevation to the depth contour d;
a = Specified relative sea level rise for time period t.

48. The Brunn 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 should only be 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 shoreline in the study area is a sandy beach. The offshore contours are not entirely straight and parallel. However, Brunn's rule does show the potential order of magnitude in future shoreline changes within the study area attributable to the relative rise in sea level.

49. Shoreline Erosion-Sea Level Rise. It is assumed that an eroding shore maintains approximately the same profile above the seaward limit of significant transport while it erodes. Therefore, the erosion volume per foot of shoreline is the vertical distance from the dune base (+8.7 feet) or berm crest to the depth of the seaward limit of the active profile d_s, multiplied by the horizontal retreat of the profile, $\triangle x$. Using the "low" estimate of shoreline retreat of 11 feet for $\triangle x$, the potential erosion volume would be 0.3 cubic yards per foot of shoreline per year by the year 2028. Using the "high" estimate of shoreline retreat of 58 feet for $\triangle x$, the potential erosion volume would be 1.4 cubic yards per foot of shoreline per year by the year 2028.

50. Surge Levels-Sea Level Rise. One result of long-term relative sea level rise is the increase in storm surge water elevations. Table 8 displays the storm surge elevation frequency data computed by FEMA (Flood Insurance Study, City of Atlantic Beach, Florida, 1989) for the 10 year through 100 year storm events, and the Wave Information Study Report 7 (Ebersole, 1982) data for Mayport for the 5 year storm (adjusted to include high tide). Also displayed is the increase in surge elevations attributed to the "low" and "high" estimates of relative sea level rise by the year 2028. It is evident that the damage potential of storms will become greater as a result of the increase in relative sea level. For example, the FEMA 100-year storm surge level has an elevation of 11.0 feet. By the year 2028, using the "high" estimate of relative sea level rise, the 100-year surge value would increases to a 12.0-foot elevation.

TABLE 8
SUMMARY OF SURGE ELEVATIONS
(Year 2028 Conditions)

	Elevation (feet)				
Item	5-Year[1]	10-Year[2]	20-Year[3]	50-year[3]	100-year[2]
WIS/FEMA (No rise)	5.1	6.6	8.0	9.8	11.0
+"Historic"[4]	5.3	6.8	8.2	10.0	11.2
+"High"[5]	6.1	7.6	9.0	10.8	12.0

1. WIS Report 7 data (1982) for Mayport.
2. FEMA data.
3. Interpolated value.
4. Surge value plus 0.19 feet, based on historic rate (Yr 2028 values).
5. Surge value plus 1.03 feet, based on NRC Curve III (Yr 2028 values).

REAL ESTATE INVESTIGATIONS

51. In May 1989, the Corps' staff appraiser estimated the market value of lands and improvements along the coast of Duval County from Mayport to the St. Johns County line. There are approximately $155.3 million worth of structures and improvements within the front row of development in the project area along the coast. It is estimated that an additional $7.9 million worth of paved roads and street ends are susceptible to storm damages within the project area. The value of property, including structures and street ends used for damages calculations for this report is about $163.2 million.

ENGINEERING DESIGN AND COSTS ESTIMATES

DESIGN CRITERIA

52. The design for the beaches in Duval County was based on a protective beach obtained by restoration and future renourishment. The original feasibility study considered several alternative methods for correcting the erosion problems along with a program of artificial restoration and nourishment. These included groins, revetments, and a detached breakwater off the south jetty of the St. Johns River. However, none were as feasible nor would provide as much protection and benefits as a protective beach obtained by restoration and nourishment.

53. Design Berm Elevation. Since 1978, the project has performed well during storms at this design elevation. Accordingly, the original project berm design elevation of 11.0 mean low water remains the design berm height. Also, the addition of sand fencing and grassing as a project feature to reduce losses by wind blown sand in 1984 has added 2 to 3 feet of elevation creating added incidental storm protection.

54. Beach Width. The nourished or restored beach is constructed on state owned land seaward of the Erosion Control Line. Beach widths of 25 to 100 feet seaward of the Erosion Control Line were analyzed to determine the optimum beach widths.

55. Slope. The material for future beach fills will be dredged from the same borrow source as used in the initial construction of the project in 1978 and the subsequent renourishments of the beach in 1986 and 1987. Therefore, it is assumed for design computation purposes that waves would shape the slope of the beach fill more or less parallel to the face of the original estimated slopes (1 vertical to 20 horizontal from the top of the berm to mean high water, thence 1 vertical to 30 horizontal to mean low water, and finally 1 vertical to 45 horizontal out to closure depth). The slopes of the beach fill will depend on the wave climate during the time of observance. The latest beach surveys from March and June of 1989 indicated that some areas within the project area had a foreshore slope to mean low water of 1 vertical to 30 horizontal. These slopes were probably flatter due to the harsher winter wave climate that was present before the surveys. The slopes of the beach fill used during construction are 1 vertical to 20 horizontal from +11 feet m.l.w. to the depth limits of the construction profile.

56. Nourishment Rate. Additional sand is added to the design volume to match expected erosion losses so that the design project beach width is maintained between nourishments. Future annual erosion rates for the construction volume are based on post-project construction performance. The average volumetric erosion rate from south of Mayport to the St. Johns County line (that portion of the project nourished from the offshore borrow site) since the 1978 nourishment project has been 240,000 cubic yards per year. The total annual losses for the entire length of the project including Mayport has been greater than 300,000 cubic yards per year.

57. Geotechnical Summary. The sand source used for estimating purposes for the fill material is the same as the borrow site used in previous project construction. This site is located about 7.3 miles offshore and is estimated to contain 6 to 8 million cubic yards of beach quality sand. The sand in this borrow area was classified as gray, quartz, fine-to-medium grain, with a trace of shell, clean to silty or clayey. There are three other possible future sources of sand available. These sources which have been either proposed in past reports are require more detailed geotechnical investigation. One possible source is a nearshore site extending south from the St. John's River jetty for one mile. It is estimated to contain two and one half million cubic yards. The other two areas include a site adjacent to and immediately behind the presently used site, and the originally planned borrow source site located about 4.5 miles offshore. The use of the nearshore site has been eliminated to date because of German mining operations during WWII. The originally suggested site for the project was altered to the presently used borrow area due to litigation preventing the use of this area to protect shrimping grounds. These objections might not be valid for future investigations. An adjusted overfill ratio of 10 percent was established for the proposed borrow area located about 7.3 miles offshore in accordance with CERC TM-60 (Dec 1975).

PLAN DESCRIPTIONS

58. Considered Nourishment Plans. The nourishment alternatives considered include 25 to 100 feet berm extensions at +11 feet mean low water seaward of the Erosion Control Line. The volumes shown in the following tables and text are those volumes necessary to complete the section of beach south of Mayport to the St. Johns County line, about 9 miles. The beach at Mayport has never been nourished with the offshore borrow sand. Instead, the beach has been maintained by maintenance dredged material from the entrance channel of the St. Johns River and the Mayport Navy channel. The U.S. Army Corps of Engineers Reconnaissance Report, December 1988, Navigation Study for Jacksonville Harbor, St. Johns River, and IWW, Florida estimated an annual shoaling rate of 380,500 cubic yards of beach quality sand for the entrance channel of the St. Johns River. From 1963 to 1980 2.7 million cubic yards of maintenance dredged material has been placed on the beach at Mayport. The first year of renourishment construction under the new authority is considered 1992 for the alternatives. The 1992 construction is based on placing enough beach fill to restore the design beach width and match expected erosion losses until the next nourishment and includes allowances for overfill. The nourishment intervals were selected by optimizing the annual costs.

59. Cost Estimating Parameters. The cost estimates for the economic analysis are based on an economic life of 38 years, January 1990 price levels, and a directed interest rate of 8 7/8 percent. An interest rate of 10 percent was also used. Table 9 shows the cost estimating parameters used for this report. The method of construction is estimated to be by hopper dredge with pumpout capability.

TABLE 9

SUMMARY OF COST ESTIMATING PARAMETERS

ECONOMIC ANALYSIS PERIOD	= 38 YEARS	MOBILIZATION COST	= $400,000
INTEREST RATE	= 8.875 PERCENT	PRICE PER CUBIC YARD	= $8.00
ANNUAL EROSION RATE	= 240,000 CUBIC YARDS	TURBIDITY MONITORING	= $7,000 / MONTH
OVERFILL FACTOR	= 10.00%	CONTINGENCY	= 20.00%
		E&D, S&A	= 15.00%

MONTHLY PRODUCTION RATE = 155,000 CUBIC YARDS

60. Volumes of Materials. The volume required for each of the considered beach fills is tabulated in Table 10, Summary of Cost Estimates. As indicated in Table 10, the beach fill is comprised of the volume of material required to produce the desired design beach berm width seaward of the Erosion Control Line and includes the advanced nourishment volume. The advance nourishment volume was based on optimizing the annual costs for each plan over several alternative time intervals. An advanced nourishment volume capable of protecting the design cross section for four years was found to provide the most economical protection. The annual erosion rate used for the nine miles of project beach was calculated to be 240,000 cubic yards per year. Table 10 indicates a nourishment rate of 180,000 cubic yards per year to be provided for the estimated 1992 construction. This nourishment rate was reduced due to the amount of maintenance dredged material that was placed in early 1990 at Mayport and Hanna Park (approximately 660,000 cubic yards was dredged from entrance channel of the St. Johns River). The Table also includes annual losses for the two years that are estimated to elapse from 1990 and 1992 until construction can begin. The final volumes for the 1992 and subsequent periodic renourishments include an overfill factor of 10 percent for wave sorting losses. The volumes of fill were determined by superimposing sketches of the various alternative plan profiles on plots of March and June 1989 surveys completed by the Jacksonville District. The volume of future renourishments following the estimated 1992 restoration were calculated by multiplying the nourishment interval, 4 years, times the nourishment rate, 240,000 cubic yards per year.

61. Cost Estimates. Table 10 gives the summary of costs including the total average annual equivalent cost. The construction of the 1992 renourishment is estimated to require two separate contracts over two construction seasons, 1992 and 1993 (the initial construction of the project required two separate contracts to complete the beach fill from 1978 through 1980). For this reason, the costs in Table 10 for the 1992/93 renourishment reflect two mobilization costs. The future renourishment, on the other hand, could be completed within one dredging season. The cost for the future renourishment in Table 10 is the estimated cost for each renourishment following the 1992 construction. The total average annual equivalent costs were calculated using a base year of 1990 and 38 years for the economic life. From the average annual equivalent costs, comparisons were made to the benefits of the each project plan in the Economic Evaluation section of the report to determine the National Economic Development (NED) plan.

TABLE 10

SUMMARY OF VOLUMES AND COST ESTIMATES

(January 1990 Price Levels)

ITEM	25-FT 1/ PROJECT	50-FT 1/ PROJECT	60-FT 1/ PROJECT	75-FT 1/ PROJECT	100-FT 1/ PROJECT
ESTIMATED YEAR OF NEXT RENOURISHMENT (under Sect. 934)	1992	1992	1992	1992	1992
NOURISHMENT INTERVAL (YRS.)	4	4	4	4	4
NOURISHMENT RATE (C.Y./YR.)2/ (for first construction under Section 934 authority)	180,000	180,000	180,000	180,000	180,000
NOURISHMENT RATE (C.Y./YR.) (for all subsequent periodic renourishments)	240,000	240,000	240,000	240,000	240,000
VOLUME OF MATERIALS					
DESIGN FILL (C.Y.)	114,000	240,500	320,000	453,800	762,800
ADVANCE NOURISHMENT (C.Y.)2/	720,000	720,000	720,000	720,000	720,000
1990-1992 EROSION (C.Y.)	480,000	480,000	480,000	480,000	480,000
1992 CONSTRUCTION (C.Y.) -(includes overfill 10%)	1,445,400	1,584,600	1,672,300	1,819,400	2,159,300
FUTURE RENOURISHMENT(C.Y.) -(includes overfill 10%)	1,056,000	1,056,000	1,056,000	1,056,000	1,056,000
COSTS					
COST - 1992/93 RENOURISHMENT 3/	$17,151,000	$18,696,000	$19,670,800	$21,303,600	$25,077,200
INTEREST AND AMORTIZATION OF 1992/1993 WORK	$ 1,282,500	$ 1,398,000	$ 1,470,900	$ 1,593,000	$ 1,875,100
FUTURE RENOURISHMENT COST 4/	$12,276,100	$12,276,100	$12,276,100	$12,276,100	$12,276,100
ANNUAL COST OF RENOURISHMENT	$ 2,251,500	$ 2,251,500	$ 2,251,400	$ 2,251,400	$ 2,251,500
TOTAL AVERAGE ANNUAL EQUIVALENT COST	$ 3,534,000	$ 3,649,500	$ 3,722,300	$ 3,844,400	$ 4,126,600

1/ Berm widths are measured seaward from the state Erosion Control Line.
2/ Advanced nourishment quantity for 1992 construction was reduced due to maintenance dredged material disposal at Mayport and Hanna Park in 1989/1990.
3/ Construction is estimated to take 2 construction seasons to complete.
4/ Cost of each periodic future renourishment following the 1992 renourishment.

ECONOMIC EVALUATION

62. The Duval County Beach project area consists of 10 miles of Atlantic Ocean shoreline. Development in the problem area consists of 416 single family, multi-family, motel/hotel, and commercial buildings along the beach front valued at $155.3 million. Approximately $7.9 million worth of street ends and parking facilities are also susceptable to storm damages. Finally, the beach fronts of Atlantic Beach, Neptune Beach, and Jacksonville Beach have about 33,000 feet of seawalls that vary in length, type, and condition. The value of the seawalls is estimated at $8.5 million, if replaced at current price levels.

PROJECT BENEFITS

63. It is the policy of the Department of the Army to (ER 1165-2-130) to formulate shore protection projects first for the project primary benefits. The primary benefits or project purposes considered for shore protection projects are hurricane and storm damage reduction. Recreation benefits associated with this type of project are considered to be incidental for cost sharing purposes, but they are benefits to be included in the economic analysis. Economic analyses were performed for the Duval County beaches to determine the primary benefits from preventing storm damages. Various levels of shore protection were examined. Also, the plan with the most net storm damage reduction benefits was developed further to determine if adding deflation control (fencing and grassing) would increase the net benefits. The incidental benefits generated by increased recreational usage were determined for the shore protection plan with the most net storm damage reduction benefits. Because the Erosion Control Line is located generally along the top of existing coastal structures or positions were structures would be located, loss of land or shoreline stability benefits were considered insignificant for analysis purposes and were not computed. The benefits were based on shore conditions existing prior to project construction (1978). Optimization of storm damage reduction benefits using current shoreline conditions would in effect be protecting the 1978 project beach. Current market values of real estate were used to compute storm damage benefits. Recreation benefits were based on the benefit analyses in the April 1984 General Design Memorandum Addendum 1 for Duval County Beaches, Florida. The recreation benefits were updated using current price levels to determine average annual recreational benefits. Appendix B, Benefits Summary, expands on the methodology used for determining the storm damage prevention benefits and the recreation benefits.

64. Engineering Regulation 1105-2-40 provides economic evaluation procedures to be used in all Federal water resources planning studies. In particular, the guidance provided by the Water Resources Council (WRC, 1983) must be used. A directed interest rate of 8 and 7/8 percent and an economic period of analysis of 38 years were used in this report. The economic base year is 1990.

DAMAGE PREVENTION BENEFITS

65. Damage prevention benefits were determined by using an empirical computer model developed by the Jacksonville District, defined as the Storm Damage Model or SDM (see Appendix A., Storm Damage Prevention Benefits). The SDM computes the annual equivalent storm damages to buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments, bulkheads, and replacement of lost backfill. The structural values were based on the "market values" as determined by the Jacksonville District staff real estate appraisers and by engineering cost estimates.

66. The assessment of damages to existing development was based on the shore conditions during the 1978 preconstruction beach profile survey as explained under "Project Benefits" of this section. Due to continuing erosion and shoreline recession, future damages to development would be more severe with a given storm. This results in reduced beach width and hence reduced protective value between a structure and the reference (1978) shoreline. Future year damages are simulated in the model by description of the location of the reference shoreline in future years. The location of the reference shoreline is based on the pre-project shoreline recession rate for the problem area. The pre-project shoreline recession rate was developed from the 1975 Corps of Engineers GDM for Duval County Beaches. A recession rate of 2.4 feet per year was used in that portion of the project beach north of Atlantic Boulevard, while a recession rate of 1.2 feet per year was used south of Atlantic Boulevard.

67. Damages were also computed in relation to the existing (1989 shoreline), the location of the 1978 shoreline, and various protective berm width alternatives seaward of the Erosion Control Line. One of the implicit assumptions of the post-project damage to development analysis is that the considered beach nourishment project will maintain or add beach width along the entire profile above the seaward limit of significant transport, and the pre-project profile shape is maintained. Therefore, the beach width from project construction is added directly to the pre-project beach width, and the damages recomputed.

68. The storm damage prevention benefits attributed to the project are the without-project damages for the 1978 pre-project shoreline conditions minus the with-project damages. Table 11 summarizes the annual damages to structures, backfill, and coastal armor along with the values associated with condemned structures and modifications to coastal structures for the 1989 shoreline, 1978 pre-project shoreline, and various alternative berm widths from the Erosion Control Line. The annual damages prevented benefits were computed for the alternative berm width options and for maintaining the shoreline locations of the 1989 and 1978 shoreline. As can be seen from the table, the annual damage prevention benefits for maintaining the 1989 shoreline are approximately equivalent to the benefits of the 1965 authorized project (berm width of 60 feet). This is due to the fact that the 1989 shoreline, although it varies in beach width, generally has about 60 feet of berm width.

TABLE 11

DAMAGE PREVENTION BENEFIT SUMMARY
1978 PRE-PROJECT REFERENCE SHORELINE
(computed at 8 7/8% & a 38 year project life)

Alternative	Annual Expected Damage						Annual Damage Prevented ($)
	Structures ($)	Backfill ($)	Armor ($)	Condemned Struct.($)	Mod Armor($)	Total ($)	
Existing Conditions (1989)	669,100	124,500	369,900	0	64,400	1,227,900	
Without Project Conditions (1978)	2,817,100	275,100	1,033,500	23,600	74,000	4,223,300	
Maintain 1989 Shoreline	416,500	97,300	157,100	0	0	670,900	3,552,400
Maintain 1978 Shoreline	2,026,700	209,000	669,700	0	0	2,905,400	1,317,900
+25 Foot Berm Width	1,113,400	133,400	404,500	0	0	1,651,300	2,572,000
+50 Foot Berm Width	589,200	80,000	199,800	0	0	869,000	3,354,-
+60 Foot Berm Width	438,300	67,300	178,400	0	0	684,000	3,539,300
+75 Foot Berm Width	261,600	48,400	140,800	0	0	450,800	3,772,500
+100 Foot Berm Width	97,900	28,300	67,900	0	0	194,100	4,029,200

PLAN OPTIMIZATION

69. Maximizing net benefits is an economic concept aimed at sizing a project to the point where the greatest excess of benefits over costs occurs. For the purpose of determining the optimum project, shore protection projects that would maintain berm widths of 0 (periodic nourishment only alternative), 25, 50, 60, 75, and 100 feet were considered. Based on maximization of primary benefits, the plan that generates the greatest net primary benefits, is the 75 foot berm width plan. A summary of the considered plans, annual costs, primary annual benefits, and the net annual benefits is displayed in Table 12.

TABLE 12

DUVAL COUNTY, FLORIDA SHORE PROTECTION PROJECT

OPTIMIZATION OF PROJECT

BERM PROJECT WIDTH (Feet)	PERIODIC NOURISHMENT ONLY	25	50	60	75 *	100
Annual Cost						
Beach Fill	$3,429,800	$3,533,900	$3,649,500	$3,722,300	$3,844,400	$4,126,600
PRIMARY BENEFITS						
Storm Damage Prevention Benefits	$1,317,900	$2,572,000	$3,354,300	$3,539,300	$3,772,500	$4,029,200
NET BENEFITS	-$2,111,900	-$961,900	-$295,200	-$183,000	-$71,900	-$97,400
BENEFIT-TO-COST RATIO	0.38	0.73	0.92	0.95	0.98	0.98

*/ Generates the most net primary benefits - the "NED" plan.

BEACH FILL WITH DEFLATION CONTROL ALTERNATIVE

70. The benefits from the addition of sand fencing and grassing for the reduction of wind blown sand or deflation control were determined for the National Economic Development plan (75 foot berm width) from above. The primary benefits from the provision of sand fences and beach grasses are derived from the quantity of sand saved and the ability of the works to provide stability to the berm. Additionally, the formation of dunes will provide some reduction for the back beach areas to the susceptibility to flooding and wave damage.

71. The 1984 GDM estimated by empirical methods that fencing and grassing could reduce the loss of material by deflation in Duval County by 4.0 cubic yards per foot of beach. Table 6 of this report shows the actual performance of the sand fencing and grassing for the 1986 renourishment of the project. The dune volume created within this section of construction was calculated to be about 1.5 cubic yards per foot of beach. This amount, 1.5 cubic yards per foot, was used to calculate the potential reduction in the annual erosion losses for Duval County and to determine the cost/benefits of adding deflation control to the project.

72. For the estimated 1992 restoration of the project, 33,800 linear feet of sand fencing and grassing will be required. This was estimated from subtracting the amount of fencing and grassing placed in the 1990 maintenance disposal at Mayport and Hanna Park, and 3,360 feet of access points to the beach. It is further estimated that 48,200 feet of fencing and grassing will be required every 13 years in order to restore the dunes, fencing, and grassing that will be destroyed by storm induced recession.

73. This 13 year frequency was determined by finding from the Dune model recession versus frequency relationship (see Appendix A., Storm Damage Prevention Benefits, pg. 3) the frequency where the beach recedes halfway into the limits of the fencing and grassing. This frequency, a 20 year event, was used to develop the period of time before the exceedance risk factor was greater than 50 percent. For a period of 13 years, there is approximately a 50 percent chance of occurrence for the 20 year recession or larger event. For the purpose of calculating costs, it was estimated that fencing and grassing would have to be replaced in year 14 and year 26 from 1990 in order to coincide with future periodic nourishment construction intervals.

74. The fencing and grassing is expected to reduce the annual erosion and thus the future advanced nourishment requirements by approximately 70,000 cubic yards per year (48,000 feet X 1.5 cubic yards per foot). The cost of sand fencing and grassing is estimated at March 1990 prices to be $5.00 per linear foot and $6.00 per linear foot, respectively. An annual maintenance cost of $8,000 per year was estimated for upkeep. Table 13 compares the benefits and costs for the 75 foot berm alternative with and without deflation control. The cost for the 1992 fencing and grassing is estimated at $371,800, and for subsequent future renourishments $530,000. The annual cost of the plan with deflation control, reduced for annual erosion losses and with added cost for sand fence and grassing construction, is presently estimated at $3,287,200. As can be seen from Table 13 the net benefits for adding sand fencing and grassing provisions is higher than the without conditions.

TABLE 13

COMPARISON OF 75 FOOT BERM WIDTH PLAN WITH/WITHOUT DEFLATION CONTROL

	75 FT PLAN (no fencing/grassing)	75 FT PLAN (with fencing/grassing)
ANNUAL COST OF FILL	$3,844,400	$3,287,200
PRIMARY BENEFITS	$3,772,500	$3,772,500
NET BENEFITS	-$71,900	$485,300
BENEFIT TO COST RATIO	0.98	1.15

INCIDENTAL RECREATION BENEFITS

75. Recreation benefits are those benefits derived from the availability of beach recreational area and the demand for use of that area by residents and tourists. The 1984 Duval County Beaches, Florida, General Design Memorandum, Addendum 1 was used as the basis to estimate the project recreation benefits. The Benefits Supplement in Appendix B of this report contains extracts from the 1984 GDM with an updated "Travel Cost Method" based on 1988 driving costs and 1989 average wage statistic

The recreation benefits were calculated using a regional model which assumes that beach activity demand attributable to the county can be distributed evenly along the length of the available beach. The average annual recreation benefits attributable to the 75-foot berm width alternative for the beaches in Duval County were computed by amortizing the present worth of the benefits to the project over the 38 remaining project years. The recreation benefits at 8 7/8 and 10 percent interest rates equal $2,108,500 and $1,917,500, respectively.

ENVIRONMENTAL CONSIDERATIONS

76. Renourishing Duval County would serve the public interest by preserving a heavily used public beach from erosion and affording continued protection to shorefront structural improvement from storm-induced waves and surges. In addition, it would preserve beach habitat for sand-dwelling invertebrates and a large population of shorebirds.

77. Animal life directly affected by the project would include the benthic vertebrates associated with the offshore borrow areas and within the reach of beach to be filled. The less motile invertebrates in the borrow area would be destroyed. The borrow area would be left as a pit that would refill with sand and organic particles from dead marine organisms. During recovery a succession of biological communities would inhabitant the site, and within three to four years it would become similar to the surrounding bottom.

78. In the beach fill areas, organisms are capable of upward borrowing and surviving during and after construction. Organisms similar to those destroyed would probably reestablish within 6 to 18 months following completion to the nourishment work.

79. Turbidity caused by dredging and filling operations would result in minor impacts on water quality and biota but would be of a temporary nature, ending with project completion. The same temporary effects would occur during each period of renourishment.

80. Threatened or Endangered Species. The Duval County shoreline, provides nesting habitat for sea turtles. The Fish and Wildlife Service has issued a no jeopardy opinion under the Endangered Species Act provided that every effort be made to schedule dredging before May 30 or after October 5, or if that is not possible, to follow the Service's reasonable and prudent measures to reduce incidental take. The Corps has agreed with these requests. No other listed species is likely to be affected by the project. The National Marine Fisheries Service has said that no listed species under its jurisdiction would be affected by project plans.

81. Cultural Resources. Offshore borrow areas are the same as those previously used. No items of archaeological or historic interests have been located in the proposed borrow areas.

82. Coordination. The proposed action and impacts are essentially the same as that coordinated in the 1974 EIS. The project was coordinated with the U. S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act in 1983 and 1989 with no unresolvable controversies. The FWS and NMFS concurred with the Corps determination of no adverse affect on September 18, 1989 and September 26, 1989, respectively. However, the Corps stipulated that before implementation of any nourishment segment of the Duval County Shore Protection Project, an Environmental Assessment will be prepared, providing updated coordination in compliance with the Coastal Zone Management Act, the Fish and Wildlife Coordination Act, the Endangered Species Act, the Clean Water Act and other applicable Federal and State statutes. Such documentation and the record of updated coordination with concerned Federal and State agencies will be made a part of implementing documents for the renourishments of the Duval County Shore Protection Project. Appendix G is the Environmental Assessment prepared for the Reevaluation Report.

THE RECOMMENDED PLAN

83. The 1965 authorization provided for initial beach fill and periodic nourishment for a 10 mile segment between the south jetty of the St. Johns River and the Duval - St. Johns County line. The authorization recommended a 60-foot protective beach berm width with a berm elevation of 11 feet above mean low water. The authorized beach project in Duval County was constructed in 1978 with subsequent renourishment in 1985 through 1987 as recommended. The authorized project provided for periodic nourishment for project life, but limited Federal participation to 10 years following completion of the initial restoration. The following describes the selected plan for a 38 year extension of Federal participation in beach nourishment of the Duval County beaches as provided for by Section 156, Public Law 94-587 as amended by Section 934, Public Law 99-662. This law provides the Chief of Engineers with the authority to extend Federal participation to the fiftieth year (2028 for the Duval County beaches) after the initiation of construction of the project (1978).

PLAN SELECTION

84. The original 1964 feasibility study, Beach Erosion Control Study on Duval County, Florida was prepared to examine the beach erosion and the hurricane-induced flooding problems in Duval County. The study considered several alternative methods of correcting the erosion problems along with a program of artificial restoration and nourishment. These included groins, revetments, and a detached breakwater off the south jetty of the St. Johns River. However, none were as feasible nor would provide as much protection and benefits as a protective beach obtained by restoration and nourishment. The study concluded that the most practical plan of improvement provided for initial beach fill and periodic nourishment for the 10 miles of shore between the St. Johns River jetties and the Duval - St. Johns County line.

85. This Section 934 study recommends the continuation the periodic nourishment plan as concluded in the original documents. If no periodic nourishment is provided (the "no action plan"), it is estimated that more than $1.2 million annual in damages will occur over the next 38 years. The "no action plan" is unacceptable to the local sponsor. They desire and expect the Corps of Engineers to maintain the authorized project with periodic nourishment for continued shore protection. The continuation of periodic nourishment must be provided under the new cost sharing guidance provided by PL 99-662 with updated plan formulation, costs, and benefits. As required by ER 1105-2-100, alternatives will be determined and evaluated in terms of four accounts: national economic development (NED); environmental quality (EQ); regional economic development (RED); and other social effects (OSE). There are no significant impact differences among the various considered beach sizes relative to the EQ, RED, and OSE accounts. Therefore selection of the proper beach size is based on the NED account with maximization of net primary benefits. The recommended plan for the Duval Shore Protection Project developed from these criteria is the 75-foot berm width plan with provisions for fencing and grassing.

DESCRIPTION OF RECOMMENDED PLAN

86. The recommended plan for the Duval County beaches provides for a 75-foot berm extension seaward from the state established Erosion Control Line. This includes restoration of the protective beach along the 10 mile shoreline and future periodic nourishment at 4 year intervals. Also, the recommended plan will provide fencing and grassing provisions to aid in the reduction of wind blown sand losses as needed. The limits of the beach fill are the same as the 1978 initial construction shown on figure No. 3, page 11.

87. The next restoration of the desired protective beach is estimated to require 1.8 million cubic yards of material. The Engineering Design and Cost Estimates section of this report, Table 10, shows that this volume is comprised of 933,800 cubic yards of design fill (includes 2 years of estimated erosion losses between 1990-1992 before expected construction time), 720,000 cubic yards for 4 years of advanced nourishment, and 10 percent for overfill allowances. After the 1992 construction, it is estimated that 748,000 cubic yards of future periodic nourishment will be required every four years to maintain the beach throughout the project life. Actual quantities of future nourishment would be based on the results of project performance monitoring. The estimated quantity of material to restore the design section was based on March and June 1989 surveys.

88. The cross-sectional configuration of the restored beach would be comprised of seaward slopes shaped by wave action. The original authorizing document estimated slopes of 1V (vertical) to 20H (horizontal) from the top of the berm to mean high water, 1V to 30H to mean low water, and 1V to 45H out to closure. The slope of the beach would not be obtained by grading, but would be allowed to adjust as natural forces dictate. The construction slopes are estimated at 1V to

20H, and the construction berm widths will be determined during preparation of plans and specifications for the project. Figure 7 shows the typical construction section for the 75-foot project berm design.

MODIFICATIONS OF THE AUTHORIZED PROJECT

89. The 1965 authorization provided for initial beach fill and periodic nourishment for a 10 mile segment between the south jetty of the St. Johns River and the Duval - St. Johns County line. The authorized project provided a 60-foot protective berm width with a berm elevation of 11 feet above mean low water. The recommendation for extension of Federal participation is made subject to restoration of a beach berm width of 75 feet with the berm elevation of 11 feet above mean low water. This variation from the originally authorized berm width was based on optimizing net benefits in accordance with the Water Resources Council's (WRC) Economic And Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies as required by ER 1105-2-100. The 1965 authorized berm width design of 60 feet was based on the behavior of the beach berm prior to the severe 1962 northeast storm and on past long and short term seasonal losses and changes, not on optimization guidelines.

SOURCE OF MATERIAL

90. The borrow area for the 1992 restoration and future project renourishments will be the same as the site used in previous project construction. This source is located about 7.3 miles east and offshore of Hanna Park. A detailed study of the borrow area for permitting requirements indicated that approximately 8 million cubic yards of sand is available from this borrow area. By current estimates, approximately 8 million cubic yards of material will be required to continue the renourishment of the project beach through project life (2028). Therefore, a sufficient sand source exists to construct the project and to maintain the restored beach throughout the project life. Other possible sand sources were discussed in the geotechnical summary of the Engineering Design and Costs Estimates section of this report.

CONSTRUCTION

91. Beach nourishment could be accomplished utilizing a hopper type dredge with pumpout capability. Once the fill material is pumped on the beach, it will require minor grading to achieve the desired construction profile. The cost estimate for the project assumes the use of a 3,600 cubic yard hopper dredge with a monthly production rate of 155,000 cubic yards.

92. The estimated time to complete the next renourishment construction is 11.7 months based on the use of one dredge. Based on past work, the next renourishment will be split into two contracts to reduce construction time and to avoid bad weather. Future renourishments will require about 5 months of construction time. These production rates, along with the associated costs, will depend on the number and size of the dredges actually used for the project.

TYPICAL CONSTRUCTION SECTION

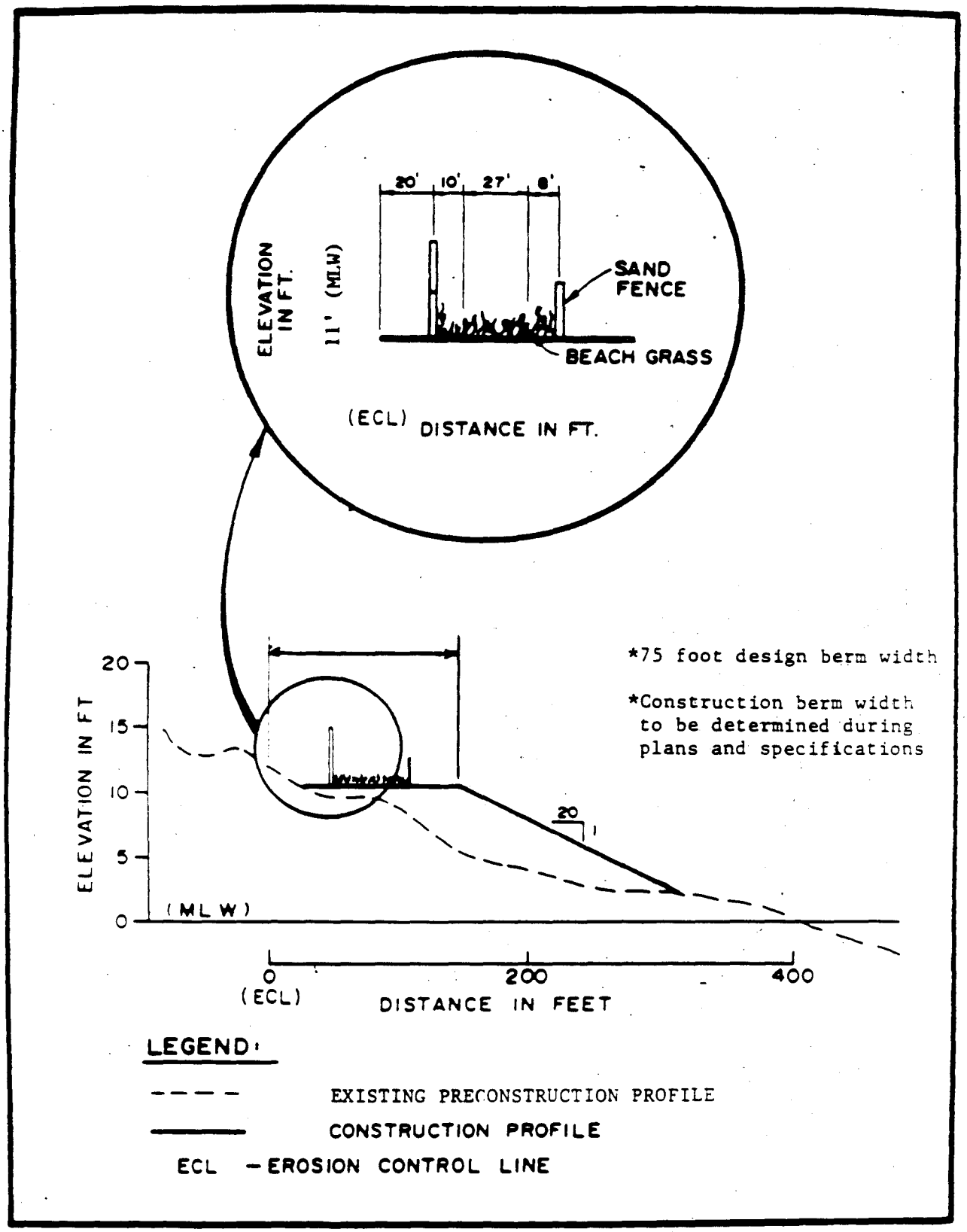

Figure 6

REAL ESTATE REQUIREMENTS AND RELOCATIONS

93. Lands, easements, rights-of-way and relocations (LERR) were provided as part of the initial beach construction. No additional LERR are known to be necessary. If any fill is required landward of the erosion control line, the local sponsor will be required to obtain the necessary appropriate real estate interests.

SCHEDULE FOR PLANS, SPECIFICATIONS, AND CONSTRUCTION

94. The anticipated time for the next renourishment is in Fiscal Year 1992. The construction time for the subsequent renourishments is estimated to proceed in four year intervals after the 1992 restoration. Initiation and completion of the construction schedules are contingent on extension of Federal participation in the authorized project, and subsequent receipt of the Federal and non-Federal funding and permits. Prior to construction, a contract (Local Cooperation Agreement) between the Corps and the non-Federal project sponsor must be executed.

ECONOMICS OF THE RECOMMENDED PLAN

COST ESTIMATES

95. Engineering Circular 1110-2-538 dated 28 February 1989 requires the establishment and consistent use of a standard code of accounts to be used when estimating costs for civil works projects. The cost estimates shown in Table 14 are presented using the standard code of accounts. Cost estimates for engineering and design were prepared by the Engineering Division of the Jacksonville, Florida District Office of the U. S. Army Corps of Engineers. A directed interest rate of 8 and 7/8 percent and 10 percent were used to determine annual cost in Tables 14 and 15. Engineering Circular 11-2-157 dated 31 March 1990 specifies that a discount rate of 10 percent be used when determining the Federal interest in budgeting a project for construction.

96. April 1990 price levels were used for the selected plan cost estimates. The project quantities are based on conditions of the shoreline during the 1989 surveys. To account for the remaining engineering design, supervision and administration of project construction and for contingencies, the estimates include an additional 15 and 20 percent, respectively. Since the project is being constructed along public shoreline, no relocation or disposal area cost, except for some nominal administrative costs, will be required. An easement line is not required. Interest during construction is based on accounting practices from ER 37-2-10, and is computed from the middle of the month in which expenditures are made to the in-service date of the project or separable unit thereof. The in-service date is the first of the month following availability for service. For the Duval County Shore Protection Project interest during construction was calculated for the proposed 1992 construction and is included in Tables 14 and 15. The cost of monitoring the project both during and after construction is included as part of the project cost. Tables 14 and 15 display the estimated cost for: (1) the next beach restoration, (2) future renourishment, (3) the cost of preconstruction planning, engineering and design, and (4) the cost of construction management.

TABLE 14

AL COUNTY, FLORIDA COST ESTIMATES - 75 FOOT PROJECT (10.0 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost	PERCENT FEDERAL	AMOUNT FEDERAL
12.-.-.-	DREDGING - 1992 RESTORATION AND ADVANCE NOURISHMENT (Primary Offshore Borrow Area)									
12.0.A.-	Mob/Demob	2	Job/ls	$400,000	$800,000	20.00%	$160,000	$960,000	61.6%	$591,400
	Monthly Production Rate	155,000	Cubic yards							
12.0.3.-	Hopper Dredging									
12.0.3.B	Excavation and Disposal	1,819,000	Cubic yards	$8.00	$14,552,000	20.00%	$2,910,400	$17,462,400	61.6%	$10,756,800
	(Construction Time =	11.7	Months)							
12.0.R.-	Associated General Items									
	Turbidity Mon.	1	Job/ls	$84,000	$84,000	20.00%	$16,800	$100,800	61.6%	$11,100
	Turtle Monitoring	1	Job/ls	$180,000	$180,000	20.00%	$36,000	$216,000	61.6%	$133,100
	Sand Fencing	33,800	LF	$5.00	$169,000	20.00%	$33,800	$202,800	61.6%	$124,900
	Planting	33,800	LF	$6.00	$202,800	20.00%	$40,560	$243,360	61.6%	$149,900
	Subtotal, Construction Costs				$15,987,800				61.6%	$9,848,500
12.0.Z.-	Contingencies						$3,197,600		61.6%	$1,969,700
12.-.-.-	Dredging Total:							$19,185,400	-61.6%	$11,818,200
01.-.-.-	Lands and Damages (Admin cost)				$10,000	20.00%	$2,500	$12,500	61.6%	$7,700
30.-.-.-	Planning, Engineering & Design				$1,247,000	20.00%	$249,000	$1,496,000	61.6%	$921,500
31.-.-.-	Construction Management				$1,091,000	20.00%	$218,000	$1,309,000	61.6%	$806,300
SUBTOTALS					$18,335,800		$3,667,100	$22,002,900		
INTEREST DURING CONSTRUCTION								$ 820,000		
TOTAL ESTIMATED FIRST COST OF NEXT RESTORATION								$22,823,000	61.6%	$14,059,000
INTEREST AND AMORTIZATION OF NEXT RESTORATION								$ 1,779,100		

TABLE 14 (Continued)

CONTINUATION OF
DUVAL COUNTY, FLORIDA COST ESTIMATES - 75 FOOT PROJECT (10 MILES) INTEREST RATE = 8.875 PERCENT

Account Code	Item	Quantity	Unit	Price/Unit	Total	Contingency Percent	Contingency Amount	Total Cost	PERCENT FEDERAL	AMOUNT FEDERAL
12.-.-.-	DREDGING - COST OF FUTURE RENOURISHMENT (Primary Offshore Borrow Area)									
12.0.A.-	Mob/Demob	1	Job/ls	$400,000	$400,000	20.00%	$80,000	$480,000	61.6%	$295,700
	Monthly Production Rate	155,000	Cubic yards							
12.0.3.-	Hopper Dredging									
12.0.3.B	Excavation and Disposal	748,000	Cubic yards	$8.00	$5,984,000	20.00%	$1,196,800	$7,180,800	61.6%	$4,423,400
	(Construction Time =	4.8	Months)							
12.0.R.-	Associated General Items									
	Turbidity Mon.	1	Job/ls	$35,000	$35,000	20.00%	$7,000	$42,000	61.6%	$25,900
	Turtle Monitoring	1	Job/ls	$75,000	$75,000	20.00%	$15,000	$90,000	61.6%	$55,400
	Sand Fencing	48,200	LF	$5.00	$241,000	20.00%	$48,200	$289,200	61.6%	$178,100
	Planting	48,200	LF	$6.00	$289,200	20.00%	$57,800	$347,000	61.6%	$213,800
	Subtotal, Construction Costs				$7,024,000				61.6%	$4,326,800
12.0.Z.-	Contingencies						$1,405,000		61.6%	$ 865,500
12.-.-.-	Dredging Total:							$8,429,000	61.6%	$5,192,300
01.-.-.-	Lands and Damages (Admin cost)				$10,000	20.00%	$2,500	$12,500	61.6%	$7,700
30.-.-.-	Planning, Engineering & Design				$562,000	20.00%	$112,000	$674,000	61.6%	$415,200
31.-.-.-	Construction Management				$492,000	20.00%	$98,000	$590,000	61.6%	$363,400
					$8,088,000		$1,617,500			
	TOTAL ESTIMATED COST FUTURE RENOURISHMENT WITH FENCING/GRASSING							$9,705,500	61.6%	$5,978,600
	TOTAL ESTIMATED COST FUTURE RENOURISHMENT WI FENCING/GRASSING							$9,069,300	%	$5,586,700
	TOTAL ANNUAL COST OF FUTURE RENOURISHMENT (8 ESTIMATED)							$1,654,500		

97. Interest and Amortization of 1992 Renourishment. Interest and amortization of the next restoration project costs were determined by multiplying the present worth of the 1992 cost by the capital recovery factor for the 38 year project years remaining at 8 and 7/8 and 10 percent interest rates. The estimated cost of the 1992 construction including interest during construction is $22,823,000. Interest and amortization at 8 and 7/8 percent for this amount is $1,779,100.

98. Annual Cost of Future Beach Renourishment. The cost of each renourishment subsequent to the 1992 construction will depend on the amount of fencing and grassing required. It is estimated that the fencing and grassing will have to be replaced during two of the future renourishment cycles. The periods of grassing and fencing replacement were estimated to coincide with project construction during the years 2004 and 2016 (see paragraph no. 73. of the report under the heading "Beach Fill With Deflation Control Alternative"). The estimated cost of renourishment with fencing and grassing is $9,705,500. The cost of the future renourishment without fencing and grassing construction is estimated to be $9,069,300. The sum of the present worths (at 8 and 7/8 percent) of this cost for the construction periods in years 1996, 2000, 2004, 2008, 2012, 2016, 2020, and 2024 is $17,906,100. The average annual cost of these future beach renourishments is the sum of the present worths of the work times the nourishment capital recovery factor for the 38 year period (.092401 for 8 and 7/8 percent) or $1,654,500.

ECONOMIC JUSTIFICATION

99. Table 15 summarizes the economic justification for the recommended extension of Federal participation in the authorized project. Annual costs and benefits for both 8 and 7/8 and 10 percent interest rates are displayed. The benefit-to-cost ratio decreases slightly from 1.7 to 1.6 when the interest rate increases from 8 and 7/8 to 10 percent. Similarly, the total project benefits decrease from $5,881,000 to $5,662,500. The recommended project is the plan that generates the most net benefits, and is designated the National Economic Development (NED) plan.

100. The upper limit effects from possible relative sea level rise on project storm damage prevention benefits were also considered. NRC III data, the "high" estimate curve of the National Research Council's report Responding to Changes in Sea Level, Engineering Implications (NRC, 1987) for the prediction of sea level rise, was used to determine these effects. Storm induced recession values developed from the NRC Curve III data (see Table 2, Appendix A) were used to determine the storm damage prevention benefits with measured sea level rise. The annual prevention of damage to development benefits considering sea level rise and an 8 and 7/8 percent interest rate are estimated to be $5,367,900 with the 75-foot project in place.

101. The projected average annual costs estimated to maintain the design section could increase given the scenario of future sea level rise causing an increase in erosion rates. One problem with estimating future erosion losses is that little is known about the rate at which beach profiles respond to changes in water levels. However, Per Brunn (1962)

proposed a formula for computing the rate of shoreline recession from the rate of sea level rise that takes into account local topography and bathymetry (see "Shoreline Recession-Sea Level Rise" page 27 of report). The computed recession was then used to estimate the erosion volume losses (see "Shoreline Erosion-Sea Level Rise" page 27 of report). Using the "high" estimate the potential erosion volume due to added sea level would be 66,500 cubic yards per year by the year 2028. The total possible average annual erosion for the upper limits of sea level rise would be the sum of 66,500 and the existing rate of 240,000 cubic yards per year or a total of 306,500 cubic yards per year. The annual cost developed from these losses is $4,541,500 at an 8 and 7/8 percent interest rate.

102. The net primary benefits from the effects of sea level rise, is the difference between the storm damage benefits of $5,367,900 and the annual cost of $4,541,500 or $826,400. Given the difficulties in estimating future erosion losses with future sea level rise and the fact that this estimate shows an increase in net primary benefits, it would still take more than 1.5 times the existing erosion rate, 365,000 cubic yards per year, to reduce the net primary benefits to the $287,000 range as in the previous benefit calculations.

TABLE 15

ECONOMIC SUMMARY
FOR
RECOMMENDED PROJECT

ITEM	WITH 75-FT PROJECT */ (8.875%)	WITH 75-FT PROJECT (10.0%)
ANNUAL PROJECT COSTS		
Interest and Amortization		
1992 Beach Restoration	$1,779,100	$1,938,100
Future Beach Renourishment	$1,654,500	$1,603,500
TOTAL ANNUAL COST	$3,433,600	$3,541,600
PRIMARY BENEFITS		
Prevention of		
Damage to Development	$3,772,500	$3,705,000
Total Primary Benefits	$3,772,500	$3,705,000
NET PRIMARY BENEFITS	$ 338,900	$ 163,400
INCIDENTAL BENEFITS		
Recreation Benefits	$2,108,500	$1,917,500
TOTAL PROJECT BENEFITS	$5,881,000	$5,622,500
BENEFIT-TO-COST RATIO	1.7	1.6

*/ From Table 15.

PLAN IMPLEMENTATION

COST ALLOCATION

103. Section 103(d) of the Water Resources Development Act of 1986 (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 103(c) of the Act. These purposes are normally hurricane and storm damage reduction and/or separable recreation, and shared in the same percentages as to the purposes to which the costs are assigned, except that no costs are assigned to incidental recreation. Hurricane and storm damage reduction projects are cost shared at 65 percent Federal, and separable recreation projects are cost shared at 50 percent 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 1165-2-130 dated March 15, 1988. A summary table of shore ownership and level of Federal participation for the 10 mile problem area is displayed in Table 16. Appendix E of the report describes the lot by lot breakdown of the cost allocation for the project.

104. Table 16 shows that the approximately one mile of Federally owned shoreline at the Mayport Naval Base will be cost shared at 100 percent Federal. Normally, non-Federal public shores are dedicated to park and conservation areas. The benefits of protecting such shores are the prevention of recreational output losses. The cost sharing for these benefits is 50 percent Federal and 50 percent non-Federal. Public parks and street ends in the project area are cost shared at 50 percent Federal/non-Federal since the primary project output for this shorefront is recreation. The cost sharing would be 65 percent Federal and 35 percent non-Federal for protection of privately owned shores resulting in public benefits. Protection of undeveloped private lands is a 100 percent local responsibility.

TABLE 16

COST APPORTIONMENT DUVAL COUNTY

SHORE OWNERSHIP AND PROJECT PURPOSE (As defined in ER 1165-2-130)	MAXIMUM LEVEL OF FEDERAL PARTICIPATION IN CONSTRUCTION COSTS	SHORELINE LENGTH (FEET)	PARTICIPATION TIMES LOT WIDTH
I. FEDERALLY OWNED	100.00%	5,840	5,840
II. PUBLICLY AND PRIVATELY OWNED PROTECTION RESULTS IN PUBLIC BENEFITS			
A. Hurricane and Storm Damage Reduction	65.00%	31,052	20,184
B. Loss of Land or Incidental Recreation	50.00%	12,819	6,410
C. Separable Recreation	50.00%	N/A	
III. PRIVATELY OWNED, USE LIMITED TO PRIVATE INTERESTS	0.00%	N/A	
IV. PRIVATELY OWNED, UNDEVELOPED	0.00%	2,928	0
TOTAL 52,639 SHORELINE LENGTH (FEET) WITHIN PROJECT LIMITS	SUM OF COLUMN	52,639	32,434
TOTAL 10 SHORELINE LENGTH (MILES) WITHIN PROJECT LIMITS	THE SUM OF 32,434 DIVIDED BY 52,639 FT =		*61.6%
TOTAL 2,928 NO PUBLIC BENEFIT LENGTH	WHICH IS THE FEDERAL SHARE OF APPLICABLE CONSTRUCTION COSTS		

105. Lands, easements, rights-of-way, and relocations are included in the total costs for cost apportionment but are a non-Federal responsibility. Final apportionment is based on current law and conditions of shore ownership and use at the time of construction or subsequent nourishment.

FEDERAL RESPONSIBILITY

106. If extension of Federal participation is approved, the Corps of Engineers will be responsible for Federal funding and construction of the restoration of the protective beach and subsequent future periodic nourishments. The total cost of the next project construction is $22,823,500. The Federal share of the cost to do this work is presently estimated at $14,059,300 (61.6%). The estimated cost of subsequent periodic nourishments during periods of fencing and grassing construction is $9,705,500 with 61.6 percent, $5,978,600, Federal. Renourishments without fencing and grassing added will cost $9,069,300 with $5,586,700 the Federal share. The Federal cost sharing by project feature is shown in Table 14.

NON-FEDERAL RESPONSIBILITY

107. The non-Federal project sponsor will provide an up-front cash contribution for the next restoration proposed in 1992. The value of this contribution is estimated at $8,764,200 or 38.4 percent of the total project cost defined above. Additionally, all subsequent renourishments will be cost shared by the non-Federal sponsor at 38.4 percent. The non-Federal share of future periodic nourishment is $3,726,900 with fencing and grassing provisions and $3,482,600 without fencing and grassing provisions.

108. The non-Federal project sponsor shall provide all necessary lands, easements, rights-of-way, and dredged material disposal areas required for the project, and perform all necessary relocations. The value of any contributions under the preceding sentence shall be included (credited) in the non-Federal share of the project, as required by Section 103(i) of P.L. 99-662. 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 specific items of local cooperation are listed in the following report section entitled "Recommendations".

LOCAL COOPERATION AGREEMENT

109. Under the provisions of Public Law 99-662, the City of Jacksonville will sponsor the extension of the project through a new Local Cooperation Agreement. A draft Local Cooperation Agreement (LCA) for the project shall be included in the General Design Memoranda for the project, as required by Engineering Regulation 1165-2-131, paragraph 4.f.(1). This agreement will specify the details of the Federal and non-Federal

responsibilities for construction of the project. No Federal commitments relating to a construction schedule or specific provisions of the LCA can be made to the local sponsor on any aspect of this project or separable element until:

(1) The extension of Federal participation is approved by the ASA(CW) and authorized by the Chief of Engineers;

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

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

VIEWS OF THE NON-FEDERAL SPONSOR

110. By letter of May 18, 1988 (see Appendix C), the City of Jacksonville expressed their interests in continuing an agreement with the Federal government to extend the beach renourishment of the project. This agreement would be outlined to the sponsor through a new Local Cooperation Agreement (LCA). The City of Jacksonville will accept the local cost of the project as determined under the provisions of Public Law 99-662. The local project sponsor must furnish a letter indicating that prior to construction, that the sponsor will enter a written agreement, as required by Section 221 of Public Law 91-611, as amended, to provide assurances of local cooperation satisfactory to the Secretary of the Army. Such assurances include the non-Federal cash contribution for project construction and the provision of lands, easements and rights-of-way and relocations.

FINANCIAL ANALYSIS

111. Financial analysis is required for any plan being considered for 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 a reasonable plan for meeting that commitment. The financial analysis includes (1) the non-Federal sponsor's statement of financial capability; (2) the non-Federal sponsor's financing plan; and (3) an assessment of the sponsor's financial capability, to be made by the Corps of Engineers. Prior to finalization of the Local Cooperation Agreement, the local sponsor or it's financial consultant must prepare and submit a financing plan and the statement of financial capability. The statement of financial capability must be signed by the appropriately empowered official representing the sponsor. If a sponsor's financing depends on the contribution of funds by a third party or parties, and the sponsor does not have the capability to meet its financial obligations without said contribution, a separate statement of financial capability and financing plan must also be provided for the contributions for the third party or parties. This must include the source of funds, authority, capability to obtain remaining funds, and evidence of the third party's legal obligation to provide its contribution.

FLOOD PLAIN DEVELOPMENT

112. The selected plan is in the base flood plain (100-year flood) and has been evaluated in accordance with Executive Order 11988. Relocation of the proposed project outside the flood plain would not be responsive to the problems and needs of the study area and was not considered further. A non-flood plain alternative for the potential development with the project would be to restrict all future development to those areas outside the flood plain or elevated above the flood plain. Potential flood plain development with the project would be restricted as a result of local ordinances and State law. Any induced potential damage as a result of project implementation would be minimal. The project would have minimum impact on the natural and beneficial values of the flood plain. In the without project flood plain (that area immediately adjacent to the proposed project), 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.

COASTAL BARRIER RESOURCE ACT

113. The proposed new Federal investment decision for the Duval County shore protection project does not include any recommendations which would result in any new Federal expenditures or financial assistance prohibited by the Coastal Barrier Resources Act (Public Law 97-348); nor were funds obligated in past years for this project for purposes prohibited by this Act.

SUMMARY OF PROPOSED PROJECT MODIFICATIONS

114. The proposed project provides for the continuation of the protective and recreational beach for the 10 miles of shore between the St. Johns River jetties and the Duval County - St. Johns County line. Due to changes in cost sharing laws and regulations regarding plan formulation, the originally authorized plan should be modified to meet current criteria. Table 17 summarizes the proposed project modifications for the continuation of the authorized project.

TABLE 17

SUMMARY OF DUVAL COUNTY PROPOSED PROJECT MODIFICATIONS

Project Modification	Authorized Project	Proposed Project
I. Design Berm Width	60-foot project	75-foot project
II. Federal Cost Sharing	58.4 percent	61.6 percent

CONCLUSIONS

115. I have given consideration to all significant aspects in the overall public interest, including engineering feasibility, economic, social and environmental effects, and congressional intent in the drafting of the 1986 Water Resources Development Act. The modifications to the authorized project described in this report provide the optimum solution for protection of the study area that can be developed within the framework of the formulation concepts and current Federal law, policies, and guidelines.

RECOMMENDATIONS

116. I recommend modification of the authorized project for Duval County, Florida in accordance with the plan selected herein with such modifications as in the discretion of the Chief of Engineers as may be deemed necessary. I further recommend that Federal participation in the cost of the project for protection of the shores of Duval County, Florida be extended from 10 to 50 years. These recommendations are made with the provisions that local interests will:

a. Provide to the United States all necessary lands, easements, rights-of-way, relocations, and suitable borrow and/or disposal areas required for construction and subsequent maintenance of the project, including that required for periodic nourishment.

b. Hold and save the United States free from claims for damages which may result from construction and subsequent maintenance, operation, and public use of the project, except damages due to the fault or negligence of the United States or its contractors.

c. Maintain continued public ownership and public use of the shore upon which the amount of Federal participation is based during the economic life of the project.

d. Maintain and repair the protective measures and/or structures during the economic life of the project as required to serve the intended purposes at their design levels of storm damage protection and in accordance with regulations prescribed by the Secretary of the Army.

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

f. Contribute the local share of periodic beach nourishment, where and to the extent applicable (during the economic life of the project) as required to serve the intended purposes.

Kathryn Abbey Hanna Park. The park is located immediately south of Mayport Naval Station along 7,800 feet of shorefront. The park consists of 450 acres of land with full recreational facilities including parking for 2,200 cars and a 300 unit camping area. The park was acquired by the Consolidated City of Jacksonville in 1970 and developed by 1973.

A survey of visitors to the park at the same time counts were made at five major access points along the project shorefront to the south, was conducted on Sunday, 29 May 1983 to determine the ratio of children under 12 to adult visiting the park and beach attendance. The yearly attendance at the park was 219,690 from June 1982 through May 1983, based upon ticket sales to persons 12 years and older. The 29 May 1983 survey indicted that .37 children per adult sought access that day. The total estimated attendance for the year including children is 300,976 = (219,690 + .37 x 219,690).

Public Access to Project Shorefront. Access to the project shorefront south of Mayport Naval Station is predominantly by car. The major routes to the shorefront in the project area are State Road 10 (Atlantic Boulevard), U.S. Highway 90 (Beach Boulevard), and State Road 202 (J. Turner Butler Boulevard) which run west to east. State Road A1A runs parallel to and generally within 1/4 mile of the shorefront and provides access from the north and south. The Jacksonville Transportation Authority provides scheduled bus service daily on an hourly basis between the city of Jacksonville and Mayport Naval Station. Kathryn Abby Hanna Park, Atlantic Beach, Neptune Beach, and Jacksonville Beach south to 35th Avenue South.

Eighty-five walkways and street ends along the shorefront in August 1983 were visited by District personnel to determine number and spacing along the shore. There are 8 access points from parking lots at Kathryn Abby Hanna Park, 2 walkways and 15 street ends in Atlantic Beach, 21 street ends in Neptune Beach, and a 775-foot-long segment of shorefront for recreational use at Jacksonville Beach, and 43 street ends and walkways in Jacksonville Beach.

Daily Demand

Historical patterns of beach use along the Atlantic coast of Florida can be characterized by user groups. These groups define how annual participation occurs within a given year. Daily attendance within the year reflects the climate or season which affects monthly participation. Daily attendance is also influenced by weekdays and weekends. Daily

RECREATION BENEFITS

Introduction. The estimated recreational benefits attributable to the project were based on updating the 1984 Duval County Beaches, Florida General Design Memorandum, Addendum 1. Those benefits from the 1984 report were determined using procedures based on those prescribed in the Manual of Procedures developed by the Water Resources Council and published in the December 1979 Federal Register (Volume 44, No. 242/Friday, December 1979).

The methodology used in estimating recreation benefits entails determining the total beach visits to Duval County beaches under the "With and Without" Project conditions. The difference of the results of the two analyses establishes beach visitors attributable to the considered words. The with-project condition has been determined to be a 75 foot project berm width seaward from the Erosion Control Line. Based on optimization of storm damage benefits, the without-project condition was determined from pre-project conditions (the project was built in 1978, but the pre-project conditions were based on the 1974 beach as developed in the 1975 Duval County Beaches, Florida General Design Memorandum). Recreation benefits attributable to the considered works were determined by applying a value determined by the travel cost method to the visits attributable to the new beach.

Study Area. As related to analysis of recreation benefits the principal study area is Duval County; however, visitors from other counties in Florida and out of state recreate in Duval County. Out-of-state visitors to the county beaches are generally from the eastern and central parts of the United States and other countries. The specific project area extends along the Atlantic coast of Duval County from the St. Johns River south to the county line, a distance of about 10 miles.

Recreation Resource. The beaches of Duval County are an important recreational resource to northeast Florida. All recreational beach area in Duval County was included to determine the interactive influence of the total county demand for beach use on the project area. Accessibility to the project area beach is based on location of designated access points, available public parking and transportation facilities, and the distance a beach visitor could be expected to walk to enjoy an uncrowded area of beach. It is assumed that visitors arriving by car are willing to walk up to 1/4 mile from an access point to recreate at the beach.

Available Parking. Kathryn Abby Hanna Park currently has 2,200 parking spaces within 1/4 mile of the shorefront. Existing parking within 1/4 mile of access points includes space for 1083 cars along Atlantic Beach, Neptune Beach, and Jacksonville Beach. Full walk-on and public transportation demand were not considered due to the limitations of the recreation model used. Assuming a daily turnover rate of two and with four persons per car, the available parking would provide for 26,300 visitors.

APPENDIX B

RECREATION BENEFITS SUMMARY

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ENVIRONMENTAL ASSESSMENT

SHORE PROTECTION PROJECT REEVALUATION

DUVAL COUNTY, FLORIDA

1.00 Need for and Objectives of Action.

1.01 The proposed action is a consideration of the feasibility of extended Federal participation in the project from 10 to 50 years with modifications, as summarized on page 51 of the Report.

1.02 The shore line of Duval County, Florida is experiencing continuing erosion attributed to a combination of wind and wave patterns, currents and storms. Remedial action is needed to counter loss and to restore the protective beach to reduce potential damage to structures.

1.03 A final E.I.S. was prepared in August 1974. The project was coordinated with the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) under Section 7 of the Endangered Species Act in 1983 and 1989 with no unresolvable controversies. A Scoping letter on the Reevaluation Document was sent to all interested Federal, State and local agencies and individuals on 28 June 1989. No substantive issues were brought forth at that time.

1.04 Description of Project. Initial construction of the authorized project was carried out in two phases. In 1978, 238,500 cubic yards were placed in the southern half of Reach 1, and 1,029,300 cubic yards were placed in Reach 2. From August 1978 to October 1980, Reach 3 received 990,600 cubic yards, and Reach 4 received 618,600 cubic yards. A total of approximately 2,877,000 cubic yards of material was placed during the entire 3-year period. The material was obtained from an offshore sand source located 7.5 miles east of Hanna Park.

1.05 Borrow Area. The offshore borrow area used in previous Duval County beach restoration projects will also be used for the renourishment. The section of the borrow area selected for use is the southern half of the alternate borrow area with the exception of the southeastern corner. At that location the depth of the sand pockets and the presence of some clay precludes the dredging of the area by a hopper dredge.

2.00 Alternatives. Considered alternatives included use of groins, a current deflector at the seaward end of the south jetty and no action.

3.00 Impacts of the proposed action.

3.01 Renourishing Duval County Beach would serve the public interest by preserving a heavily used public beach from erosion and affording continued protection to shore structures from storm-induced waves and tides. In addition, it would preserve beach habitat currently used for nesting by endangered sea turtles and continue to afford habitat for sand-dwelling invertebrates and a large population of shorebirds.

3.02 Animal life directly affected by the project would include the benthic invertebrates associated with the offshore borrow areas and within the reach of beach to be filled. The less motile invertebrates in the borrow area would be destroyed. The borrow area would be left as a pit that would refill with sand and organic particles from dead marine organisms. During recovery a succession of biological communities would inhabit the site, and within three to four years it would become similar to the surrounding bottom.

3.03 In the beach fill areas, organisms are capable of upward burrowing and surviving during and after construction. Organisms similar to those destroyed would probably re-establish within 6 to 18 months following completion of the operation.

3.04 Turbidity caused by dredging and filling operations would result in minor impacts on water quality and biota but would be of a temporary nature, ending with project completion. The same temporary effects would occur during each period of renourishment.

3.05 Threatened or Endangered Species. The Duval County shoreline, provides nesting habitat for sea turtles. The Fish and Wildlife Service has issued a no jeopardy opinion under the Endangered Species Act provided that effort be made to schedule dredging before May 30 or after October 5, or if that is not possible, to follow the Service's reasonable and prudent measures to reduce incidental take. The Corps will select the second option, dredging and disposing on the beach in the summer and employing the specified reasonable and prudent measures. Right whales, which use the area for migration and calving, will not be affected, as the work will not be done during the winter calving season. No other listed species is likely to be affected by the project. The National Marine Fisheries Service has said that no listed species under its jurisdiction would be affected by project plans.

3.06 Cultural Resources. Offshore borrow areas are the same as those previously used. No items of archeological or historic interests have been located in the proposed borrow areas.

4.00 Coordination. The proposed work is essentially the same as that coordinated in the 1974 EIS. State Water Quality certification will be required, and such certification would constitute the State's final concurrence with the project's consistency with the Florida Coastal Management Plan. Any subsequent work must be coordinated with the U. S. Fish and Wildlife Service under the Fish and Wildlife Coordination Act and the Endangered Species Act, as amended, with the National Marine Fisheries Service under the Endangered Species Act, the State Historic Preservation Office and other appropriate Federal, State and local agencies and organizations.

APPENDIX D

REAL ESTATE REQUIREMENTS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9450 Koger Boulevard
St. Petersburg, FL 33702

September 26, 1989 F/SER23:TAH:td

Mr. A. J. Salem
Chief, Planning Division
U.S. Dept. of the Army
Jacksonville District, COE
Post Office Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Salem:

This responds to your September 8, 1989, letter regarding renourishment of the Duval County Beach Erosion Control Project. A Biological Assessment (BA) for renourishment activities submitted in 1983 was incorporated by reference pursuant to Section 7 of the Endangered Species Act of 1973 (ESA).

We have reviewed the BA and concur with your determination that populations of endangered/threatened species under our purview would not be adversely affected by the proposed action. However, you are advised that the U.S. Fish and Wildlife Service (FWS) has jurisdiction over turtles on land, and consultation with them should be initiated. You are also advised that we do not necessarily agree with your conclusion that right whales are "able to avoid collisions with a considerable degree of success." In fact, observations of right whale behavior during dredging of the Kings Bay channel suggest that these animals will not avoid collisions, and their normal behavior may be to confront oncoming vessels. We continue to be concerned with night operations in areas where right whales may be present.

The fact that your work will be performed during summer months decreases the chances of impacting whales. However, it increases the chances of impacting nesting female turtles. It is our understanding that the FWS policy for such activities is that they will be conducted outside of known nesting periods.

This concludes consultation responsibilities under Section 7 of the ESA. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity.

If you have any questions, please contact Dr. Terry Henwood, Fishery Biologist at FTS 826-3366.

Sincerely yours,

Charles A. Oravetz

Charles A. Oravetz, Chief
Protected Species Management
Branch

cc: F/PR2
F/SER1

September 8, 1989

Planning Division
Environmental Resources Branch

Mr. David J. Wesley
Field Supervisor
U.S. Fish and Wildlife Service
3100 University Boulevard South
Suite 120
Jacksonville, Florida 32216-2730

Dear Mr. Wesley:

In accordance with the provisions of Section 7 of the Endangered Species Act, as amended, the following information is provided concerning a reevaluation study of the Federal interest in cost-sharing continued beach renourishment projects for Duval County.

On August 30, 1983 your office concurred (FWS Log No. 4-1-83-217) with CE's "no effect" determination of the project's impact on endangered species under your jurisdiction. We incorporate by reference the earlier biological assessment and supplement it with the following information.

Although the original project would remain unchanged, in the intervening period new measures have been implemented for the protection of sea turtles. The CE will specify the following:

a. Nest relocation activities will begin 65 days prior to nourishment activities which occur within the nesting season (March 1-November 30).

b. Nest surveys and relocations will be conducted by personnel with prior experience and training in nest survey and relocation procedures, and with a valid Florida Department of Natural Resources Permit.

c. Nests shall be relocated between sunrise and 10 a.m. each day, and the relocation will be to a nearby self-release beach hatchery in a secure setting where artificial lighting will not conflict with hatch orientation.

d. If sand compaction is greater than 500 cone penetrometer units on the nourished beaches they will be plowed to a depth of at least 30 inches immediately following completion of beach nourishment.

e. A report describing the actions taken to implement the above will be submitted to the Jacksonville Field Office within 60 days of completion of the proposed project. This report will include dates of actual construction activities, identification of the permitted investigator, description and location of hatcheries, nest survey and relocation results and hatching success of nests.

Based on this information and the unchanged nature of the proposed work, we have determined that there will be no effect on listed species under FWS jurisdiction. We request your concurrence with our determination.

Sincerely,

A. J. Salem
Chief, Planning Division

September 8, 1989

Planning Division
Environmental Resource Branch

Mr. Charles Oravetz
Chief, Protected Species Management Branch
National Marine Fisheries Service
9450 Koger Boulevard
St. Petersburg, Florida 33702

Dear Mr. Oravetz:

In accordance with the provisions of Section 7 of the Endangered Species Act, as amended, the following information is provided concerning the Duval County Beach Erosion Control Project. The Corps of Engineers proposes to renourish a section of Duval County beach that was damaged by the northeastern storms of early 1989. The renourishment area will begin at 19th Street in Atlantic Beach (Station 356+60) and continue south to 2 blocks north of Atlantic Boulevard (Station 270+00). The source of fill will be the borrow site located 7.5 miles offshore and documented in the General Design Memorandum (GDM). Work must be performed during the summer months to take advantage of seasonally calmer seas.

On August 25, 1983 your office concurred with Corps' no effect determination of the nourishment project's impact on endangered species under your jurisdiction. We incorporate by reference the earlier biological assessment and supplement it with the following information.

Although the original project as outlined in the GDM would remain the same, in the intervening period we have become more aware of the increased presence of the right whale in the waters offshore Duval County. Even though the borrow site is greater than 5 miles offshore and within the zone of whale sightings there have been no documented instances in this area of collisions between these animals and barges or ships. This indicates to us that the species is able to avoid collisions with a considerable degree of success.

Based on that knowledge, the slow speed of the vessels to be used in the project, and the small portion of the wintering range to be occupied, we have determined that there will be no effect on listed species under NMFS jurisdiction. We request your concurrence with our determination.

Sincerely,

A. J. Salem
Chief, Planning

Enclosures

United States Department of the Interior
FISH AND WILDLIFE SERVICE
2747 Art Museum Drive
Jacksonville, Florida 32207

August 30, 1983

Mr. A.J. Salem
Chief, Planning Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232

FWS Log No. 4-1-83-217

Dear Mr. Salem:

This responds to your letter of August 16, 1983, pursuant to Section 7 of the Endangered Species Act of 1973, as amended, regarding the periodic nourishment of the Duval County shoreline.

The proposed activity provides for the first periodic nourishment of the Duval County Beach Erosion Control project completed in 1980. Beach nourishment is being considered for selected reaches beginning at the St. Johns River south jetty extending south to the St. Johns County line. Approximately one and one-half million cubic yards of sand material is to be placed along the selected reaches. The proposed borrow area is the site used for the original nourishment in 1980. It is located 7 to 8 miles east of Kathryn Abbey Hanna Park.

The Endangered species evaluated with reference to this project were brown pelican, Arctic peregrine falcon and loggerhead sea turtle.

Based on the information provided in the biological information report, our familiarity with the area, and the precautions that will be taken to eliminate impacts on turtle nests, we concur with the COE's determination of "no effect". We suggest however, that the contractor maintain a record identifying those beaches where turtle nests are removed, and we request a copy of this log at the conclusion of each nesting season.

Although this does not constitute a Biological Opinion described under Section 7 of the Endangered Species Act, it does fulfill the requirements of the Act and no further action is required. If modifications are made in the project or if additional information involving potential impacts on listed species becomes available, please notify our office.

Sincerely yours,

David J. Wesley
Field Supervisor
Endangered Species Field Station

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Region
9450 Koger Boulevard
St. Petersburg, FL 33702

August 25, 1983

Mr. A.J. Salem
Chief, Planning Division
Jacksonville District, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232

Dear Mr. Salem:

This resonds to your August 16, 1983, letter regarding the first periodic nourishment of the Duval County shoreline, Florida. A biological assessment (BA) was transmitted pursuant to Section 7 of the Endangered Species Act of 1973 (ESA).

We have reviewed the BA and concur with your determination that populations of endangered/threatened species under our purview would not be adversely affected by the proposed action.

This concludes consultation responsibilities under Section 7 of the ESA. However, consultation should be reinitiated if new information reveals impacts of the identified activity that may affect listed species or their critical habitat, a new species is listed, the identified activity is subsequently modified or critical habitat determined that may be affected by the proposed activity.

Sincerely yours,

Charles A. Oravetz

Charles A. Oravetz, Chief
Protected Species Management Branch

cc: FWS/Jacksonville, FL

Florida Department of Environmental Regulatio

Twin Towers Office Bldg. ● 2600 Blair Stone Road ● Tallahassee, Florida 32399-24

Bob Martinez, Governor Dale Twachtmann, Secretary John Shearer, Assistant Secre

July 25, 1989

Mr. A. J. Salem, Chief
Planning Division
US Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Salem:

RE: Reevaluation of Duval County, Florida Shore Protection Project

We have no objections to the referenced reevaluation. A permit was issued for this project (#160865099) which expires in November 1989. At the time of permit issuance there were no significant environmental concerns. If additional work is anticipated, it will most likely require a new permit. Duval County requested a permit extension in May, however, it could not be granted due to the provisions of Chapter 17.12.140, Florida Administrative Code. As of this date, a new application has not been received.

Should you have any questions, please call Mickey Bryant, Intergovernmental Coordination Section, at 904-488-1030.

Sincerely,

Gary L. Shaffer
Agency Assistance Coordinator
Office of Agency Assistance
Division of Water Management

GLS/jmw

cc: Paul Johnson
Jerry Owen

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

REPLY TO
ATTENTION OF

Planning Division
Environmental Resources Branch

28 June 1989

TO ADDRESSEES ON ATTACHED LIST

A reevaluation of the Duval County, Florida, Shore Protection Project is underway. This project is outlined in the Final Environmental Impact Statement, Beach Erosion Control Project which was prepared by the Jacksonville District, Corps of Engineers, in August of 1974. The purpose of this reevaluation will be to ascertain if there is sufficient Federal interest to continue in the cost sharing for periodic beach nourishment. Authorized Federal participation was limited to 10 years and will expire in October 1990.

We are requesting your views, comments, and any documentation regarding the environmental impact of this project. Your comments should include both favorable or unfavorable impacts. All comments should be submitted to the above address ATTN: CESAJ-PD-ES by July 28, 1989. The comments received will be included as a supplement to the above report evaluation. Point of contact for this study is Dr. Gerald L. Atmar.

Your response to this letter is of utmost importance to this reevaluation.

Sincerely,

for A. J. Salem
Chief, Planning Division

Attachments

Director
Office of Environmental Compliance
Department of Energy, Room 4G064
1000 Independence Avenue SW.
Washington, D.C. 20585 (2 cys)

Mr. Edward R. Meyer
Federal Maritime Commission
Office of Energy & Environmental Impact
1100 L Street NW.
Washington, D.C. 20005-4013

Mr. Bruce Blanchard, Director
Office of Environmental Project Review
Department of the Interior
Room 4241
18th and C Streets NW.
Washington, DC 20240 (12 cys)

Executive Director
Advisory Council on Historic Preservation
The Old Post Office Building
1100 Pennsylvania Avenue NW.
#809
Washington, D.C. 20004-2590

Florida Audubon Society
1101 Audubon Way
Maitland, Florida 32751-5451

Mr. John Rains, Jr.
Isaak Walton League of America, Incorporated
5314 Bay State Road
Palmetto, Florida 33561-9712

State Clearinghouse
Office of Planning & Budgeting
Executive Office of the Governor
The Capitol
Tallahassee, Florida 32301-8074
(16 cys)

Florida Wildlife Federation
P.O. Box 15917
West Palm Beach, Florida 33416

Field Supervisor
Jacksonville Field Office
U.S. Fish and Wildlife Service
3100 University Boulevard South
Jacksonville, Florida 32216

Bureau of Lab and Sp. Pro.
DER
2600 Blairstone Road
Tallahassee, Florida 32301-8241
(5cys)

Dr. Elaine Harrington
Florida Chapter
Sierra Club
927 Delores Drive
Tallahassee, FL 32301-2929

State Conservationist
Soil Conservation Service
U.S. Department of Agriculture
401 First Avenue SE.
Gainesville, Florida 32601-6816

Seventh Coast Guard District (dpl)
51 SW. 1st Avneue
Miami, Florida 33130-1608

National Marine Fisheries Service
Environmental Assessment Branch
3500 Delwood Beach Road
Panama City, Florida 32407-7499

National Marine Fisheries Service
Office of the Regional Director
9450 Koger Boulevard
St. Petersburg, Florida 33702-24

National Marine Fisheries Service
Chief, Protected Species Management Branch
9450 Koger Boulevard
St. Petersburg, Florida 33702-24

Regional Director
U.S. Fish and Wildlife Service
75 Spring Street SW.
Atlanta, Georgia 30303-3309

Ms. Lynn Stein, Chairperson
Sierra Club
11 Lake Julia Drive South
Ponte Vedra, Florida 32082-9633

The Nature Conservancy
Florida State Office
1331 Palmetto Avenue, No. 205
Winter Park, Florida 32789-4969

National Audubon Society
950 Third Street
New York, New York 10022

Environmental Information Center
of the Florida Conservation
Foundation, Incorporated
1203 Orange Avenue
Winter Park, Florida 32789-4968

National Audubon Society
Southeast Regional Office
Post Office Box 1268
Charleston, South Carolina
29402-1268

Director
Jacksonville Planning Department
128 East Forsyth Street
Suite 700
Jacksonville, Florida 32202

Coordinator
Environmental Impact Statement
Environmental Protection Agency
1421 Peachtree Street NE.
Atlanta, Georgia 30309 (9 cys)

Regional Shellfish Consultant
Food and Drug Administration
60 Eighth Street, NE.
Atlanta, Georgia 30309

Deputy Assistant Secretary
for Environmental Affairs
U.S. Department of Commerce
Washington, D.C. 20230 (6 cys)

Environmental Review Section
EPA, Region IV
345 Courtland Street NE.
Atlanta, Georgia 30365-2401 (5

Ms. Joyce M. Wood, Director
Office of Ecology & Conservation
Department of Commerce
Room 5813 (PP/EC)
14th and Constitution Avenue NW.
Washington, D.C. 20230-0001
(4 cys)

REAL ESTATE SECTION
DUVAL COUNTY, FLORIDA SHORE PROTECTION PROJECT
REEVALUATION STUDY DRAFT REPORT

GENERAL

The project provides for shore protection form the mouth of the St. Johns River to the South County line a distance of approximately 10 miles. The real estate aspects of the project consist of the placement of fill material on the beach seaward of the established erosion control line. The fill material will be obtained from an offshore borrow area 7.5 miles from Kathryn Abbey Hanna Park. A hopper dredge with pump-out capability will pick-up the material from the borrow area and bring it close to shore for placement on the beach through submerged pipeline. No nearshore stockpile areas are required. All needed upland temporary construction access to the beach will be through Hanna Park and public roads. Use of Beach Boulevard, Atlantic Boulevard, 16th Avenue South, 20th Avenue North, and 30th Avenue has occurred in the past and the City of Jacksonville foresees no problem with their continued use.

VALUE

Borrow Area - The borrow area is located 7.5 miles in the Atlantic Ocean and is beyond the boundary of the State of Florida and is not creditable. Additionally, ER 1165-2-130 9.d.(4) provides that no credit be given due to before and after market values being considered identical.

Temporary Submerged Pipeline Easement - The temporary submerged pipeline easement will also not be creditable due to identical before and after values of the submerged pipeline area.

Beachfill Area - The area of the beach to be nourished is seaward of the erosion control line and is owned by the State of Florida. The local sponsor will receive no credit for these public beach areas.

LANDS CERTIFICATIONS

The local sponsor of the project will be required to provide all lands, easements, rights-of-way, relocations and dredged material disposal areas needed for this project. The local sponsor will be required to certify that it has obtained and enjoys sufficient rights by which the project can be constructed, operated and maintained for project life. The sponsor will experience an administration cost in certifying the lands, easements and rights-of-way in the expected amount of $5,000. The Federal Real Estate administrative cost is anticipated at $5,000.

REAL ESTATE ESTIMATE

Estimate of Cost (date of value_____)

a. Land and Damages

Land (acres)	$ Ø
Improvements	$
Minerals	$
Severance	$
Total Lands and Damages	$

b. Acquisition Cost

Federal	$ 5,000
Non-Federal	$ 5,000

c. Public Law 91-646 $ Ø

d. Contingencies $ 2,500

Total Estimate $ 12,500

APPENDIX E

COST ALLOCATION DETAILS

DUVAL COUNTY, FLORIDA
COST ALLOCATION

TABLE I.

SHORE OWNERSHIP AND PROJECT PURPOSE (As defined in EC 1165-2-149)	MAXIMUM LEVEL OF FEDERAL PARTICIPATION IN CONSTRUCTION COSTS	SHORELINE LENGTH (FEET)
I. FEDERALLY OWNED	100.00%	5,840
II. PUBLICALLY AND PRIVATELY OWNED PROTECTION RESULTS IN PUBLIC BENEFITS		
A. Hurricane and Storm Damage Reduction	65.00%	31,052
B. Loss of Land or Incidential Recreation	50.00%	12,819
C. Separable Recreation	50.00%	
III. PRIVATELY OWNED, USE LIMITED TO PRIVATE INTERESTS	0.00%	
IV. PRIVATELY OWNED, UNDEVELOPED	0.00%	2,928
	TOTAL DISTANCE	52,639

* LOT BY LOT DESCRIPTION *

TABLE II.

LOT WIDTH (FEET) (B)	SHORELINE DESCRIPTION (D)	WITHIN PROJECT LIMITS (E)	WITHIN 1/4 MILE OF ACCESS (F)	SHORE OWNERSHIP AND PROJECT PURPOSE (G)	LEVEL OF FEDERAL PARTICIPATION (H)	FEDERAL PARTICIPATION TIMES LOT WIDTH ((B)*(H)) (I)
850	NAVY	Y	-	I.	100.00%	850.0
1000	NAVY	Y	-	I.	100.00%	1000.0
500	NAVY	Y	-	I.	100.00%	500.0
500	NAVY	Y	-	I.	100.00%	500.0
350	NAVY	Y	-	I.	100.00%	350.0
500	NAVY	Y	-	I.	100.00%	500.0
500	NAVY	Y	-	I.	100.00%	500.0
200	NAVY	Y	-	I.	100.00%	200.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
120	NAVY	Y	-	I.	100.00%	120.0
7170	PARK	Y	Y	II.B.	50.00%	3585.0
200	PARK	Y	Y	II.B.	50.00%	100.0
200	PARK	Y	Y	II.B.	50.00%	100.0
50	PARK	Y	Y	II.B.	50.00%	25.0
100	PARK	Y	Y	II.B.	50.00%	50.0
100	PARK	Y	Y	II.B.	50.00%	50.0

50	PARK	Y	Y	II.B.	50.00%	25.0
200	DEVELOPED	Y	Y	II.A.	65.00%	130.0
390	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
96	DEVELOPED	Y	Y	II.A.	65.00%	62.4
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
175	DEVELOPED	Y	Y	II.A.	65.00%	113.8
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
530	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
375	DEVELOPED	Y	Y	II.A.	65.00%	243.8
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
25	STREET R.O.W.	Y	Y	II.B.	50.00%	12.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
40	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5

50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
115	DEVELOPED	Y	Y	II.A.	65.00%	74.8
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
40	DEVELOPED	Y	Y	II.A.	65.00%	26.0
120	DEVELOPED	Y	Y	II.A.	65.00%	78.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
75	DEVELOPED	Y	Y	II.A.	65.00%	48.8
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
110	DEVELOPED	Y	Y	II.A.	65.00%	71.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5

60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
661	DEVELOPED	Y	Y	II.A.	65.00%	429.7
35	DEVELOPED	Y	Y	II.A.	65.00%	22.8
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
105	DEVELOPED	Y	Y	II.A.	65.00%	68.3
105	DEVELOPED	Y	Y	II.A.	65.00%	68.3
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
150	DEVELOPED	Y	Y	II.A.	65.00%	97.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
30	STREET R.O.W.	Y	Y	II.B.	50.00%	15.0
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
30	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
85	DEVELOPED	Y	Y	II.A.	65.00%	55.3
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
40	DEVELOPED	Y	Y	II.A.	65.00%	26.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
270	DEVELOPED	Y	Y	II.A.	65.00%	175.5
70	STREET R.O.W.	Y	Y	II.B.	50.00%	35.0
226	DEVELOPED	Y	Y	II.A.	65.00%	146.9
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
57	STREET R.O.W.	Y	Y	II.B.	50.00%	28.5

50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
78	DEVELOPED	Y	Y	II.A.	65.00%	50.7
76	DEVELOPED	Y	Y	II.A.	65.00%	49.4
57	STREET R.O.W.	Y	Y	II.B.	50.00%	28.5
102	DEVELOPED	Y	Y	II.A.	65.00%	66.3
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
78	DEVELOPED	Y	Y	II.A.	65.00%	50.7
86	DEVELOPED	Y	Y	II.A.	65.00%	55.9
52	STREET R.O.W.	Y	Y	II.B.	50.00%	26.0
104	DEVELOPED	Y	Y	II.A.	65.00%	67.6
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
104	DEVELOPED	Y	Y	II.A.	65.00%	67.6
57	STREET R.O.W.	Y	Y	II.B.	50.00%	28.5
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
57	STREET R.O.W.	Y	Y	II.B.	50.00%	28.5
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
30	DEVELOPED	Y	Y	II.A.	65.00%	19.5
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
57	STREET R.O.W.	Y	Y	II.B.	50.00%	28.5
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
57	STREET R.O.W.	Y	Y	II.B.	50.00%	28.5
120	DEVELOPED	Y	Y	II.A.	65.00%	78.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5

50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
90	DEVELOPED	Y	Y	II.A.	65.00%	58.5
90	DEVELOPED	Y	Y	II.A.	65.00%	58.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
60	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
120	DEVELOPED	Y	Y	II.A.	65.00%	78.0
60	DEVELOPED	Y	Y	II.A.	65.00%	39.0
60	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
80	DEVELOPED	Y	Y	II.A.	65.00%	52.0
280	DEVELOPED	Y	Y	II.A.	65.00%	182.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
66	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
48	DEVELOPED	Y	Y	II.A.	65.00%	31.2
48	DEVELOPED	Y	Y	II.A.	65.00%	31.2
98	DEVELOPED	Y	Y	II.A.	65.00%	63.7
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
195	DEVELOPED	Y	Y	II.A.	65.00%	126.8
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
300	DEVELOPED	Y	Y	II.A.	65.00%	195.0
380	DEVELOPED	Y	Y	II.A.	65.00%	247.0
260	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
260	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
260	DEVELOPED	Y	Y	II.A.	65.00%	169.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
156	DEVELOPED	Y	Y	II.A.	65.00%	101.4
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
52	DEVELOPED	Y	Y	II.A.	65.00%	33.8
208	DEVELOPED	Y	Y	II.A.	65.00%	135.2

80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
33	DEVELOPED	Y	Y	II.A.	65.00%	21.5
32	DEVELOPED	Y	Y	II.A.	65.00%	20.8
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
65	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
195	DEVELOPED	Y	Y	II.A.	65.00%	126.8
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
130	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
130	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
145	DEVELOPED	Y	Y	II.A.	65.00%	94.3
200	PUBLIC PARKING	Y	Y	II.B.	50.00%	100.0
190	DEVELOPED	Y	Y	II.A.	65.00%	123.5
190	DEVELOPED	Y	Y	II.A.	65.00%	123.5
100	STREET R.O.W.	Y	Y	II.B.	50.00%	50.0
160	DEVELOPED	Y	Y	II.A.	65.00%	104.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
33	DEVELOPED	Y	Y	II.A.	65.00%	21.5
32	DEVELOPED	Y	Y	II.A.	65.00%	20.8
32	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
33	DEVELOPED	Y	Y	II.A.	65.00%	21.5
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
195	DEVELOPED	Y	Y	II.A.	65.00%	126.8
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
147	DEVELOPED	Y	Y	II.A.	65.00%	95.6
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
65	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
65	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
260	PUBLIC PARKING	Y	Y	II.B.	50.00%	130.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
260	DEVELOPED	Y	Y	II.A.	65.00%	169.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0

130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
33	DEVELOPED	Y	Y	II.A.	65.00%	21.5
97	DEVELOPED	Y	Y	II.A.	65.00%	63.1
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
340	DEVELOPED	Y	Y	II.A.	65.00%	221.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
200	DEVELOPED	Y	Y	II.A.	65.00%	130.0
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
330	DEVELOPED	Y	Y	II.A.	65.00%	214.5
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
32	DEVELOPED	Y	Y	II.A.	65.00%	20.8
33	DEVELOPED	Y	Y	II.A.	65.00%	21.5
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
65	DEVELOPED	Y	Y	II.A.	65.00%	42.3
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
130	DEVELOPED	Y	Y	II.A.	65.00%	84.5
80	STREET R.O.W.	Y	Y	II.B.	50.00%	40.0
390	DEVELOPED	Y	Y	II.A.	65.00%	253.5
40	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
240	DEVELOPED	Y	Y	II.A.	65.00%	156.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
120	DEVELOPED	Y	Y	II.A.	65.00%	78.0
60	STREET R.O.W.	Y	Y	II.B.	50.00%	30.0
120	DEVELOPED	Y	Y	II.A.	65.00%	78.0
40	STREET R.O.W.	Y	Y	II.B.	50.00%	20.0
180	DEVELOPED	Y	Y	II.A.	65.00%	117.0
180	DEVELOPED	Y	Y	II.A.	65.00%	117.0
660	DEVELOPED	Y	Y	II.A.	65.00%	429.0
135	DEVELOPED	Y	Y	II.A.	65.00%	87.8
20	STREET R.O.W.	Y	Y	II.B.	50.00%	10.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5

50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
90	UNDEVELOPED	Y	Y	IV.	0.00%	0.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
55	DEVELOPED	Y	Y	II.A.	65.00%	35.8
105	DEVELOPED	Y	Y	II.A.	65.00%	68.3
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	STREET R.O.W.	Y	Y	II.B.	50.00%	25.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5

50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
50	DEVELOPED	Y	Y	II.A.	65.00%	32.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
70	DEVELOPED	Y	Y	II.A.	65.00%	45.5
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
100	DEVELOPED	Y	Y	II.A.	65.00%	65.0
175	DEVELOPED	Y	Y	II.A.	65.00%	113.8
125	DEVELOPED	Y	Y	II.A.	65.00%	81.3
224	DEVELOPED	Y	Y	II.A.	65.00%	145.6

SUM OF COLUMN (H) = 32,433.3

52,639 FT SHORELINE LENGTH (FEET) WITHIN PROJECT LIMITS

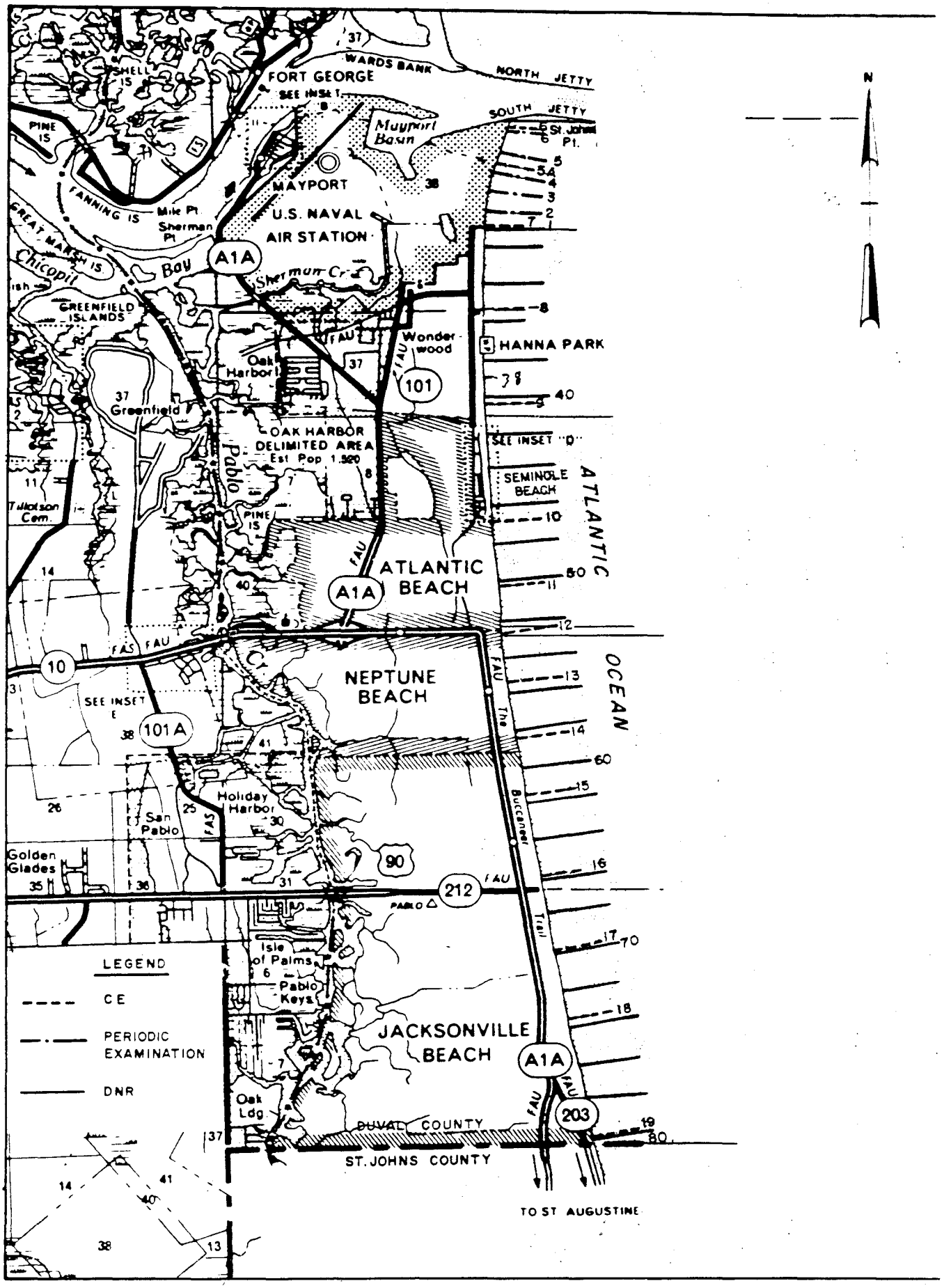
9.97 MI SHORELINE LENGTH (MILES) WITHIN PROJECT LIMITS

32,433 FT DIVIDED BY 52,639 FT WHICH IS THE FEDERAL SHARE OF APPLICABLE CONSTRUCTION COSTS 61.61%

2,928 FT NO PUBLIC BENEFIT LENGTH

APPENDIX F

PROFILE LINE LOCATIONS


FORT GEORGE
WARDS BANK
NORTH JETTY
SOUTH JETTY
St. Johns Pt.
SHELL IS
PINE IS
FANNING IS
Mile Pt
Sherman Pt
GREAT MARSH IS
Chicopit Bay
Mayport Basin
MAYPORT
U.S. NAVAL AIR STATION
A1A
Sherman Cr
GREENFIELD ISLANDS
Oak Harbor
Wonder wood
HANNA PARK
101
Greenfield
OAK HARBOR DELIMITED AREA
Est Pop 1,920
SEMINOLE BEACH
ATLANTIC
Pablo
Tillotson Cem.
PINE IS
ATLANTIC BEACH
10
FAS
FAU
NEPTUNE BEACH
OCEAN
101A
Holiday Harbor
San Pablo
Golden Glades
90
212
PABLO
Isle of Palms
Pablo Keys
JACKSONVILLE BEACH
Oak Ldg
DUVAL COUNTY
ST. JOHNS COUNTY
203
TO ST AUGUSTINE
LEGEND
CE
PERIODIC EXAMINATION
DNR
N

APPENDIX G

ENVIRONMENTAL ASSESSMENT

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

REPLY TO
ATTENTION OF

SHORE PROTECTION PROJECT REEVALUATION
DUVAL COUNTY, FLORIDA

FINDING OF NO SIGNIFICANT IMPACT

I have reviewed the planning document and the Environmental Assessment of the considered action. Based on information analyzed in the Environmental Assessment, I conclude that the considered action will have no significant impact on the quality of the human environment.

Reasons for this conclusion are, in summary:

a. Minimal disruption of the aquatic habitat;
b. No adverse impacts to threatened or endangered species; and
c. Aesthetic and functional improvement of area beaches.

In consideration of the information summarized, I find that the considered action does not require an Environmental Impact Statement.

Date 3/7/91

BRUCE A. MALSON
Colonel, Corps of Engineers
Commanding

United States Department of the Interior
FISH AND WILDLIFE SERVICE

3100 University Blvd. South
Suite 120
Jacksonville, Florida 32216

September 18, 1989

Mr. A.J. Salem
Chief, Planning Division
U.S. Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

FWS Log No. 4-1-89-258

Dear Mr. Salem:

This is in response to your September 8, 1989 letter, regarding the Duval County Beach Erosion Control Project (FWS Log No. 4-1-83-217). We concur with the no effect determination based on the sea turtle protection measures to be implemented by the Corps identified in the September 8, 1989 letter, and the very low nesting activity in the project area.

Although this does not constitute a Biological Opinion described under Section 7 of the Endangered Species Act, it does fulfill the requirements of the Act and no further action is required. If modifications are made in the project or if additional information involving potential impacts on listed species becomes available, please notify our office.

Sincerely yours,

David J. Wesley
Field Supervisor

APPENDIX B

RECREATION BENEFITS SUMMARY

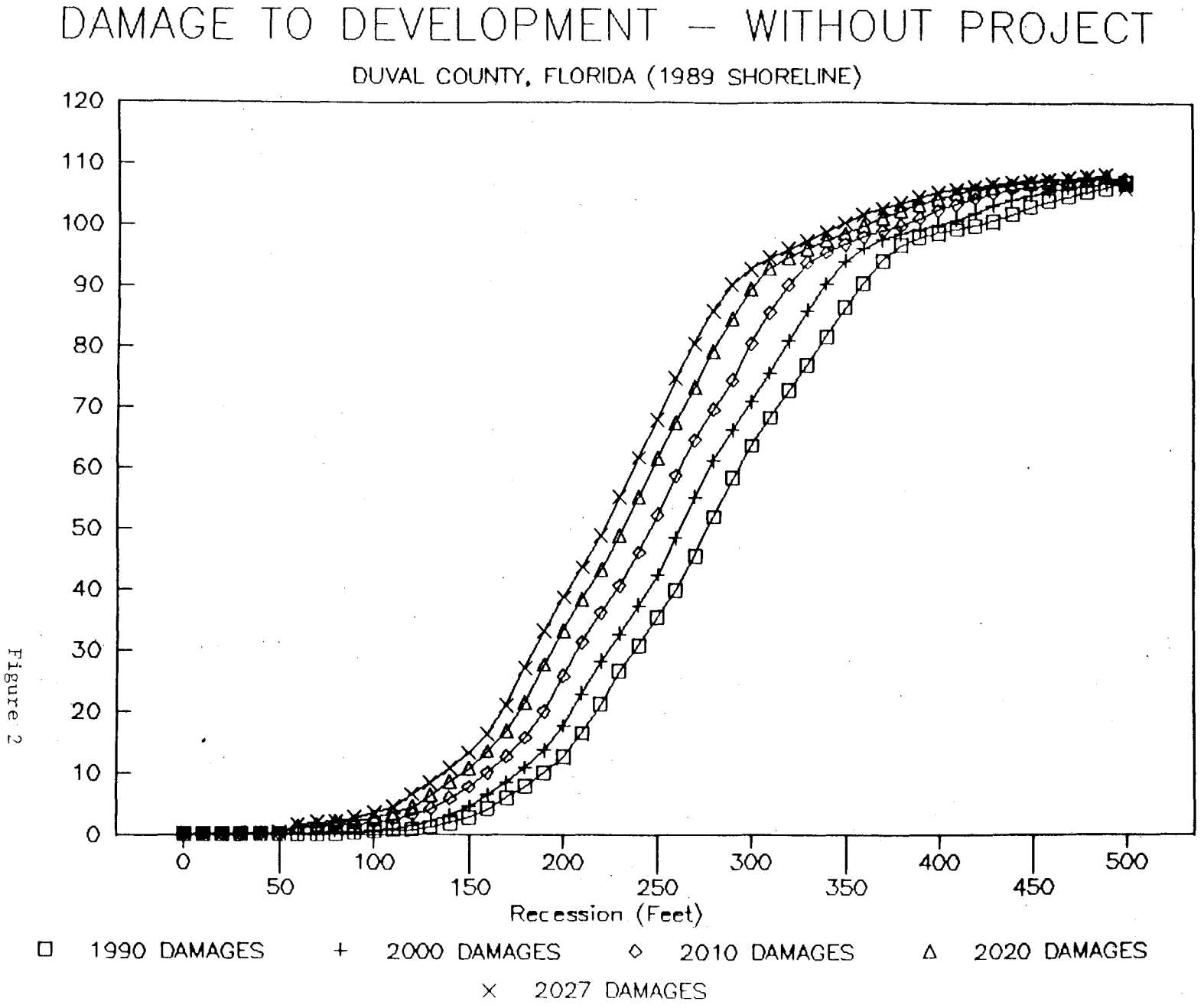

DAMAGE TO DEVELOPMENT – WITHOUT PROJECT
DUVAL COUNTY, FLORIDA (1989 SHORELINE)
Dollars ($)
(Millions)
120
110
100
90
80
70
60
50
40
30
20
10
0
0
50
100
150
200
250
300
350
400
450
500
Recession (Feet)
□ 1990 DAMAGES
+ 2000 DAMAGES
◇ 2010 DAMAGES
△ 2020 DAMAGES
× 2027 DAMAGES

Figure 2

DAMAGE TO DEVELOPMENT – WITHOUT PROJECT

DUVAL COUNTY, FLORIDA (1978 SHORELINE)

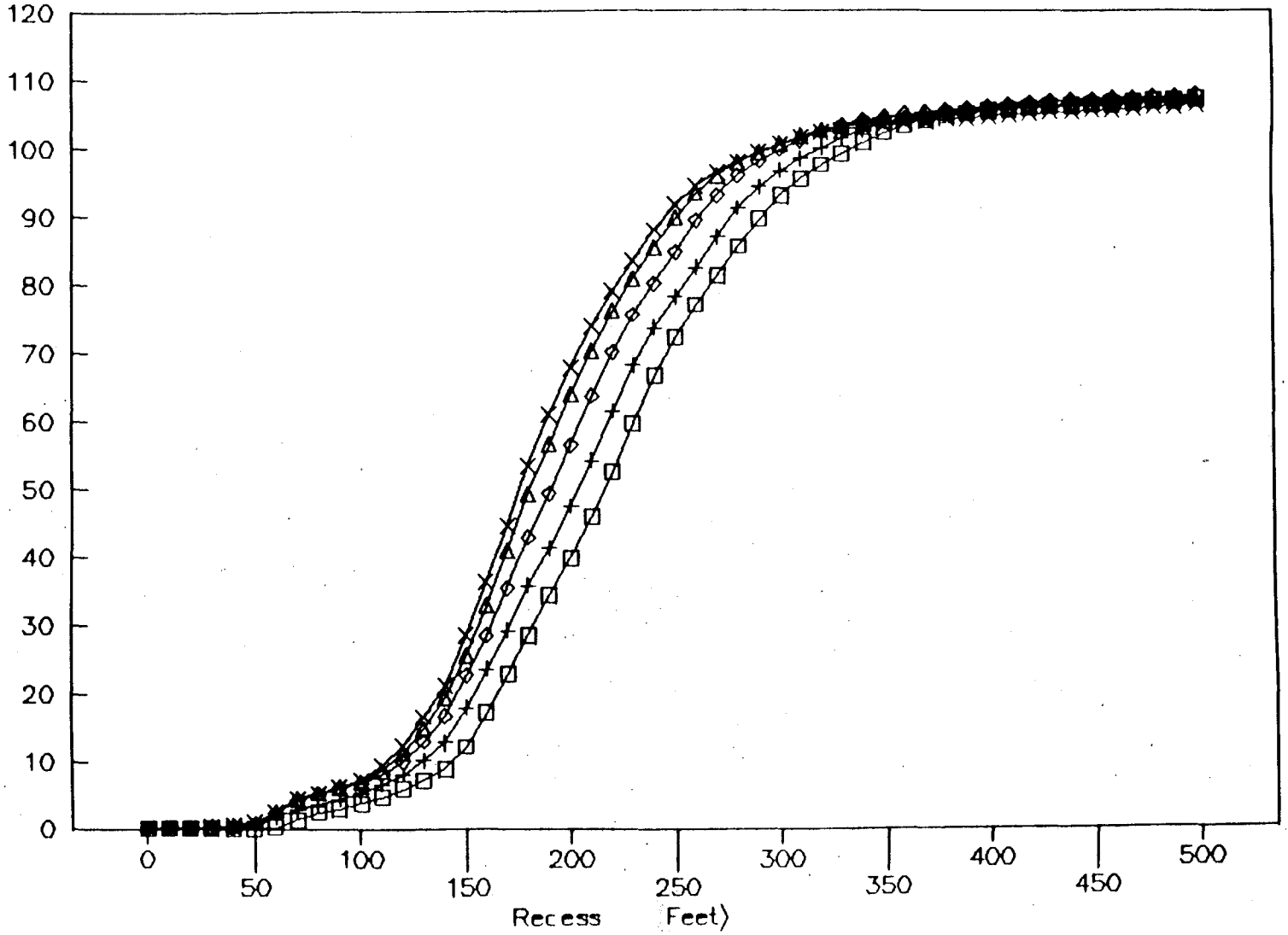


Figure 1

TABLE 5

DAMAGE PREVENTION BENEFIT SUMMARY
1978 PRE-PROJECT REFERENCE SHORELINE
(computed at 8 7/8% & a 38 year project life)

Alternative	Annual Expected Damage						Annual Damage Prevented from 1978 Shoreline ($)
	Structures ($)	Backfill ($)	Armor ($)	Condemned Struct.($)	Modified Armor ($)	Total ($)	
Existing Conditions (1989)	669,100	124,500	369,900	0	64,400	1,227,900	
Without Project Conditions (1978)	2,817,100	275,100	1,033,500	23,600	74,000	4,223,300	
Maintain 1989 Shoreline	416,500	97,300	157,100	0	0	670,900	3,552,400
Maintain 1978 Shoreline	2,026,700	209,000	669,700	0	0	2,905,400	1,317,900
+25 Foot Berm Width	1,113,400	133,400	404,500	0	0	1,651,300	2,572,000
+50 Foot Berm Width	589,200	80,000	199,800	0	0	869,000	3,354,300
+60 Foot Berm Width	438,300	67,300	178,400	0	0	684,000	3,539,300
+75 Foot Berm Width	261,600	48,400	140,800	0	0	450,800	3,772,500
+100 Foot Berm Width	97,900	28,300	67,900	0	0	194,100	4,029,200

170237 -0000	CONDOMINIUM	',	9900000 ,	661 ,	3 ,	1 ,	1 ,	210 ,	280 ,	320
170243 -0000	SFR	',	97600 ,	35 ,	4 ,	1 ,	1 ,	210 ,	250 ,	280
170333 -0000	SFR	',	130500 ,	70 ,	1 ,	1 ,	1 ,	210 ,	270 ,	320
70332 -0000	SFR	',	116400 ,	70 ,	1 ,	1 ,	1 ,	215 ,	270 ,	310
170331 -0000	SFR	',	91400 ,	105 ,	1 ,	1 ,	1 ,	220 ,	290 ,	320
170330 -0000	SFR	',	216000 ,	105 ,	1 ,	1 ,	1 ,	220 ,	280 ,	320
170237 -0700	CONDOMINIUM	',	1926600 ,	150 ,	3 ,	1 ,	1 ,	220 ,	270 ,	310
RIGHT OF WAY		',	86000 ,	40 ,	1 ,	9 ,	6 ,	220 ,	221 ,	400
170119 -0000	SFR	',	75000 ,	50 ,	3 ,	1 ,	1 ,	220 ,	270 ,	310
170121 -0000	SFR	',	160400 ,	50 ,	2 ,	1 ,	1 ,	220 ,	270 ,	310
170118 -0000	SFR	',	115200 ,	50 ,	2 ,	1 ,	1 ,	220 ,	270 ,	300
170117 -0000	SFR	',	100700 ,	50 ,	2 ,	1 ,	1 ,	200 ,	280 ,	330
170112 -0000	SFR	',	135400 ,	100 ,	2 ,	1 ,	1 ,	210 ,	290 ,	320
170157 -0000	SFR	',	48300 ,	100 ,	2 ,	1 ,	1 ,	190 ,	260 ,	310
170156 -0000	SFR	',	62200 ,	50 ,	2 ,	1 ,	1 ,	180 ,	250 ,	280
170155 -0000	SFR	',	84300 ,	50 ,	2 ,	1 ,	1 ,	170 ,	250 ,	280
170154 -0000	SFR	',	198700 ,	50 ,	2 ,	1 ,	1 ,	165 ,	260 ,	290
170153 -0000	SFR	',	121300 ,	50 ,	2 ,	1 ,	1 ,	160 ,	230 ,	260
170160 -0000	SFR	',	107900 ,	50 ,	2 ,	1 ,	1 ,	150 ,	220 ,	250
170159 -0000	SFR	',	84720 ,	100 ,	2 ,	1 ,	1 ,	140 ,	200 ,	240
170158 -0000	SFR	',	94600 ,	150 ,	2 ,	1 ,	1 ,	160 ,	220 ,	260
RIGHT OF WAY		',	107500 ,	40 ,	1 ,	9 ,	6 ,	175 ,	176 ,	400
170187 -0000	SFR	',	160300 ,	100 ,	2 ,	1 ,	1 ,	190 ,	260 ,	290
170186 -0000	SFR	',	131100 ,	100 ,	2 ,	1 ,	1 ,	210 ,	290 ,	320
170185 -0000	SFR	',	125300 ,	100 ,	2 ,	1 ,	1 ,	230 ,	320 ,	350
RIGHT OF WAY		',	122000 ,	40 ,	1 ,	9 ,	6 ,	245 ,	246 ,	500
170193 -0000	SFR	',	193000 ,	50 ,	2 ,	1 ,	1 ,	260 ,	320 ,	360
170192 -0000	SFR	',	98800 ,	50 ,	2 ,	1 ,	1 ,	250 ,	320 ,	350
0191 -0000	SFR	',	58600 ,	50 ,	2 ,	1 ,	1 ,	240 ,	310 ,	340
0190 -0000	SFR	',	62900 ,	50 ,	2 ,	1 ,	1 ,	240 ,	300 ,	330
170189 -0000	SFR	',	147200 ,	50 ,	2 ,	1 ,	1 ,	250 ,	280 ,	330
170188 -0000	SFR	',	211200 ,	50 ,	2 ,	1 ,	1 ,	245 ,	290 ,	340
RIGHT OF WAY		',	78800 ,	30 ,	1 ,	9 ,	6 ,	230 ,	231 ,	450
179314 -1000	CONDOMINIUM	',	640000 ,	70 ,	3 ,	1 ,	1 ,	210 ,	280 ,	340
VACANT AREA		',	0 ,	30 ,	1 ,	1 ,	1 ,	205 ,	206 ,	430
170215 -0000	SFR	',	124100 ,	50 ,	3 ,	1 ,	1 ,	200 ,	270 ,	290
170214 -0000	SFR	',	77600 ,	50 ,	2 ,	1 ,	1 ,	190 ,	260 ,	280
170213 -0000	SFR	',	139000 ,	85 ,	2 ,	1 ,	1 ,	180 ,	240 ,	280
170212 -0000	SFR	',	164600 ,	50 ,	1 ,	1 ,	1 ,	170 ,	240 ,	280
RIGHT OF WAY		',	109900 ,	40 ,	1 ,	9 ,	6 ,	170 ,	171 ,	400
170222 -0000	SFR	',	67800 ,	40 ,	3 ,	1 ,	1 ,	170 ,	270 ,	310
170221 -0000	SFR	',	61600 ,	60 ,	2 ,	1 ,	1 ,	170 ,	260 ,	330
170220 -0000	SFR	',	26300 ,	50 ,	2 ,	1 ,	1 ,	170 ,	280 ,	310
170219 -0000	SFR	',	120000 ,	52 ,	2 ,	1 ,	1 ,	160 ,	290 ,	310
170218 -0000	SFR	',	55300 ,	50 ,	2 ,	1 ,	1 ,	160 ,	370 ,	390
RIGHT OF WAY		',	140000 ,	50 ,	1 ,	9 ,	6 ,	165 ,	166 ,	400
170223 -0000	COMMERCIAL	',	3840000 ,	270 ,	9 ,	1 ,	1 ,	170 ,	200 ,	310
ATLANTIC	BOULEVARD	',	200000 ,	70 ,	1 ,	9 ,	6 ,	170 ,	171 ,	400

169664 -0000	SFR	',	81700 ,	115 ,	2 ,	7 ,	7 ,	90 ,	240 ,	270
169662 -0000	SFR	',	68700 ,	100 ,	1 ,	7 ,	7 ,	90 ,	230 ,	270
169661 -0000	SFR	',	64300 ,	50 ,	2 ,	7 ,	7 ,	100 ,	230 ,	250
169660 -0000	SFR	',	100300 ,	50 ,	2 ,	7 ,	7 ,	100 ,	240 ,	270
169659 -0000	SFR	',	74300 ,	50 ,	2 ,	7 ,	7 ,	100 ,	230 ,	260
169658 -0000	SFR	',	320000 ,	50 ,	2 ,	7 ,	7 ,	100 ,	230 ,	260
169657 -0000	SFR	',	85900 ,	50 ,	2 ,	7 ,	7 ,	110 ,	230 ,	250
169656 -0000	SFR	',	54700 ,	50 ,	1 ,	7 ,	7 ,	100 ,	290 ,	320
169655 -0000	SFR	',	54200 ,	40 ,	3 ,	7 ,	7 ,	90 ,	200 ,	230
169654 -0000	SFR	',	57100 ,	120 ,	2 ,	7 ,	7 ,	90 ,	240 ,	270
169653 -0000	SFR	',	79400 ,	50 ,	2 ,	7 ,	7 ,	80 ,	200 ,	250
169652 -0000	SFR	',	79500 ,	50 ,	1 ,	7 ,	7 ,	80 ,	200 ,	230
169651 -0000	SFR	',	79100 ,	50 ,	2 ,	7 ,	7 ,	70 ,	200 ,	230
169650 -0000	SFR	',	64000 ,	50 ,	2 ,	7 ,	7 ,	60 ,	200 ,	230
169648 -0000	SFR	',	144100 ,	50 ,	1 ,	7 ,	7 ,	50 ,	180 ,	210
169647 -0000	SFR	',	145500 ,	50 ,	2 ,	7 ,	7 ,	50 ,	190 ,	230
169646 -0000	SFR	',	30600 ,	50 ,	1 ,	7 ,	7 ,	50 ,	180 ,	230
169645 -0000	SFR	',	193700 ,	100 ,	2 ,	7 ,	7 ,	50 ,	180 ,	220
170313 -0000	SFR	',	63200 ,	50 ,	2 ,	7 ,	7 ,	50 ,	170 ,	200
170312 -0000	SFR	',	125000 ,	75 ,	2 ,	7 ,	7 ,	50 ,	180 ,	200
170311 -0000	SFR	',	105700 ,	75 ,	2 ,	7 ,	7 ,	50 ,	170 ,	200
170309 -0000	SFR	',	223200 ,	100 ,	1 ,	7 ,	7 ,	50 ,	160 ,	190
RIGHT OF WAY		',	121900 ,	40 ,	1 ,	9 ,	6 ,	45 ,	46 ,	300
170307 -0000	SFR	',	56300 ,	50 ,	2 ,	1 ,	1 ,	40 ,	180 ,	210
170305 -0000	SFR	',	150800 ,	50 ,	1 ,	1 ,	1 ,	50 ,	240 ,	270
170304 -0000	SFR	',	159300 ,	75 ,	2 ,	1 ,	1 ,	70 ,	190 ,	220
170303 -0000	SFR	',	73900 ,	50 ,	2 ,	1 ,	1 ,	80 ,	200 ,	230
170302 -0000	SFR	',	98500 ,	75 ,	2 ,	1 ,	1 ,	90 ,	280 ,	310
RIGHT OF WAY		',	119500 ,	40 ,	1 ,	1 ,	1 ,	90 ,	91 ,	340
170301 -0000	SFR	',	88900 ,	50 ,	2 ,	1 ,	1 ,	90 ,	310 ,	330
170300 -0000	SFR	',	89300 ,	50 ,	2 ,	1 ,	1 ,	90 ,	240 ,	270
170299 -0000	SFR	',	100100 ,	50 ,	2 ,	1 ,	1 ,	100 ,	210 ,	250
170298 -0000	SFR	',	51500 ,	50 ,	1 ,	1 ,	1 ,	110 ,	240 ,	280
170297 -0000	SFR	',	95300 ,	50 ,	2 ,	1 ,	1 ,	130 ,	290 ,	330
170296 -0000	SFR	',	39800 ,	50 ,	2 ,	1 ,	1 ,	130 ,	350 ,	380
RIGHT OF WAY		',	126700 ,	40 ,	1 ,	9 ,	6 ,	135 ,	136 ,	400
170295 -0000	SFR	',	61800 ,	50 ,	3 ,	1 ,	1 ,	140 ,	260 ,	290
170294 -0000	SFR	',	142200 ,	50 ,	2 ,	1 ,	1 ,	150 ,	260 ,	300
170293 -0000	SFR	',	92600 ,	50 ,	2 ,	1 ,	1 ,	150 ,	270 ,	300
170292 -0000	SFR	',	124800 ,	50 ,	2 ,	1 ,	1 ,	160 ,	270 ,	300
170290 -0000	SFR	',	86700 ,	100 ,	2 ,	1 ,	1 ,	170 ,	280 ,	310
RIGHT OF WAY		',	126700 ,	40 ,	1 ,	9 ,	6 ,	175 ,	176 ,	440
170273 -0000	SFR	',	134400 ,	100 ,	2 ,	1 ,	1 ,	180 ,	240 ,	290
170272 -0000	SFR	',	85400 ,	100 ,	2 ,	1 ,	1 ,	170 ,	280 ,	310
170271 -0000	SFR	',	105300 ,	110 ,	2 ,	1 ,	1 ,	170 ,	290 ,	330
RIGHT OF WAY		',	133900 ,	40 ,	1 ,	9 ,	6 ,	170 ,	171 ,	450
170269 -0000	SFR	',	112500 ,	60 ,	2 ,	1 ,	1 ,	170 ,	280 ,	320
170268 -0000	SFR	',	48000 ,	30 ,	2 ,	1 ,	1 ,	170 ,	280 ,	310
170267 -0000	SFR	',	84100 ,	30 ,	2 ,	1 ,	1 ,	170 ,	350 ,	380
170266 -0000	SFR	',	55200 ,	60 ,	2 ,	1 ,	1 ,	170 ,	400 ,	430
170265 -0000	SFR	',	89700 ,	30 ,	2 ,	1 ,	1 ,	175 ,	350 ,	380
170264 -0000	SFR	',	105400 ,	30 ,	2 ,	1 ,	1 ,	200 ,	330 ,	370
170263 -0100	TOWNHOUSE	',	70300 ,	50 ,	2 ,	1 ,	1 ,	200 ,	270 ,	360
RIGHT OF WAY		',	117100 ,	40 ,	1 ,	9 ,	6 ,	205 ,	206 ,	450

169772 -0000	SFR	',	165000 ,	50 ,	2 ,	9 ,	6 ,	250 ,	360 ,	410
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	250 ,	500 ,	501
69720 -0000	SFR	',	165000 ,	50 ,	2 ,	9 ,	6 ,	230 ,	330 ,	370
CANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	200 ,	480 ,	481
169719 -0000	SFR	',	77500 ,	50 ,	1 ,	9 ,	6 ,	200 ,	330 ,	370
169718 -0000	SFR	',	150000 ,	50 ,	2 ,	9 ,	6 ,	200 ,	280 ,	330
169717 -0000	SFR	',	80500 ,	50 ,	2 ,	9 ,	6 ,	170 ,	270 ,	310
169716 -0000	SFR	',	92000 ,	50 ,	3 ,	9 ,	6 ,	130 ,	220 ,	240
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	90 ,	16 ,	300
169710 -0000	SFR	',	50500 ,	100 ,	1 ,	9 ,	6 ,	50 ,	190 ,	220
VACANT LOT		',	0 ,	40 ,	1 ,	9 ,	6 ,	50 ,	250 ,	251
169709 -0000	SFR	',	110400 ,	50 ,	3 ,	9 ,	6 ,	100 ,	160 ,	190
169708 -0000	SFR	',	45900 ,	50 ,	1 ,	9 ,	6 ,	125 ,	180 ,	210
169707 -0000	SFR	',	33400 ,	50 ,	1 ,	9 ,	6 ,	150 ,	210 ,	240
169706 -0000	SFR	',	37900 ,	50 ,	2 ,	9 ,	6 ,	150 ,	150 ,	190
169705 -0000	SFR	',	31700 ,	50 ,	1 ,	9 ,	6 ,	200 ,	220 ,	250
169704 -0000	SFR	',	98300 ,	50 ,	2 ,	9 ,	6 ,	220 ,	230 ,	270
169723 -0000	CONDOMINIUM	',	444300 ,	50 ,	2 ,	9 ,	6 ,	260 ,	260 ,	300
RIGHT OF WAY		',	119520 ,	40 ,	1 ,	9 ,	6 ,	260 ,	151 ,	400
169698 -0000	SFR	',	112900 ,	50 ,	3 ,	9 ,	6 ,	270 ,	330 ,	370
169697 -0000	SFR	',	41600 ,	50 ,	2 ,	9 ,	6 ,	250 ,	370 ,	390
169696 -0000	SFR	',	135700 ,	50 ,	3 ,	9 ,	6 ,	250 ,	330 ,	360
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	250 ,	400 ,	401
169694 -0000	SFR	',	113000 ,	50 ,	3 ,	9 ,	6 ,	250 ,	320 ,	350
169693 -0000	SFR	',	83500 ,	50 ,	2 ,	9 ,	6 ,	250 ,	340 ,	360
169692 -0010	SFR	',	126600 ,	50 ,	2 ,	9 ,	6 ,	250 ,	290 ,	320
169692 -0000	SFR	',	72700 ,	50 ,	2 ,	9 ,	6 ,	250 ,	270 ,	300
69691 -0000	SFR	',	190000 ,	50 ,	2 ,	9 ,	6 ,	250 ,	290 ,	320
690 -0000	SFR	',	71100 ,	50 ,	2 ,	9 ,	6 ,	250 ,	270 ,	300
9689 -0000	SFR	',	86300 ,	50 ,	2 ,	9 ,	6 ,	250 ,	360 ,	390
169688 -0000	SFR	',	59900 ,	50 ,	2 ,	9 ,	6 ,	250 ,	270 ,	290
VACANT LOT		',	0 ,	100 ,	1 ,	9 ,	6 ,	240 ,	400 ,	401
169685 -0460	SFR	',	232600 ,	50 ,	1 ,	9 ,	6 ,	230 ,	260 ,	300
169685 -0000	2 TOWNHOMES	',	345600 ,	50 ,	1 ,	9 ,	6 ,	220 ,	280 ,	330
169684 -0000	SFR	',	160900 ,	50 ,	1 ,	9 ,	6 ,	210 ,	280 ,	310
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	210 ,	400 ,	401
169682 -0000	SFR	',	85000 ,	50 ,	3 ,	9 ,	6 ,	210 ,	250 ,	300
169681 -0000	SFR	',	91800 ,	70 ,	3 ,	9 ,	6 ,	200 ,	310 ,	350
169697 -0000	SFR	',	450000 ,	70 ,	2 ,	9 ,	6 ,	200 ,	230 ,	310
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	190 ,	380 ,	381
169677 -0000	SFR	',	134900 ,	50 ,	2 ,	9 ,	6 ,	180 ,	280 ,	320
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	180 ,	370 ,	371
169675 -0000	SFR	',	108400 ,	50 ,	3 ,	9 ,	6 ,	180 ,	290 ,	330
169674 -0000	SFR	',	87400 ,	50 ,	1 ,	9 ,	6 ,	180 ,	270 ,	310
169673 -0000	SFR	',	144900 ,	100 ,	1 ,	9 ,	6 ,	170 ,	270 ,	310
169672 -0000	SFR	',	36200 ,	50 ,	2 ,	9 ,	6 ,	160 ,	230 ,	260
169671 -0000	SFR	',	53200 ,	50 ,	2 ,	9 ,	6 ,	160 ,	230 ,	260
169670 -0000	SFR	',	55100 ,	50 ,	2 ,	9 ,	6 ,	160 ,	290 ,	340
169669 -0000	SFR	',	134800 ,	50 ,	2 ,	9 ,	6 ,	150 ,	250 ,	290
169668 -0000	SFR	',	73500 ,	50 ,	2 ,	9 ,	6 ,	150 ,	330 ,	360
VACANT LOT		',	0 ,	50 ,	1 ,	9 ,	6 ,	150 ,	350 ,	351
169667 -0000	SFR	',	226200 ,	50 ,	1 ,	9 ,	6 ,	150 ,	280 ,	320
169666 -0000	SFR	',	65400 ,	75 ,	2 ,	9 ,	6 ,	80 ,	230 ,	270
9665 -0000	SFR	',	148100 ,	100 ,	2 ,	7 ,	7 ,	80 ,	230 ,	260

TABLE 4

DUVAL COUNTY, FLORIDA SHORE PROTECTION PROJECT
STORM DAMAGE MODEL INPUT SUMMARY
FOR BEACH NORTH OF ATLANTIC BOULEVARD

SITE DESCRIPTION	VALUE	WIDTH	NO. OF FLOORS	ARMOR INDEX	CONSTR. INDEX	DIST TO ARMOR	DIST TO ZERO VAL.	DIST TO FULL VAL
BEACH FROM SOUTH JETTY' ',	0 ,	850 ,	1 ,	9 ,	5 ,	120 ,	121 ,	250
NAVAL BASE UNKNOWN ',	900000 ,	1000 ,	1 ,	9 ,	5 ,	120 ,	540 ,	630
NAVAL BASE CPO/NCO CLUB',	400000 ,	500 ,	1 ,	9 ,	5 ,	30 ,	320 ,	390
NAVAL BASE BOQ ',	360000 ,	500 ,	2 ,	9 ,	5 ,	30 ,	260 ,	470
NAVAL BASE O CLUB ',	576000 ,	350 ,	2 ,	9 ,	5 ,	30 ,	450 ,	510
NAVAL BASE POOL HOUSES ',	35000 ,	500 ,	1 ,	9 ,	5 ,	30 ,	380 ,	490
NAVAL BASE REC CLUB ',	552000 ,	500 ,	1 ,	9 ,	5 ,	30 ,	350 ,	440
NAVAL BASE EMPTY AREA ',	0 ,	200 ,	1 ,	9 ,	5 ,	80 ,	81 ,	600
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	480 ,	510
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	450 ,	480
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	440 ,	470
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	440 ,	470
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	450 ,	480
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	470 ,	500
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	200 ,	420 ,	450
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	150 ,	340 ,	380
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	150 ,	280 ,	320
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	125 ,	250 ,	270
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	100 ,	250 ,	290
NAVAL BASE SFR ',	44000 ,	120 ,	1 ,	9 ,	5 ,	150 ,	310 ,	350
HANNA PARK ',	0 ,	7170 ,	1 ,	9 ,	6 ,	380 ,	800 ,	801
HANNA PARK GAZEBOS ',	10000 ,	200 ,	1 ,	9 ,	6 ,	300 ,	400 ,	550
HANNA PARK BUILDING ',	10000 ,	200 ,	1 ,	9 ,	6 ,	300 ,	350 ,	550
HANNA PARK ROAD ',	10000 ,	50 ,	1 ,	9 ,	6 ,	300 ,	200 ,	550
HANNA PARK GAZEBOS ',	10000 ,	100 ,	1 ,	9 ,	6 ,	200 ,	280 ,	350
HANNA PARK RED CROSS ',	10000 ,	100 ,	1 ,	9 ,	6 ,	200 ,	280 ,	340
HANNA PARK ROAD ',	90000 ,	50 ,	1 ,	9 ,	6 ,	300 ,	200 ,	550
168394 -0000 SFR ',	221500 ,	200 ,	1 ,	9 ,	6 ,	280 ,	430 ,	460
VACANT LOTS ',	0 ,	390 ,	1 ,	9 ,	6 ,	280 ,	700 ,	701
168352 -0500 CONDOMINIUM ',	480000 ,	75 ,	3 ,	9 ,	6 ,	250 ,	430 ,	550
168349 -0000 SFR ',	140600 ,	96 ,	2 ,	9 ,	6 ,	250 ,	450 ,	490
168846 -5700 CONDOMINIUM ',	400000 ,	150 ,	2 ,	9 ,	6 ,	250 ,	450 ,	500
168846 -1000 SFR ',	120000 ,	150 ,	2 ,	9 ,	6 ,	250 ,	450 ,	500
168846 -5000 CONDOMINIUM ',	590000 ,	150 ,	2 ,	9 ,	6 ,	250 ,	440 ,	500
168345 -0000 CONDOMINIUM ',	452000 ,	175 ,	2 ,	9 ,	6 ,	250 ,	440 ,	460
168345 -1000 CONDOMINIUM ',	783000 ,	150 ,	2 ,	9 ,	6 ,	250 ,	440 ,	500
168346 -0000 CONDOMINIUM ',	812000 ,	150 ,	3 ,	9 ,	6 ,	250 ,	500 ,	550
VACANT LOTS ',	0 ,	530 ,	1 ,	9 ,	6 ,	250 ,	600 ,	601
169519 -0000 CONDOMINIUM ',	2064000 ,	375 ,	2 ,	9 ,	6 ,	250 ,	350 ,	530
169515 -0000 SFR ',	120000 ,	75 ,	2 ,	9 ,	6 ,	250 ,	430 ,	460
169514 -0000 TOWNHOMES ',	211500 ,	75 ,	2 ,	9 ,	6 ,	250 ,	450 ,	490
169513 -0000 TOWNHOMES ',	221600 ,	75 ,	2 ,	9 ,	6 ,	250 ,	420 ,	470
ACCESS AREA ',	0 ,	25 ,	1 ,	9 ,	6 ,	250 ,	550 ,	551

TABLE 3

SAMPLE INPUT DATA

DUVAL COUNTY, FLORIDA SHORE PROTECTION PROJECT

YEAR	SHORE POSITION	YEAR	SHORE POSITION	YEAR	SHORE POSITION	YEAR	SHORE POSITION	YEAR	SHORE POSITION
1990	3.6	1991	6.0	1992	8.4	1993	10.8	1994	13.2
1995	15.6	1996	18.0	1997	20.4	1998	22.8	1999	25.2
2000	26.6	2001	29.0	2002	31.4	2003	33.8	2004	36.2
2005	38.6	2006	41.0	2007	43.4	2008	45.8	2009	48.2
2010	50.6	2011	53.0	2012	55.4	2013	57.8	2014	60.2
2015	62.6	2016	65.0	2017	67.4	2018	69.8	2019	72.2
2020	74.6	2021	77.0	2022	79.4	2023	81.8	2024	84.2
2025	86.6	2026	89.0	2027	91.4				

EQUIVALENT PROFILE EXTENSION = 0

PROBABILITY	STORM INDUCED RECESSION
.001	236
.010	235
.020	215
.030	190
.050	160
.100	110
.200	75
.500	25

ARMOR INDEX	DESCRIPTION OF ARMOR	UNIT COST	LEVEL OF PROTECTION	DAMAGE FACTOR
1.	CON. WAVE RETURN SEAWL	260	50	1.00
2.	CONCRETE SHEET PILE -SM	260	50	1.00
3.	CONCRETE SHEET PILE -MD	285	60	1.00
4.	CONCRETE SHEET PILE -LG	300	70	1.00
5.	ROCK REVETMENT - SM	890	65	.40
6.	EMERGENCY SAND BAGGING	130	20	.50
7.	VARIABLE SEAWALL	260	60	1.00
8.	COLLAPSED SEAWL/RUBBLE	100	20	.50
9.	NO ACTION	0	0	.00
0.	CONC SHT PILE WD BK-HD	300	80	1.00
1.	CON. SHT PILE TOE PROT	400	80	1.00
2.	NO ACTION	0	0	.00

COST PER SQUARE UNIT OF BACKFILL AND VEGETATION = 1.03

Boulevard. Table 3 provides a sample of the input parameters for the model of the beach north of Atlantic Boulevard. These include the relative shore position, probability versus recession, and descriptions of coastal armor. Table 4 list the inventory of the beach front property along the project beach from Mayport south to Atlantic Boulevard. Table 4 includes the value of the development, if existing, along with the number of floors, lot width, and distance to zero and to full value (from reference shoreline) of damages. Also, the table includes the distance to coastal armor with its appropriate index from Table 3 for existing conditions and future construction.

6. Damages were also computed in relation to the existing (1989 shoreline), the location of the 1978 shoreline, and various protective berm width alternatives seaward of the Erosion Control Line. One of the implicit assumptions of the post-project damage to development analysis is that the considered beach nourishment project will maintain or add beach width along the entire profile above the seaward limit of significant transport, and the pre-project profile shape is maintained. Therefore, the beach width from project construction is added directly to the pre-project beach width, and the damages recomputed in relation to the shoreline recession distance. Figure 1 and Figure 2 show the Duval County without project conditions of recession versus damages for the 1978 and the 1989 shoreline. The data for these figures which include the 10 miles of project beach in Duval County were developed by the storm damage model.

7. The storm damage prevention benefits attributed to the project are the without-project damages for the 1978 pre-project shoreline conditions minus the with-project damages. Table 4 summarizes the annual damages to structures, backfill, and coastal armor along with the values associated with condemned structures and modifications to coastal structures for the 1989 shoreline, 1978 pre-project shoreline, and various alternative berm widths from the Erosion Control Line. The annual damage prevention benefits were computed for the alternative berm width options and for maintaining the shoreline locations of the 1989 and 1978 shoreline. As can be seen from the table, the annual damage prevention benefits for maintaining the 1989 shoreline are approximately equivalent to the benefits of the 1965 authorized project berm width of 60 feet. The 1989 shoreline actually varies in beach width along the county to both greater and lesser than 60 feet of berm width, but was considered an average of 60 feet for the purposes of the storm damage model.

3. A cumulative frequency curve of storm induced recession was developed using the DUNE program. Several beach profiles were averaged to determine a typical beach profile. The resulting storm induced recession for existing conditions is summarized in Table 2. The cumulative frequency versus recession with predicted sea level rise (NRC Curve III) at the year 2028 is shown in Table 2. Based on the use of this shoreline storm response model, a relationship was developed between shoreline recession and storm frequency. By the use of a structural inventory and aerial photography, the relationship between shoreline recession and damage to development was determined.

TABLE 2

DUVAL COUNTY STORM INDUCED RECESSION

Return Interval (Years)	FEMA Recession (Feet)	FEMA Erosion A_e (Cu. Yd./Ft.)	NRC Curve III Recession (Feet)	NRC Curve III Erosion A_e (Cu. Yd./Ft.)	Exceedance Probability
100	235	14.9	260	----	0.010
50	215	12.2	240	13.5	0.020
20	160	6.8	190	9.6	0.050
10	110	3.7	145	5.9	0.100
5	75	2.0	90	3.1	0.200
2	25	---	45	16.5	0.500

Note: Storm induced recession is defined herein as the horizontal distance from the mean high water shoreline to the furthest landward extent of the storm erosion envelope.

4. Damage prevention benefits were determined by using an empirical computer model developed by the Jacksonville District, defined as the Storm Damage Model or SDM. The SDM computes the annual equivalent storm damages to buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments, bulkheads, and replacement of lost backfill. The structural values of buildings were based on the "market values" as determined by the Jacksonville District staff real estate appraisers. The remaining structural improvement values are based on engineering cost estimates.

5. The assessment of damages to existing (1989) development was based on the shore conditions during the 1978 preconstruction beach profile survey as explained under "Project Benefits" of this report. Due to continuing erosion and shoreline recession, future damages to development would be more severe with a given storm. This results in reduced beach width and hence reduced protective value between a structure and the reference (1978) shoreline. Future year damages are simulated in the model by description of the location of the reference shoreline in future years. The location of the reference shoreline is based on the pre-project shoreline recession rate for the problem area. The pre-project shoreline rate was developed from the 1975 Corps of Engineers GDM for Duval County Beaches. A recession rate of 2.4 feet per year was used in that portion of the project beach north of Atlantic Boulevard, while a recession rate of 1.2 feet per year was used for the project beach south of Atlantic

STORM DAMAGE PREVENTION BENEFITS

1. The first step in determining damage prevention benefits is to develop a relationship between shoreline recession and storm events. Expected storm damage was computed using a probabilistic approach incorporating results from a computer model, DUNE. This model, developed by Birkemeier and Sargent (1985), was used to develop the relationship between shoreline recession and storm events. Input to the computer program consists of a prestorm 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 surge frequency.

2. Input data for the computer program was obtained from a variety of sources. Prestorm beach profile data was obtained from the March and June 1989 surveys by the Corps of Engineers. Storm surge levels were obtained from the Federal Emergency Management Agency flood insurance study of the City of Atlantic Beach, Florida, Duval County (FEMA 1989) and from Report 7 of the Wave Information Study series (Ebersole 1982). Deep water significant wave height data was obtained from Report No. 6 of the Wave Information Study series (Corson et al. 1982). Table 1 summarizes the surge levels and wave heights for the study area for existing conditions. Summaries of surge level estimates for the study area with sea level rise (National Research Council (NRC) Curve III) at the year 2028 are also shown in Table 1. The NRC Curve III is used as a "high" estimate since it represents a substantial eustatic sea level rise within the range of upper limits established in other studies. Median grain size of the beach material 0.19 millimeters, and is based on information presented earlier in this report. An average ocean surface water of 70.7 degrees Fahrenheit was used (Brahtz 1968).

TABLE 1

DUNE MODEL SURGE LEVEL AND WAVE INPUT DATA

Return Interval (Years)	FEMA Surge Level (Feet)	FEMA Wave Height (Feet)	NRC Curve III Surge Level (Feet)	NRC Curve III Exceedance Probability
100	11.0	16.5	12.0	0.010
50	9.8	15.5	10.8	0.020
20	5.3 1/	14.9	9.0	0.050
10	6.6	14.5	7.6	0.100
5	5.1 2/	14.1	6.1	0.200
2	2.7 2/	13.5	3.7	0.500

1/ Interpolated value from FEMA data.

2/ WIS Report 7 data (1982) for Mayport adjusted for high tide.

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APPENDIX A

STORM DAMAGE PREVENTION BENEFITS

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117. 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.

Bruce A. Malson
Colonel, U.S. Army
District Engineer

TABLE 8-12 (Cont)

DEMAND CURVE RELATIONSHIP CALCULATIONS OF PRICE AND VISITATION USING A 10-MILE INTERVAL

50 Miles Additional Distance at A $ 5.20 Price

Zone Origin	Population	Distance (in Miles)	Visits Per Capita	Estimated Visitation
1	69,559	59.60	0.50	34,780
2	339,184	82.16	0.15	50,878
3	136,235	96.54	0.00	0
			Total	85,657

60 Miles Additional Distance at a $ 6.24 Price

1	69,559	69.60	0.15	10,434
2	339,184	92.16	0.00	0
3	136,235	106.54	0.00	0
			Total	10,434

TABLE B-12

DEMAND CURVE RELATIONSHIP-CALCULATIONS OF PRICE AND VISITATION USING A 10-MILE INTERVAL

Zone Origin	Population	Distance (in Miles)	Visits Per Capita	Estimated Visitation
0 Miles Additional Distance at A $ 0.00 Price				
1	69,559	9.60	4.00	278,236
2	339,184	32.16	1.77	600,356
3	136,235	46.54	0.94	128,061
			Total	1,006,653
10 Miles Additional Distance at a $ 1.04 Price				
1	69,559	19.60	2.60	180,853
2	339,184	42.16	1.87	634,274
3	136,235	56.54	1.35	183,917
			Total	999,045
20 Miles Additional Distance at a $ 2.08 Price				
1	69,559	29.60	1.87	130,075
2	339,184	52.16	1.35	457,898
3	136,235	66.54	0.87	118,524
			Total	706,498
30 Miles Additional Distance at a $ 3.12 Price				
1	69,559	39.60	1.35	93,905
2	339,184	62.16	0.87	295,090
3	136,235	76.54	0.50	68,118
			Total	457,112
40 Miles Additional Distance at a $ 4.16 Price				
1	69,559	49.60	0.87	60,516
2	339,184	72.16	0.50	169,592
3	136,235	86.54	0.15	20,435
			Total	250,544

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 further and further from the potential users, requiring them to pay more and more in travel costs (An example of the calculations involved in this process is shown in table B-12).

A demand curve which relates the expected visitations at varying price levels was plotted as figure B-2. The area under the curve represents the average value of visits to the entire county beaches. The computed value of these visits is $3,085,800. The average value per visit is computed by dividing this value by the total number of visits in the analysis (1,006,653). The average value per visit is $3.07. A value of $3.07 was used in the analysis of recreation benefits.

CALCULATION OF RECREATION BENEFITS

Recreation benefits for Duval County are the product of the value of a visit ($3.07) and the visitors attributed to the 75 foot project versus the pre-project conditions (Table B-5 & B-6). The benefits related to the project years from that table are as follows.

	1990	2000	2010	2020	2028
Table B-5 & B-6 (visitors attributed 75 ft Project)	135,800	437,800	1,415,000	2,560,700	3,716,500
Benefits from Project (visitors X $3.07)	$416,900	$1,344,000	$4,344,000	$7,861,350	$11,409,700

The average annual recreation benefits attributable to the beaches in Duval County were computed by amortizing the present worth of the benefits to the project over the 38 year period remaining in the project life. Benefits were calculated at 8 7/8 and 10 percent interest rate. The recreation benefits at 8 7/8 and 10 percent equal $2,108,500 and $1,917,500, respectively.

TABLE B-11

TOTAL AND AVERAGE TRAVEL COST

Zone	MWATD (MI)	Round Trip (MI)	Parking (MI)	Total Dist	Cost Per Mi	Cost Per Hr	Vel (MPH)	Total Cost	Unit Cost
1	4.30	8.60	1.0	9.60	.074	3.29	30.	1.23	.128
2	15.58	31.16	1.0	32.16	.074	3.29	40.	3.24	.101
3	22.77	45.54	1.0	46.54	.074	3.29	50.	3.92	.084
							Avg Cost/Mi		$ .104

persons and the population is comprised of 24.2 percent children and 75.8 percent adults. The average occupancy of each automobile would be comprised of 3.03 adults and 0.97 children. The weighted opportunity cost of time per hour per visitor would be $3.29 and would be computed as follows:

$$\frac{(0.97 \times 1.31) + (3.03 \times 3.93)}{4} = \$3.29$$

Based on the previous discussion and assuming an increasing average speed as the distance from the beach increases (more expressway travel), the total cost required to access the beach and return is given on table B-13. Notice that 1 mile has been added to the commuting distance to allow for parking. The total cost of travel per beach visitor from the previously established origin zones as shown in table B-11 is summarized by the following equation:

Total Cost of Travel = Out-of-Pocket Cost + Opportunity Cost of Time

where,

$$\text{Out-of-Pocket Cost} = \frac{D \times CM}{4};$$

$$\text{Opportunity Cost of Time} = \frac{D \times CH}{V}; \text{ and}$$

D = total distance
CM = cost per mile
CH = cost per hour
V = velocity
4 = number of persons per vehicle

Average Value of Travel

Values utilized for price which include travel cost and opportunity cost were converted to a price per person per mile for each zone by dividing the price per person by the weighted mean round trip distance in that zone. Price per person per mile computed for the three zones is 12.8¢, 10.1¢, and 8.4¢, respectively. The difference in these values is mainly attributable to different travel times reflected in opportunity cost. An average value of 10.4¢ was calculated for the three zones as shown on table B-11.

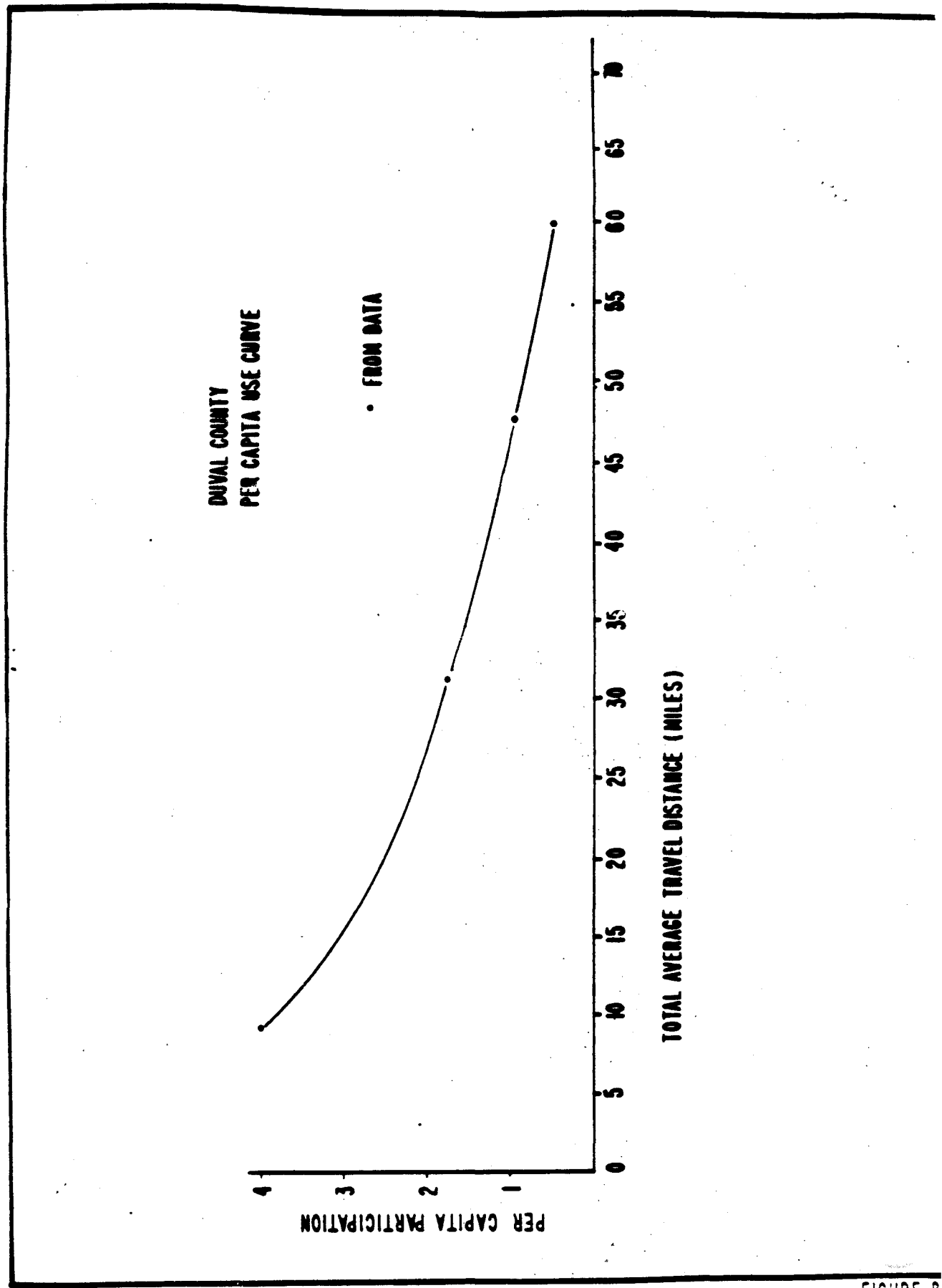

DUVAL COUNTY
PER CAPITA USE CURVE
• FROM DATA
PER CAPITA PARTICIPATION
TOTAL AVERAGE TRAVEL DISTANCE (MILES)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
1
2
3
4

FIGURE B

A per capita utilization curve which relates per capita participation and travel distance was derived by drawing a smooth curve through the average participation rate computed for the eight zones and their respective mean weighted round trip travel distances. This curve is illustrated in figure B-1. A mean weighted round trip travel distance of 46 miles was determined as the point where no further day beach use could be expected.

Cost of Travel

The cost of travel is comprised of the out-of-pocket travel cost and the opportunity cost of time. The values for the out-of-pocket travel cost are based on the AAA Booklet, "Your Driving Costs 1988 Edition". The travel cost per mile is determined as an average variable cost per mile.

Average Variable Cost to Operate an Automobile
(cents per mile)

1988 Variable Cost	Intermediate	Compact	Subcompact	Average
Gas and Oil	5.7	5.2	4.0	5.0
Maintenance	1.7	1.6	1.4	1.6
Tires	.9	.8	.7	.8

The out-of-pocket travel cost from the table is 7.4

According to ER 1105-2-100 (15 dec 89), the opportunity cost of leisure time is valued as one half the after tax wage rate for adults, and the value of leisure time for children is one third of the adult rate. The 1989 average hourly State-wide wage rate of $10.48 was derived from information obtained from the Florida Sate Department of Labor and Employment Security. The after taxes rate was estimated to be $7.86 per hour. Using the formula from ER 1105-2-100, the adult opportunity cost of time is $3.93 ($7.86/2) and the children's opportunity cost of time is $1.31 ($3.93/3). It is assumed each automobile is occupied by four

TABLE B-9

MEAN WEIGHTED AVERAGE TRAVEL DISTANCES (MWATD)

Zone No.	Subzone No.	Subzone Population	Zone Population	Zone Partic	Distance One-way	One-way MWATD	RDTRIP MWATD
1	I	36,960	69,559	4.00	1.7	4.30	8.59
	M	10,338			5.0		
	O	22,261			8.3		
2	I	86,731	339,184	1.77	11.7	15.58	31.17
	M	106,418			15.0		
	O	146,035			18.3		
3	I	99,998	136,235	0.94	21.7	22.77	45.53
	M	27,525			25.0		
	O	8,712			28.3		

c. A compilation was made for each major 10-mile zone by subzone. The tract population for each subzone per zip code was established. The compilation is summarized in table B-7.

Zone Per Capita Use Rate

30. The participation rates for beach visitations in Duval County were obtained from a statistical survey made by the State of Florida. The total number of beach visitations 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 zone. The sum of these visitations per zip code were summated to obtain the total zone visitation. The total zone visitation when divided by the zone population gives the average zone participation rate shown on table B-8.

TABLE B-8

AVERAGE PARTICIPATION RATE

Distances (mi)	Subzone	Participation Rate	1980 Population	1980 Participation
3.3	1 Inner	7.70	36,960	284,592
6.6	1 Middle	2.00	10,338	20,676
10.	1 Outer	2.32	22,261	51,646
13.3	2 Inner	1.90	86,731	164,789
16.6	2 Middle	1.76	106,418	187,296
20.	2 Outer	1.58 1/	146,035	230,735
23.3	3 Inner	1.39	99,998	138,997
26.6	3 Middle	.95 1/	27,525	26,149
30.	3 Outer	.5	8,712	4,356
33.3	4 Inner 2/	Avg. Per Capita		1,109,236
36.6	4 Middle 2/	Rate = $\frac{1,109,236}{544,978}$ = 2.04		
40.	4 Outer 2/			

1/ Participation rate averaged from adjacent subzones.
2/ Population and participation rate limited and therefore not included.

Travel Distance Computation

31. Travel distance is of paramount importance when using the travel cost method as a proxy for willingness to pay for a beach visit. The utilization of subzones allows the determination of a mean weighted average travel distance (MWATD) for each zone. The MWATD for each zone was calculated by first taking the distance from the centroid of each 3.3-mile-wide subzone and multiplying it by the subzone population. The number thus obtained for each subzone was summated for each zone (3 subzones) and this cumulative value was divided by the total zone population to obtain the MWATD for these distances in miles shown on table B-9.

TABLE B-7

POPULATION BY SUBZONE

Subzone	1980 Population (1980 Census)
1 Inner	36,960
1 Middle	10,338
1 Outer	22,261
2 Inner	86,731
2 Middle	106,418
2 Outer	146,035
3 Inner	99,998
3 Middle	27,525
3 Outer	8,712
4 Inner	3,501
4 Middle	1,838
4 Outer	919
Total	551,236

h. Average values in each zone computed in "g" and equate to a price per person per mile.

i. Calculate total demand from all zones as point on price - demand curve where price equals 0.0.

j. Simulate moving the Duval County ocean coast seaward using 10-mile increments.

k. For each simulation estimate per capita participation from the per capita use relationship and compute estimated demand for each zone.

l. For each simulation plot price vs. demand on a composite demand curve.

m. Estimate value of a beach visit by dividing the area under the curve developed by step i, j, k, and l by the total demand.

Origin Zones

Selection of the origin zones was based on the unique geography of northeast Florida in which Duval County is located. An area with radius of 40 miles was selected to keep the one-way travel time within 1 hour in keeping with day users within Duval County.

Considering the intersection of the three major east-west access highways and the shorefront as mile 0, four 10-mile-wide origin zones lying equidistant to the nearest beach area were plotted on a 1980 census tract county map. The equidistance of the zones was maintained by drawing circles whose radius increased by 10-mile increments. The circles originate from the ocean beach area fronting the most direct access route from the mainland to the barrier island beaches. These access routes consists of the following roads from west to east: Atlantic Boulevard, Beach Boulevard, and J. Turner Butler Boulevard.

For a better population grouping definition each of the 10 zones were subdivided into 3.3-mile-wide subzones which correspond to the Inner (I), Middle (M), and Outer (O) with respect to location within the zone.

Population Distribution

The population in each zone was established by using block statistics derived from the U.S. Department of Commerce 1980 Census of Housing for Duval County, Florida. The methodology used to establish population groupings was as follows:

a. The tract numbers were identified and located on the master 1980 census tract map.

b. The zone and zip codes in which these tracts were located were noted along with the population from each tract.

TABLE B-5 & B-6

ANNUAL BEACH VISITS (X 1,000) *

ATTENDANCE CATEGORIES	DAYS	1990	2000	2010	2020	2028
	(1974 PRE-PROJECT CONDITIONS)					
1	6	141.6	106.1	81.4	65.1	51.0
2	20	472.1	353.7	271.5	217.1	170.1
3	25	590.2	442.1	339.3	271.4	212.6
4	163	2116.2	2525.0	2212.4	1769.7	1386.0
	TOTAL	3320.1	3426.9	2904.6	2323.3	1819.7
	(75 FOOT PROJECT)					
1	6	157.8	157.8	157.8	157.8	157.8
2	20	525.3	525.3	525.3	525.3	525.3
3	25	656.6	656.6	656.6	656.6	656.6
4	163	2116.2	2525.0	2979.9	3544.3	4196.5
	TOTAL	3455.9	3864.7	4319.6	4884	5536.2
VISITS ATTRIBUTED TO 75 FOOT PROJECT VS. PRE-PROJECT CONDITIONS		135.8	437.8	1415	2560.7	3716.5

* Values restrained by beach capacity and available parking.

The total annual visits allocated to the project area beach were determined considering the carrying capacity of pre-project existing conditions and the 75-foot recommended plan (Table B-4), the demand for recreational use as shown in Table B-3, and the capacity restricted by the existing parking. The results of this analysis are shown in Table B-5 and Table B-6. The recreation use attributed to the 75-foot project was determined from the difference between the pre-project condition visits and the 75-foot project visits.

VALUE OF BEACH VISIT

25. The travel cost method was used to determine the value of a beach visit. The basic 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 would be determined by dividing the area under the Cost of Travel vs. Beach Activity Demand Curve by the total anhual demand. The procedures which comprise the analysis are listed below and discussed in the following paragraphs.

a. Considering the Duval County ocean coast as mile 0, establish 10-mile-wide origin zones that lie equal distance to the coast.

b. Establish population of each zone.

c. Establish beach-use demand in each zone.

d. Establish per capita beach-use rate in each zone.

e. Establish mean round trip distance for each zone and establish a per capita use relationship (per capita participation rate vs. mean round trip travel distance).

f. Compute travel and opportunity costs per person for each zone for a given trip.

g. Adjust travel and opportunity costs for round trip distance and compute "f" on a per mile basis for each zone.

TABLE B-4

COMPARISON OF CARRYING CAPACITIES

1974 PRE-PROJECT CONDITIONS CARRYING CAPACITY *

	1990	2000	2010	2020	2028
AREA (sq ft)	1,180,288	884,144	678,637	542,857	425,159
CAPACITY	23,606	17,683	13,573	10,857	8,503

75-FOOT PROJECT PLAN CARRYING CAPACITY

AREA (sq ft)	6,123,000	6,123,000	6,123,000	6,123,000	6,123,000
CAPACITY	122,460	122,460	122,460	122,460	122,460

* Calculated from tables A-4, pg. A-12, Duval County General Design Memorandum (Aug 1975).

TABLE B-3

PROJECTED BEACH ACTIVITY DEMAND
(X 1,000)

ttendance ategories	Days	1990	2000	2010	2020	2028
1	6	796.6	950.5	1121.7	1334.2	1579.7
2	20	1848.7	2205.7	2603.1	3096.2	3665.9
3	25	1319.6	1574.5	1858.1	2210.1	2616.8
4	163	2116.2	2525.0	2979.9	3544.3	4196.5
Total		6,081.1	7,255.6	8,562.8	10,184.8	12,058.9

TABLE B-2

ANNUAL BEACH ACTIVITY DEMAND (X 1,000)

YEAR	COUNTY PARTICIP. RATE	COUNTY RESIDENTS	STATE PARTICIP. RATE	STATE RESIDENTS	STATE TOURISTS PARTICIP. RATE	COUNTY TOURISTS	TOTAL ANNUAL COUNTY DEMAND	ANNUAL DEMAND FOR PROJECT AREA**
1990	2.04	707.3	0.038	12,986	1.96	2,189	6,227	6,081
2000	2.04	783.4	0.038	15,431	1.96	2,676	7,429	7,256
2010	2.04	833.0	0.038	17,457	1.96	3,268	8,768	8,563
2020	2.04	923.1	0.038	19,344	1.96	3,985	10,429	10,185
2028	2.04	995.0 *	0.038	20,854 *	1.96	4,860	12,348	12,059

* Based on interpolated data from 1988 Florida Statistical Abstract.

** Demand reduced to account for 2.33 percent of total demand at Talbot Island State Park, based on 1982 attendance.

Ps = Constant from State survey = Participation rate of residents from other Florida counties who recreate on Duval County beaches
Pt = Constant from State survey = Participation rate tourist to Duval County.
Nc = County resident population
Ns = State population
Nt = County tourist population
K = Constant for adjusting calculated demand to reflect actual counted beach visits = Actual county demand

Data from the visitor counts at the access points on 29 May 1983 would not provide a representative k factor for adjusting demand since rain occurred at 10:30 a.m. and continued intermittently until it rained heavily at 3 p.m. A k factor of 1.0 is considered applicable for use based upon the information available from the State survey. Table B-2 indicates the data utilized in computing the annual demand at 10-year intervals.

Projected beach activity demand by user group for the county beaches is summarized in table B-3. The values shown in this table were computed by applying the annual demands shown in table B-2 to the percentages listed in table B-1. This computation distributes the annual demand into use patterns based on attendance data for the study area.

Carrying Capacity. The pre-project recreational beach area in 1974 was 1,796,750 square feet. The carrying capacity, considering 100 square feet per person and a turnover ratio of 2 per day, was 39,900. The recommended plan project dimensions are a level berm 75 feet wide at +11 feet MLW with a foreshore slope as would be shaped by waves. This was estimated to be 1 vertical on 20 horizontal to mean high water, 1V:30H from mean high water to mean low water, and 1V:45H from mean low water to the existing bottom. The total project dry beach width available for recreation is 130 feet. This figure was calculated by adjusting the dry beach amount of 195 feet from the Erosion Control line to the project mean high water line by the 65 feet that is used for grassing and fencing.

Table B-4 indicates the carrying capacity of the 75 foot project design plan compared to the 1974 pre-project carrying capacity. The length of available beach indicated is from the south limit of Mayport Naval Station to the Duval-St. Johns County line, since the 5,700 feet of shorefront at the Mayport Naval Station base is utilized only by Navy personnel and their guests. Projected future beach carrying capacities are based upon data contained in the 1975 General Design Memorandum for the 1974 pre-project carrying capacities and upon the calculated carrying capacity for the 75 foot berm project beach. The carrying capacity for the project beach is equal to 130 feet, mentioned above, times the length of 47,100 feet (52,800 - 5700) or 6,123,000 square feet.

records for 1 year at Kathryn Abby Hanna park were selected for an analysis of the patterns of beach use. User groups were derived by ranking attendance records in descending order. Each day's attendance was divided by the attendance for the year to determine the percentage of yearly participat attributable to that day. To reduce the number of groups and simplify computational process, groups with similar percentages were averaged. The net result was four user groups representing 214 days in the year. These user groups are shown in table B-1. For example, the records indicate that user group no. 1 consists of six weekend days in May and June. This would be considered a peak-day category.

TABLE B-1

USER GROUPS ATTENDANCE CATEGORIES

Attendance Category	No. of Days In Group	Percent of Total Attendance
1. Peak Days (Holidays)	6	13.1
2. Lesser Peak Days (Holidays & Weekends)	20	30.4
3. Weekends (Seasonal) 1/	25	21.7
4. Weekdays (Seasonal) 1/	163	34.8

1/ Seasonal demand for beach use in North Florida from March through September. The remaining 151 days attendance is attributed to camping at the park and periods of unusually warm weather from October through February.

Annual Beach Use Demand. The annual beach activity demand for the project area at Duval County was determined from data contained in the 1980 Census for population and the 1988 SCORP, which is a statistical analysis by the State of Florida for participation rates and projected per capita use rates for Florida residents and tourists. Census data was utilized in conjunction with data provided by a statistical report by the State of Florida based on information obtained from about 11,000 questionaires on outdoor recreation to evaluate per capita use rates and the user day value by the travel cost method. Attendance records for 1 year at Talbot Island State Park were used to eliminate that portion of the demand from the projected future demand at the project area. The project area carrying capacity was constrained by eliminating the shorefront of the Mayport Naval Station from the project area due to use restricted to Navy personnel. Based upon these data, the annual beach activity demand was determined utilizing the following relationships:

$$CD = (PcNc + PsNs + PtNt)\ K$$

CD = County beach activity demand
Pc = Constant from State survey = participation rate by county residents

AREA UNDER CURVE = $3,085,806

TOTAL VISTORS = 1,006,653

AVERAGE COST PER PERSON = $3.07

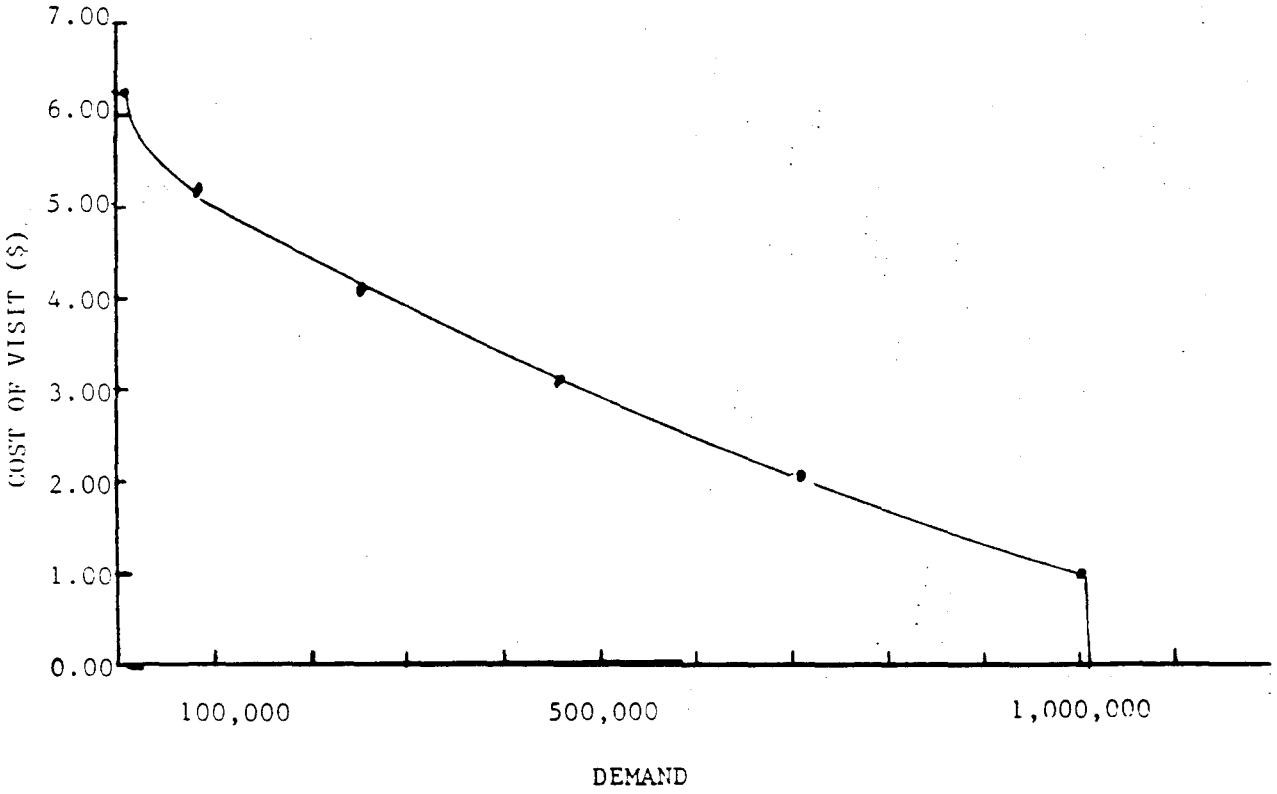


Figure B-2

APPENDIX C

PERTINENT CORRESPONDENCE

JUN 2 4 1988

Planning Division
Coastal Branch

Honorable Thomas L. Hazouri
Mayor of Jacksonville
Jacksonville, Florida 32202

Dear Mayor Hazouri:

You are advised that, in response to your request, a re-evaluation study of the Duval County shore protection project has been initiated.

The study is required to evaluate whether extending Federal participation in the cost of this project, pursuant to the provisions of Section 934 of Public Law 99-662, is warranted.

You will be advised of the study progress and findings as they develop.

Sincerely,

SIGNED: William D. Brown

Robert L. Herndon
Colonel, Corps of Engineers
District Engineer

WILLIAM D. BROWN
Lieutenant Colonel, Corps of Engineers
Deputy District Engineer

OFFICE OF THE MAYOR
THOMAS L. HAZOURI
Jacksonville, Florida
32202

May 18, 1988

Colonel Robert L. Herndon
District Engineer, Jacksonville
U. S. Army Corps of Engineers
P. O. Box 4970
Jacksonville, FL 32232-0019

Subject: Agreement for Beach Renourishment

Dear Colonel Herndon:

Your timely notification that the current Agreement expires in 199(and that a new Agreement must be in process to preclude ex[illegible]ration of the project authorization is very much appreciated.

The City of Jacksonville (Duval County) is very interested in the possibility of continuing the current Agreement for the forty (40) years required under the Water Resources Act of 1987. We request that you initiate the study required by Public Law 99-662 to determine whether further Federal participation is warranted. It is our understanding that the study will indicate the cost effectiveness of continuing this program which, of course, is fundamental to its continuance.

We appreciate the briefing we received from your representative, who gave us a comprehensive review of the program, and the additional benefits available under the revised public law. Should further action be required, please contact the Director of Public Works, S. A. Salem, P. E., at 630-1665 or Walter W. Hogrefe, P. E., project engineer, at 630-1344.

With best wishes and warm regards, I remain

Sincerely yours,

THOMAS L. HAZOURI

TLH:sas

March 30, 1988

Planning Division
Coastal Branch

Mr. S. A. Salem, P.E.
Director of Public Works
220 E. Bay Street
Jacksonville, Florida 32202

Dear Mr. Salem,

This is to provide the information requested by your letter of March 7, 1988 to Colonel Herndon on the Federal Shore Protection project for Duval County. As you suggested, Mr. Walt Hogrefe of your office was contacted to discuss concerns and reservations the city may have in entering into an agreement to extend the period of Federal participation in this project.

The estimated Non-Federal share of the annual cost, based on project costs of nourishment operations since the initial project was completed in 1980 is $635,000. Assuming the state continues to provide up to 75% of the Non-Federal share of the project cost, the annual cost to the city would be about $160,000.

The funding for each periodic nourishment must be available prior to construction and as there are funds to be appropriated at these levels of government, the works must be scheduled as funds are available even though the length of time between periodic nourishments must be extended.

The study to determine if continued Federal participation is warranted would be initiated prior to the termination of the existing agreement with the city and if favorable a new ageeement would be executed. A letter from the mayor would provide stating the city's position would be adequate authority for the Corps of Engineers to proceed with the study.

The Federal cost sharing for shore protection projects was changed by PL99-662. A preliminary evaluation of the Duval County projects cost sharing under current policies and guide lines results in the Federal share of project cost increasing from 58.4% under the existing agreement to about 65% should the reevaluation study prove favorable for continued Federal participation.

As discussed with Mr. Hogrefe, we would be glad to have a Corps of Engineers representative meet with you or other members of city government, to discuss additional information you may need.

Mr. Adil J. Salem
Chief, Planning Division

Equal Opportunity Employer

DEPARTMENT OF PUBLIC WORKS
Office of the Director

March 7, 1988

Col. Robert L. Herndon
District Engineer, Jacksonville
Army Corps of Engineers
P. O. Box 4970
Jacksonville, Florida 32232

Dear Col. Herndon:

Reference your letter of January 25, 1988, I sincerely appreciate your early notification regarding the expiration of the Federal-Duval County Beach Erosion Control Agreement in 1990. It is my understanding that under the current authorized project we will continue to participate during fiscal year 1989, for which Federal funds have been provided. We have included a proposal for this work within our Capital Improvement Program and have also requested the State to include the proposed project within the State Public Works Program for FY 1990. Based on information from personnel in your Planning Division, availability of these funds should approximately coincide with the construction contract availability.

I am sure you will appreciate that the extension of this program for 50 years is a significant and costly undertaking. The time period and potential magnitude of expenditure is certain to generate a great deal of discussion in view of the many demands for support of various programs. It is equally certain that the Administration and the City Council will be thoroughly exploring the arguments for and against this undertaking. The lead time you have provided by your timely notice may be needed before a final decision is made.

Additional information, as noted below, is required to support a resolution that this office will have prepared supporting the extension of the current project. Once it has been submitted to the Mayor's office, it is difficult to forecast just how long various processing steps may take. Since the Corps of Engineers supports the project, I trust that I may count on the support of your office in providing answers to the questions that may be posed during the processing of the project.

Questions that are virtually certain to occur, and that require answers to provide justification to support a request to the City Council for a resolution to continue the project are:

a. Based on the Corps of Engineers experience with the current Duval County project, and similar older projects, what is the anticipated annual expenditure? If not annual, the cost for the periods on which you base your estimates?

b. State funding has been a major contribution to the "local" share, but is not guaranteed. If State funding is not available during a certain period because of other priorities, does the City (County) have the option of deferring renourishment during that period even though the Corps considers it desirable to start?

c. Your letter indicates that a new study must be made to reevaluate the project and its potential benefits. The letter also indicates that the cost of the study would be shared by the City at the time of the next nourishment. Since the study clearly is basic to evaluating the future worth of the project, will it be initiated by the Corps prior to termination of the existing agreement, or does it require a statement of intent from the City prior to its being initiated? Would a letter from the Mayor be considered adequate, or would it require a resolution from the Council? What is the estimated time frame for the study?

d. It is noted that under PL99-662, the local share of the costs would probably decrease as a result of additional work items being eligible for cost sharing. Under the current project, the local share is 41.6% (toward which the State contributes approximately 75% and the City contributes the remaining, or about 25%), and Federal is 58.4%. Can you provide information as to what the new ratio of cost sharing would be?

e. Must a new agreement be in effect prior to the expiration of the current agreement, or can it be "in process"?

Should you have any questions, please feel free to contact my office at 630-1665, or my Project Engineer, Walt Hogrefe, at 630-1344.

Sincerely,

S. A. Salem, P. E.
Director of Public Works

SAS:mb

cc: M. Atalla, Mayor's Office
Honorable C. Suggs, Council President
Bernard J. Shainbrown, CPA
Director of Finance

JAN 2 5 1988

Planning Division
Coastal Branch

Mr. Salem Salem
Director, Department of Public Works
City Hall, Room 1207
220 East Bay Street
Jacksonville, Florida 32202

Dear Mr. Salem:

This is to advise you that the authorization for the Federal Duval County Beach Erosion Control Project, which was limited to 10 years Federal participation, expires in 1990.

Section 934 of the Water Resources Act of 1987 (PL 99-662) authorizes extension of the limited period for periodic beach nourishment from 10 to 50 years. The extension to 50 years is not automatic and the City of Jacksonville must request the extension in writing and express a willingness to cost share in accordance with the Act.

Federal involvement in extension of the beach nourishment period under the provision of Section 934 would constitute a new investment decision. Therefore, a reevaluation of the project must be made using current evaluation criteria. The project must conform with current policies and cost apportionment and cost sharing in accordance with the Act. Extension or modification of the local cooperation agreement between the city and the Federal Government requires approval by the Secretary of the Army.

The study cost will be financed by the Federal Government and if the extension of the periodic beach nourishment is approved, the cost of preparing the reevaluation report will be shared in the same proportion as the allocation of construction costs to the type of benefits accruing from the project. The city would reimburse its share to the Federal Government at the time of construction for the next periodic nourishment through an equal and corresponding reduction in the Federal share of construction costs.

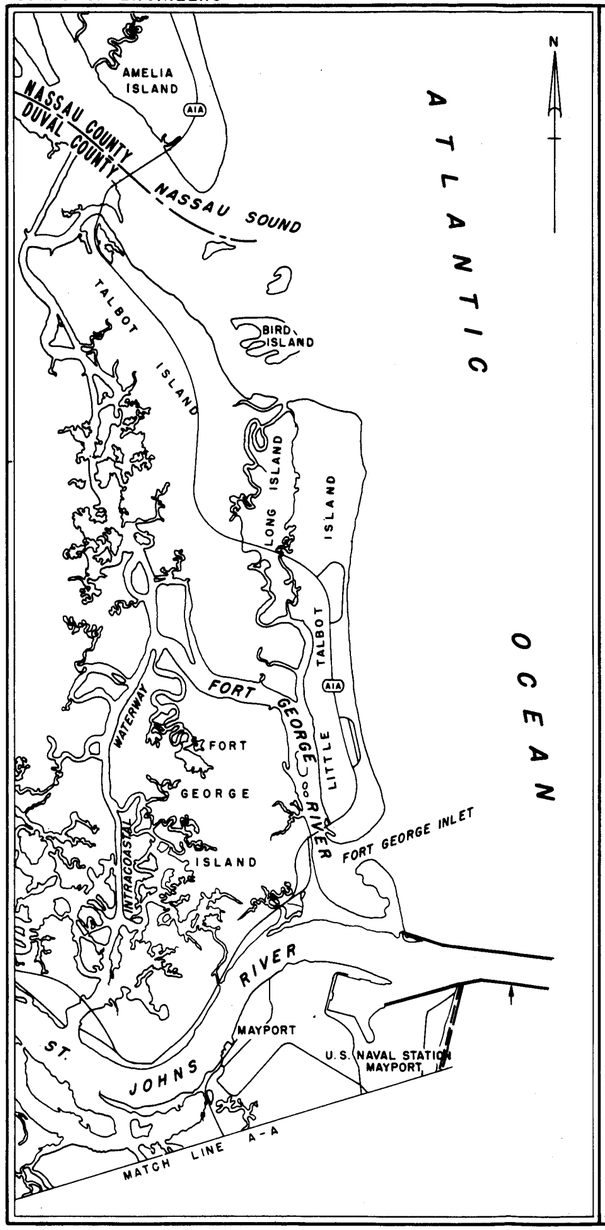
It is also brought to your attention that PL 99-662 provides for other cost, that were previously a non-Federal responsibility, to be cost shared. One example would be the cost of relocations that were found to be needed, and warranted, such as facilities to divert surface water drainage away from the project fill. This is brought up in response to the December 22, 1987 letter from Mr. Richard Fellows, City Manager of Atlantic Beach, a copy of which was furnished to you. A copy of our reply to Mr. Fellows is enclosed for your information.

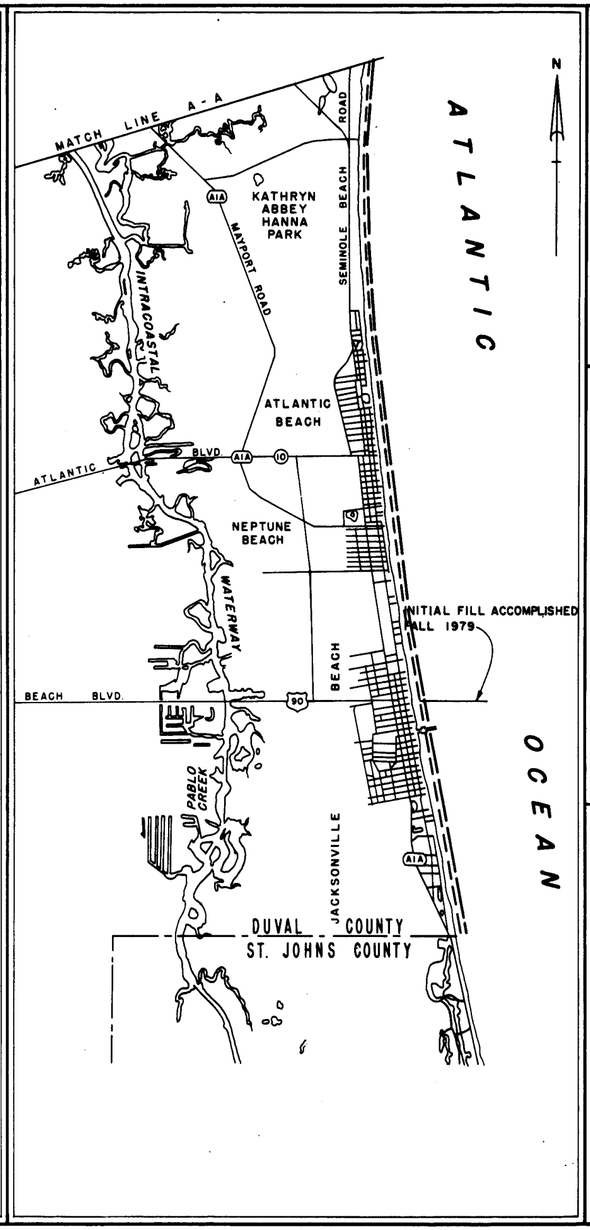
Should you have any questions concerning procedures for initiation of the required study, please contact Mr. Ed Salem at (904) 791-2238.

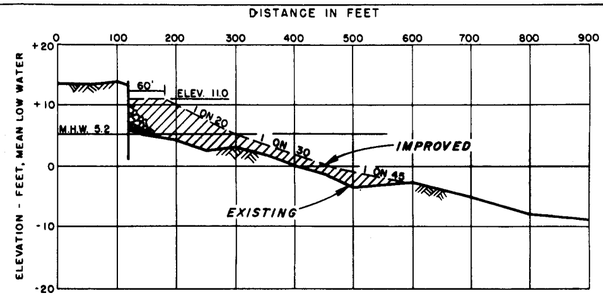
Sincerely,

Robert L. Herndon
Colonel, Corps of Engineers
District Engineer

Enclosure







TYPICAL SECTION

73

PROJECT: Provides for Federal participation in the cost of a project for improvement and protection of the shores of Duval County, Fla., by providing for a protective and recreational beach with a level berm 60 feet wide at elevation 11 feet above m. l. w. and a natural slope seaward as would be shaped by wave action along the 53,000 feet of shore between the St. Johns River jetties and the Duval - St. Johns County line; and periodic nourishment for the first 10 years of project life after completion of the initial fill placement. The Federal shore is 100 percent of the first cost of construction applicable to the Federal shore and 50 percent of the cost applicable to the publicly owned Non-Federal shore and 70 percent of the cost applicable to the Kathryn Abbey Hanna Park shore.

MEAN TIDAL RANGE: 5.2 feet in the Atlantic Ocean at Duval County. Varies from 5.4 feet at Nassau Sound to 4.9 feet at the south jetty of the St. Johns River.

AUTHORIZATION FOR EXISTING PROJECT		
ACT	WORK AUTHORIZED	DOCUMENT
27 Oct. 1965	Federal participation in cost of local shore-protection project.	H. Doc. 273/89/1

LEGEND

- PERIODIC NOURISHMENT AS NEEDED
- INITIAL RESTORATION

DUVAL COUNTY, FLA.
BEACH EROSION CONTROL

SCALE IN MILES
1 0 1 2

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT, CORPS OF ENGINEERS
JACKSONVILLE, FLORIDA
9-30-79

Figure 1