APPENDIX B

Economic Analysis and Benefit Evaluation

Brevard County, Florida Shore Protection Project
Mid-Reach Segment

August 2006
Revised August 2007
Revised August 2008
Revised May 2010
Revised June 2010
Revised December 2010

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Economic Analysis and Benefit Evaluation For
Storm Induced Damages
Brevard County, Florida Shore Protection Project
Mid-Reach Segment

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Economic Analysis and Benefit Evaluation For
Storm Induced Damages
Brevard County, Florida Shore Protection Project
Mid-Reach Segment

INTRODUCTION

1. The purpose of this Appendix is to provide the economic benefits for the Brevard County Shore Protection Project, Mid-Reach Segment. This was accomplished by identifying potential losses that could occur from storm-induced damages to residential, commercial and retail structures along the beach. The analysis assessed the expected damages caused by storms without the project and the National Economic Development (NED) benefits to be derived from improvements based on the expected reduction in storm damages. An analysis of the recreational benefits to be derived from alternative plans was incorporated into the final results.

2. Brevard County is located on the eastern coast of Florida, about midway between Jacksonville and Miami, and about 14 miles south of Port Canaveral. It is comprised of wetlands, marshes, undeveloped land, agricultural, and urban areas. The Mid-Reach Segment is so named as it is in the middle of the county between the Federally authorized and constructed North and South Reaches of the Brevard County Shore Protection Project. The Mid-Reach Segment contains parts of the cities of Satellite Beach, Indian Harbour Beach, Indialantic, and unincorporated Brevard County. The Mid-Reach consists of approximately 7.78 miles of shoreline, from the south end of Patrick Air Force Base to approximately Flug Avenue in Indialantic (from Department of Environmental Protection (DEP) monument R75.4 to R119).

3. The Brevard County Mid-Reach shoreline is impacted by long term erosion of the shoreline, which has reduced the volume of material available to buffer against storm attack. The beach is impacted additionally by periodic storms that have accelerated beach erosion and increased the probability for damage to structures. The Mid-Reach shoreline is affected by both tropical cyclones (tropical depressions, tropical storms and hurricanes) and extra-tropical storms (northeasters). The results are large-scale erosion and dramatic shoreline changes over relatively short periods of time. Under severe storm conditions, super-elevation of water levels and substantial wave energy allows breaking waves to occur at increasing elevations on the beach, increasing the risk of coastal structures to damage. Economic losses are realized when storms damage coastal properties.

4. The beach along Brevard County is also an important recreational resource to the County and a significant part of the County's tax base. Public beach areas are scattered along the length of the shoreline. Recreational use of the beach is taken into account in a recreational benefit analysis of project alternatives.

PREVIOUS STUDIES

5. An economic evaluation of the Mid-Reach segment was included in early efforts of the September 1996 Brevard County Shore Protection Project Feasibility Study. The Mid-Reach segment was removed from the selected plan due to environmental concerns that required further analysis. The General Reevaluation Study was initiated to consider the Mid-Reach segment independently so as to appropriately address all concerns.

6. This Economic Appendix attempts to follow the same principles as that initiated in the Feasibility Study and follow current policy and regulations. New alternative formulation, structural inventory, storm damage assessment, and recreational benefit calculations were completed to identify the NED plan for the Mid-Reach segment.

THE STUDY AREA

7. The Mid-Reach study area extends from the southern end of Patrick Air Force Base (DEP 75.4) south to approximately Flug Avenue in Indialantic (DEP 119) where the Brevard County South Reach project begins. The length of the study area is about 7.78 miles. The study area was divided into six Reaches based on the acreage of nearshore rock. Reach 1 is the farthest south and Reach 6 is the farthest north, as shown in **Table B-1** and **Figure B-1**. These reaches are used in developing the benefits and costs for incremental analysis

Table B-1: Reach Lengths

Reach	Start DEP Monument	End DEP Monument	Reach Length (feet)
Reach 1	R-109	R-119	9,599
Reach 2	R-105.5	R-109	3,406
Reach 3	R-99	R-105.5	6,239
Reach 4	R-93	R-99	5,603
Reach 5	R-83	R-93	9,029
Reach 6	R-75.4	R-83	7,207

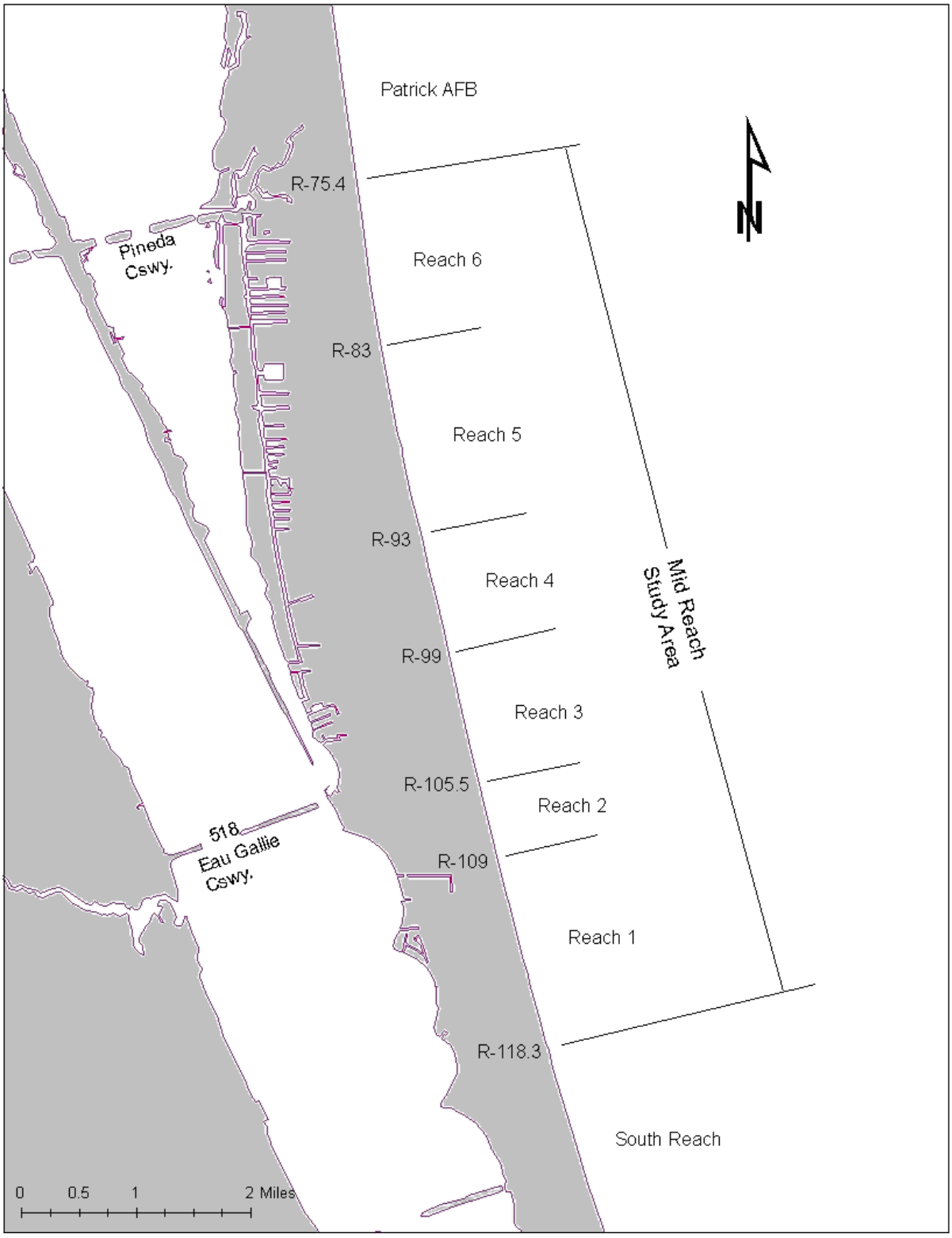


Figure B-1: Brevard Mid-Reach Study Area

Existing Conditions

8. A structural inventory was compiled for all properties vulnerable to coastal waves and surge in the Mid-Reach study area. Jacksonville District real estate specialists completed a physical inspection and field work in April 2005. The real estate values were updated to 2008 price levels using the construction cost index from the Engineering News Record. In addition, information from Brevard County and Olsen Associates 2003 study of the Mid-Reach area was used. The Florida Department of Revenue conducts annual audits for each county to insure that the appropriate values are being used for assessments and that information used to adjust assessments each year has been verified in the market. In Florida, the assessments are based on a depreciated replacement cost and, by law, the assessments are to reflect between 85 to 90% of the market value. The values of structures and improvements used by the county tax appraiser's office were developed using the cost approach. The assessed values for each structure within the project area were obtained from the County. The subject properties were then analyzed to see if any recent sales had occurred and adjusted accordingly. Structure values are presented in 2008 price level and represent the replacement cost of the structure less depreciation. The predominant structures are condominiums and single-family homes, with few commercial/retail structures. Only structures east of Highway A1A were included in the inventory since the storm damage model used in this analysis is based on recession. Highway A1A is a major highway and would protect areas to the west from being impacted by recession.

9. The existence of hazardous material, which may or may not be present on the property, was not observed by the appraiser. The appraiser has no knowledge of the existence of such materials on or in the property. The appraiser, however, is not qualified to detect such substances. The presence of substances such as asbestos, urea-formaldehyde foam insulation or other hazardous materials may affect the value of the property. The value estimate is predicated on the assumption that there is no such material on or in the property that would cause a loss in value. No responsibility is assumed for any such conditions, or for any expertise or engineering knowledge required to discover them. Verification of sales data was not completed as part of this study.

10. Research into the content value from insurance sources and similar USACE projects, indicated a range of content values between 10% and 50% of the structure value. A factor of 25% was applied to the structure values to compute the content value. The structure values are shown in **Table B-2**.

11. Additional information was assembled for the analysis including structure locations, number of floors, year of construction, and coastal armoring. Field investigations, 2004 aerial photography, February 2005 topographic and bathymetric surveys, the Brevard County parcel database, and existing reports were used to gather this information. The majority of structures along the Mid-Reach have no coastal armor. Coastal armor, when present, was inventoried for type and protective

value. A land value of $15 per linear foot was determined by Jacksonville District real estate staff for nearshore properties and adjusted to $16.31 per linear foot using the Consumer Price Index (CPI). The shoreline position change rates were provided by Jacksonville District Engineering Division for each reach along the Mid-Reach based on historical and recent survey information (see **Table B-3**).

12. Three linear measurements were made for each structure in reference to shoreline position: (1) distance to the coastal armor, (2) distance to the face of the structure, and (3) distance to the failure point of the structure. Structures on slabs were assumed to fail at the midpoint of the structure and structures on piles were assumed to fail at the landward point of the structure. The age of the structure was used to aid in determining which method to use, following a Florida building code change in 1985 that required most coastal construction to use pile supports.

13. A relationship between shoreline recession and storm events (surge), presented as frequency in percent occurrence and recession in feet was also developed. A co-operative study between investigators at the Coastal Engineering Research Center [CERC] and the Department of Water Resources Engineering [DWRE] developed a numerical model program [SBEACH] which calculates dune and beach erosion produced by storm waves and water levels. Use of SBEACH is required for beach fill design projects pursuant to a letter dated 28 September 1990 from the Director of Civil Works, Department of the Army. SBEACH was used to analyze shoreline recession in the 1996 Feasibility Study for Brevard County. Review by Jacksonville District coastal engineers concluded that no new information was available that would change the results of that modeling effort and that the storm frequency relationship used in the 1996 study was still relevant to the current Mid-Reach study. Storm induced recession is defined as the horizontal distance from the mean high water shoreline to the furthermost landward extent of the storm erosion envelope. It is assumed that the storm induced recession distance is the predicted mean recession distance for a given surge event.

Table B-2: Structure Values (shown by Reach from north to south)

REACH 6		Structure	Content	Total
Site Name	Street Address	Value	Value (25%)	Value
Pineda Phase I	101 Hwy A1A	$1,490,832	$372,708	$1,863,540
Pineda Phase II	155 Hwy A1A	$3,641,203	$910,301	$4,551,504
Pineda Phase III	175 Hwy A1A	$4,421,113	$1,105,278	$5,526,391
Oceanus I	199 Hwy A1A	$1,958,061	$489,515	$2,447,576
Oceanus II	199 Hwy A1A	$1,958,061	$489,515	$2,447,576
Oceanus III	199 Hwy A1A	$1,958,061	$489,515	$2,447,576
Oceanus IV	199 Hwy A1A	$1,958,061	$489,515	$2,447,576
Sandpiper Towers I	205 Hwy A1A	$5,684,000	$1,421,000	$7,105,000
Flores de Playa	245 Hwy A1A	$8,558,973	$2,139,743	$10,698,716
Ocean Residence N	261 Ocean Residence	$1,070,264	$267,566	$1,337,830
Opal Seas	275 Hwy A1A	$8,925,235	$2,231,309	$11,156,544
Park - State of FL	285 Hwy A1A	$12,753	$0	$12,753
Sea Gull Park		$4,251	$0	$4,251
Silver Sands I	295 Hwy A1A	$6,049,708	$1,512,427	$7,562,135
Silver Sands II	297 Hwy A1A	$6,345,000	$1,586,250	$7,931,250
Sea Breakers	307 Hwy A1A	$1,316,804	$329,201	$1,646,005
Horizon II	401 Hwy A1A	$4,683,396	$1,170,849	$5,854,245
Horizon I	403 Hwy A1A	$4,206,550	$1,051,638	$5,258,188
Horizon III	405 Hwy A1A	$4,511,732	$1,127,933	$5,639,665
Horizon IV	407 Hwy A1A	$5,178,319	$1,294,580	$6,472,899
SPRA Park	501 Hwy A1A	$108,321	$0	$108,321
parking lot		$108,321	$0	$108,321
parking lot		$108,321	$0	$108,321
Las Brisas I	537 Hwy A1A	$956,650	$239,163	$1,195,813
Las Brisas II	553 Hwy A1A	$986,320	$246,580	$1,232,900
Monaco Condo	571 Hwy A1A	$2,884,143	$721,036	$3,605,179
Monaco Condo		$2,884,143	$721,036	$3,605,179
Monaco Condo	579 Hwy A1A	$2,922,996	$730,749	$3,653,745
Monaco Condo		$2,922,996	$730,749	$3,653,745
TIITF - State of FL		$1	$0	$1
City of Satellite Beach		$1	$0	$1
Brevard County		$1	$0	$1
Brevard County	815 Hwy A1A	$67,871	$0	$67,871
City of Satellite Beach	North part of parcel	$1	$0	$1
Subtotal Reach 6		$87,882,463	$21,868,156	$109,750,619

REACH 5		Structure	Content	Total
Site Name	Street Address	Value	Value (25%)	Value
City of Satellite Beach	South Part of Parcel	$1	$0	$1
TIITF - State of FL		$1	$0	$1
New House	905 Hwy A1A	$1,079,232	$269,808	$1,349,040
Vacant		$1	$0	$1
Majesty Palm Condo	925 Hwy A1A	$7,957,600	$1,989,400	$9,947,000
Vacant	951 Hwy A1A	$1	$0	$1
Paradise Beach Club	975 Hwy A1A	$5,684,000	$1,421,000	$7,105,000
Oceana Beach Club	1035 Hwy A1A	$5,742,464	$1,435,616	$7,178,080

Table B-2 continued

New House	1055 Hwy A1A	$1,086,166	$271,542	$1,357,708
Drug Store	1077 Hwy A1A	$243,600	$60,900	$304,500
The Oceans	1085 Hwy A1A	$15,167,173	$3,791,793	$18,958,966
The Buccaneer Club I	1125 Hwy A1A	$7,522,985	$1,880,746	$9,403,731
The Buccaneer Club II	1125 Hwy A1A	$5,630,603	$1,407,651	$7,038,254
The Buccaneer Condo Apts	1175 Hwy A1A	$11,038,028	$2,759,507	$13,797,535
Seamark	1195 Hwy A1A	$924,147	$231,037	$1,155,184
Las Olas	1215 Hwy A1A	$10,033,981	$2,508,495	$12,542,476
House	10 Park Ave	$487,200	$121,800	$609,000
House	20 Park Ave	$487,200	$121,800	$609,000
House	30 Park Ave	$487,200	$121,800	$609,000
Park Avenue	Public R.O.W.	$55,216	$0	$55,216
House	5 Park Ave	$487,200	$121,800	$609,000
House	15 Park Ave	$487,200	$121,800	$609,000
House	1253 Hwy A1A	$487,200	$121,800	$609,000
Sand Castle Condo	1273 Hwy A1A	$4,222,400	$1,055,600	$5,278,000
Sand Castle - pool		$730,800	$0	$730,800
New Construction		$112,000	$28,000	$140,000
City of Satellite Beach	easement	$1	$0	$1
La Colonnade Condo	1303 Hwy A1A	$1,558,140	$389,535	$1,947,675
La Playa East pool & garage		$406,000	$0	$406,000
La Playa East Condo	1343 Hwy A1A	$4,541,613	$1,135,403	$5,677,016
TIITF - State of FL		$1	$0	$1
Misty Shore	1369 Hwy A1A	$5,309,489	$1,327,372	$6,636,861
Jordan Realty	1363 Hwy A1A	$243,600	$60,900	$304,500
Summer Cove	1385 Hwy A1A	$2,011,664	$502,916	$2,514,580
Reflections	1395 Hwy A1A	$2,905,758	$726,440	$3,632,198
City of Satellite Beach	public access	$1	$0	$1
Emerald Shores	1405 Hwy A1A	$5,723,853	$1,430,963	$7,154,816
Sea Villa	1425 Hwy A1A	$3,030,384	$757,596	$3,787,980
East Wind II	1455 Hwy A1A	$4,481,054	$1,120,264	$5,601,318
East Wind I	1465 Hwy A1A	$4,201,305	$1,050,326	$5,251,631
Brevard County	1495 Hwy A1A	$148,823	$0	$148,823
Pelican Beach Park	1525 Hwy A1A	$95,612	$0	$95,612
Subtotal Reach 5		$114,810,897	$28,343,612	$143,154,507

REACH 4		Structure	Content	Total
Site Name	Street Address	Value	Value (25%)	Value
Pelican Beach Park	1525 Hwy A1A	$95,612	$0	$95,612
Brevard County		$1	$0	$1
Brevard County		$1	$0	$1
City of Satellite Beach		$1	$0	$1
City of Satellite Beach		$1	$0	$1
Ocean Royale	1595 Hwy A1A	$1,542,800	$385,700	$1,928,500
Magnolia Ave	public R.O.W.	$55,216	$0	$55,216

Table B-2 continued

House	610 Ocean Street	$98,625	$24,656	$123,281
House	620 Ocean Street	$65,610	$16,403	$82,013
House	626 Ocean Street	$157,544	$39,386	$196,930
Townhouse	630 Ocean Street	$116,132	$29,033	$145,165
Townhouse	632 Ocean Street	$118,552	$29,638	$148,190
Townhouse	634 Ocean Street	$117,821	$29,455	$147,276
House	638 Ocean Street	$296,591	$74,148	$370,739
House	640 Ocean Street	$221,204	$55,301	$276,505
House	648 Ocean Street	$222,520	$55,630	$278,150
House	609 Ocean Street	$243,600	$60,900	$304,500
Vacant		$1	$0	$1
Magellan Ave	public R.O.W.	$55,216	$0	$55,216
House	1655 Hwy A1A	$243,600	$60,900	$304,500
House		$406,000	$101,500	$507,500
House	1683 Hwy A1A	$555,116	$138,779	$693,895
House	1687 Hwy A1A	$552,160	$138,040	$690,200
City of Satellite Beach		$1	$0	$1
Townhouses	1697 Hwy A1A	$552,160	$138,040	$690,200
Sunrise Ave	public R.O.W.	$64,960	$0	$64,960
City of Satellite Beach		$1	$0	$1
House	715 Beach Street	$321,260	$80,315	$401,575
House	721 Beach Street	$361,453	$90,363	$451,816
House	725 Beach Street	$417,238	$104,310	$521,548
House	735 Beach Street	$406,000	$101,500	$507,500
House	745 Beach Street	$326,749	$81,687	$408,436
City of Satellite Beach		$1	$0	$1
City of Satellite Beach		$1	$0	$1
Palmetto Ave	public R.O.W.	$48,720	$0	$48,720
City of Satellite Beach		$1	$0	$1
City of Satellite Beach		$67,871	$0	$67,871
House	785 Shell Street	$125,583	$31,396	$156,979
House	789 Shell Street	$40,356	$10,089	$50,445
House	795 Shell Street	$40,356	$10,089	$50,445
House	797 Shell Street	$207,872	$51,968	$259,840
Commerical/strip		$32,000	$8,000	$40,000
Vacant	782 Shell Street	$1	$0	$1
Vacant	786 Shell Street	$1	$0	$1
Commerical/strip	1777 Hwy A1A	$32,000	$8,000	$40,000
Volunteer Way	public R.O.W.	$64,960	$0	$64,960
Lantana Condo	1791 Hwy A1A	$4,877,457	$1,219,364	$6,096,821
Lantana Condo	1791 Hwy A1A	$4,877,457	$1,219,364	$6,096,821
Lantana Condo	1791 Hwy A1A	$4,877,457	$1,219,364	$6,096,821
Lantana Condo	1791 Hwy A1A	$4,877,457	$1,219,364	$6,096,821
Bicentennial Park		$129,920	$0	$129,920
Bicentennial Park		$81,200	$0	$81,200
Subtotal Reach 4		$27,994,417	$6,832,686	$34,827,099

Table B-2 continued

REACH 3		Structure	Content	Total
Site Name	Street Address	Value	Value (25%)	Value
Ocean Dunes Drive	public R.O.W.	$64,960	$0	$64,960
Aloha Condo	1891 Hwy A1A	$1,156,831	$289,208	$1,446,039
SatCom Direct	1901 Hwy A1A	$896,448	$224,112	$1,120,560
The Christal II	1907 Hwy A1A	$6,780,735	$1,695,184	$8,475,919
The Christal I	1919 Hwy A1A	$4,239,468	$1,059,867	$5,299,335
Seashore Estates I	1923 Hwy A1A	$2,597,000	$649,250	$3,246,250
Seashore Estates II	1923 Hwy A1A	$2,597,000	$649,250	$3,246,250
Seashore Estates Access	1923 Hwy A1A	$1	$0	$1
TIITF - State of FL		$1	$0	$1
Golden Palm	1941 Hwy A1A	$3,789,563	$947,391	$4,736,954
Serena Shores II	2025 Hwy A1A	$6,008,464	$1,502,116	$7,510,580
Serena Shores I	2035 Hwy A1A	$5,946,394	$1,486,599	$7,432,993
Indian Harbour Bch Club	2055 Hwy A1A	$5,967,639	$1,491,910	$7,459,549
Somerset Condo	2065 Hwy A1A	$14,486,371	$3,621,593	$18,107,964
Somerset Condo	2065 Hwy A1A	$14,486,371	$3,621,593	$18,107,964
Somerset Condo	2065 Hwy A1A	$14,486,371	$3,621,593	$18,107,964
Somerset Condo	2065 Hwy A1A	$14,486,371	$3,621,593	$18,107,964
Oceanique Condo II	2105 Hwy A1A	$3,707,592	$926,898	$4,634,490
Oceanique Condo pool	2105 Hwy A1A	$1	$0	$1
Oceanique Condo I	2105 Hwy A1A	$3,707,592	$926,898	$4,634,490
Millenium Park		$129,470	$0	$129,470
Millenium Park		$129,470	$0	$129,470
Gardenia Condo	2195 Hwy A1A	$10,414,141	$2,603,535	$13,017,676
Ocean Walk Condo	2225 Hwy A1A	$8,120,000	$2,030,000	$10,150,000
Brevard County Comm. Center	2289 Hwy A1A	$198,680	$49,670	$248,350
Wallace Ave	public R.O.W.	$32,480	$0	$32,480
Canova Beach Park	3299 Hwy A1A	$97,440	$0	$97,440
Canova Beach Park	3299 Hwy A1A	$193,532	$48,383	$241,915
Canova Beach Park	3299 Hwy A1A	$193,532	$0	$193,532
Lou's - commercial	3191 N. Hwy A1a	$145,593	$36,398	$181,991
Subtotal Reach 3		$125,059,511	$31,103,040	$156,162,552

Table B-2 continued

REACH 2		Structure	Content	Total
Site Name	Street Number	Value	Value (25%)	Value
Melbourne Ocean Club Condo	3101 N. Hwy A1A	$8,120,000	$2,030,000	$10,150,000
Brevard County		$164,960	$0	$164,960
Vacant		$1	$0	$1
Hilton Hotel	3003 N. Hwy A1A	$7,305,952	$1,826,488	$9,132,440
Villa Riviera	2925 N. Hwy A1A	$4,547,200	$1,136,800	$5,684,000
Coral Palms	2875 N. Hwy A1A	$14,692,362	$3,673,091	$18,365,453
Club Residence	2855 N. Hwy A1A	$2,436,000	$609,000	$3,045,000
Sandy Kaye	2835 N. Hwy A1A	$7,394,120	$1,848,530	$9,242,650
Silver Palms	2805 N. Hwy A1A	$5,760,474	$1,440,119	$7,200,593
Beach Access	easement	$1	$0	$1
Vacant		$1	$0	$1
Vacant		$1	$0	$1
Ocean Sands N	2727 N. Hwy A1A	$5,648,000	$1,412,000	$7,060,000
Ocean Sands S	2725 N. Hwy A1A	$5,648,000	$1,412,000	$7,060,000
Holiday Inn	2605 N. Hwy A1A	$10,241,529	$2,560,382	$12,801,911
Subtotal Reach 2		$71,958,601	$17,948,410	$89,907,011

REACH 1		Structure	Content	Total
Site Name	Street Number	Value	Value (25%)	Value
Brevard County	beach access	$48,720	$0	$48,720
TIITF - State of FL		$1	$0	$1
TIITF - State of FL		$1	$0	$1
Paradise Beach Park	2301 N. Hwy A1A	$64,960	$0	$64,960
Paradise Beach Park	2301 N. Hwy A1A	$113,680	$0	$113,680
Paradise Beach Park	2301 N. Hwy A1A	$1,254,248	$0	$1,254,248
House	2175 N. Hwy A1A	$166,720	$41,680	$208,400
House	2165 N. Hwy A1A	$90,048	$22,512	$112,560
House	2155 N. Hwy A1A	$255,520	$63,880	$319,400
House	2145 N. Hwy A1A	$440,997	$110,249	$551,246
House	2135 N. Hwy A1A	$124,187	$31,047	$155,234
House	2125 N. Hwy A1A	$147,199	$36,800	$183,999
House	2115 N. Hwy A1A	$147,199	$36,800	$183,999
House	2105 N. Hwy A1A	$67,639	$16,910	$84,549
House	2095 N. Hwy A1A	$145,156	$36,289	$181,445
House	2085 N. Hwy A1A	$150,350	$37,588	$187,938
House	2075 N. Hwy A1A	$168,799	$42,200	$210,999
House	2065 N. Hwy A1A	$209,122	$52,281	$261,403
House	2055 N. Hwy A1A	$364,181	$91,045	$455,226
House	2045 N. Hwy A1A	$248,699	$62,175	$310,874
beach access		$1	$0	$1
House	2035 N. Hwy A1A	$109,116	$27,279	$136,395
House	2025 N. Hwy A1A	$75,272	$18,818	$94,090
House	2015 N. Hwy A1A	$201,928	$50,482	$252,410
House	2005 N. Hwy A1A	$110,285	$27,571	$137,856
Vacant		$1	$0	$1
House	1965 N. Hwy A1A	$32,480	$8,120	$40,600
House	1955 N. Hwy A1A	$126,250	$31,563	$157,813
House	1945 N. Hwy A1A	$164,024	$41,006	$205,030
beach access		$1	$0	$1
House	1935 N. Hwy A1A	$146,695	$36,674	$183,369
House	1925 N. Hwy A1A	$122,270	$30,568	$152,838
House	1915 N. Hwy A1A	$320,837	$80,209	$401,046
House	1905 N. Hwy A1A	$767,015	$191,754	$958,769

Table B-2 continued

House	1885 N. Hwy A1A	$226,531	$56,633	$283,164
House	1875 N. Hwy A1A	$363,516	$90,879	$454,395
The Barringer Condo I	1835 N. Hwy A1A	$5,911,912	$1,477,978	$7,389,890
The Barringer II	1845 N. Hwy A1A	$5,799,945	$1,449,986	$7,249,931
Casa Blanca Inn	1805 N. Hwy A1A	$595,683	$148,921	$744,604
Bella Vista	1755 N. Hwy A1A	$3,396,011	$849,003	$4,245,014
Apartments	1745 N. Hwy A1A	$227,360	$56,840	$284,200
Blue Seas Apts.	1725 N. Hwy A1A	$178,640	$44,660	$223,300
Ocean Park Condo	1665 N. Hwy A1A	$10,052,560	$2,513,140	$12,565,700
Brevard County	access	$1	$0	$1
Vacant		$1	$0	$1
Sea Pearl Condo	1575 N. Hwy A1A	$6,761,063	$1,690,266	$8,451,329
Brevard County	access	$1	$0	$1
Outrigger	1555 N. Hwy A1A	$2,718,819	$679,705	$3,398,524
Majestic Shores	1525 N. Hwy A1A	$7,243,076	$1,810,769	$9,053,845
Brevard County	access	$1	$0	$1
Claridge Condo	1515 N. Hwy A1A	$4,161,079	$1,040,270	$5,201,349
Royal Palms	1505 N. Hwy A1A	$4,490,360	$1,122,590	$5,612,950
Vacant		$1	$0	$1
Brevard County	access	$1	$0	$1
The Dunes	1415 N. Hwy A1A	$4,649,739	$1,162,435	$5,812,174
Jade Palm	1345 N. Hwy A1A	$10,994,903	$2,748,726	$13,743,629
Brevard County	access	$1	$0	$1
House	1315 N. Hwy A1A	$237,689	$59,422	$297,111
House	1245 N. Hwy A1A	$214,465	$53,616	$268,081
House	1235 N. Hwy A1A	$247,563	$61,891	$309,454
Brevard County	access	$1	$0	$1
House	1225 N. Hwy A1A	$83,392	$20,848	$104,240
House	1215 N. Hwy A1A	$118,274	$29,569	$147,843
Coral Reef Condo	1177 N. Hwy A1A	$4,484,122	$1,121,031	$5,605,153
House	1163 N. Hwy A1A	$154,181	$38,545	$192,726
TIITF - State of FL	1137 N. Hwy A1A	$1	$0	$1
Brevard County	access	$1	$0	$1
House	1135 N. Hwy A1A	$118,274	$29,569	$147,843
Subtotal Reach 1		$79,812,768	$19,582,790	$99,395,560

Table B-3: Shoreline Position Change Rate by Reach

	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6
Reach Limits	R119-R109	R109-R105.5	R105.5-R99	R99-R93	R93-R83	R83-R75.4
Recession Rate (ft/yr)	0.71	0.58	0.84	0.81	1.01	0.60

Future Conditions Without Project

14. Future damages without the project in place would be more severe than existing damages under without project conditions due to continuous erosion and shoreline position change. This would result in reduced beach widths and reduced protective value between damageable structures and the future shoreline position. Damages would be expected to increase as the amount of protective beach area decreased over time. It is assumed that the coastal armor would be sufficient to halt long term erosion, but would not halt recession of the shoreline associated with a storm that would cause erosion greater than its protective value (for example in **Table B-4**, armor type 2, with a protective value of 135 feet from the mean high water line would protect against storms just under the 0.20 annual probability, i.e. the 5-year frequency event).

15. The level of development in the storm damage benefit analysis is the same as the existing condition. Although there is some precedence to include growth, a conservative approach was followed wherein the existing level of development was maintained into the future.

THE BASIC METHODOLOGY OF THE STUDY

16. The basic method was to analyze structures susceptible to damages from storm events. The collected existing information was catalogued into an electronic database. Inputs into the database consisted of damageable structures by their type, the number of floors occupied, the proximity of each damageable structure to a mean high water line, the lot sizes and each structure's value.

17. Estimating damages and benefits that would occur were based on the use of the Storm Damage Model (SDM). This computer model calculated damages based on recession of the beach in proximity of each damageable structure (i.e. change in shoreline position). The estimated benefits were based on the reduction in losses if an alternative solution was in place.

STORM DAMAGE MODEL

The Jacksonville District has developed a Windows based empirical computer model named the Storm Damage Model (SDM), which simulates damages at existing and future years. The model also computes average annual equivalent

damages. The model uses data developed from storm frequencies and shoreline recessions along with data which describes each structure and computes expected damages to each structure. The SDM model used the input from SBEACH to estimate the recession. The SBEACH engineering model predict the storm response recession of the beach profile, using inputs of both waves and surge. The SDM model is based on recession and does not have separate damage functions for waves or surge.

18. The model takes into account the risk and uncertainty of the input data to statistically determine the storm damage. For the purposes of analysis, storm damage is defined as the damage incurred by the temporary loss of a given amount of shoreline as a direct result of erosion caused by a storm of a given magnitude and frequency. In addition to residential structures, storm damages were calculated for commercial and public buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments, bulkheads, replacement of lost backfill etc. The SDM used in this analysis does not have a flood damage component. The SDM can be used in a deterministic mode and a statistical mode. In deterministic mode, the model does not account for the risk and uncertainty of the input data. In this mode, the model produces similar results as earlier versions of the SDM. In statistical mode, the model runs a number of iterations (set by the user) to approximate the risk and uncertainty in the data. The model will output data for each iteration and a running average of all of the iterations. The greater the number of iterations, the smaller the standard error of estimate. For this study, 1000 iterations were used and the standard error of estimate is near an asymptotic value. A seed number of 1701 was used, which allows the statistical results of the model to be reproduced.

19. The initial step in how the storm damage model computes damages is based on the relationships between storm frequencies and shoreline recessions and expected damages to each structure from a given storm of a given magnitude. Continuous erosion and shoreline position change result in reduced beach width and hence reduced protective value between a structure and the expected shoreline position. The location of the expected shoreline position for each year is based on the historical shoreline erosion on a per year basis. The erosion rates for each reach are shown in **Table B-3**. After the relationship between shoreline erosion and damage is determined, relationships between the probability of an occurrence of a storm event and damage is then determined by assigning probabilities from a frequency-recession curve for each existing condition and each future time increment. The relationship between probability and damage was then determined by tabulating total damage estimates for varying frequency storm events. Due to continuing erosion and shoreline recession over time, future damages to development would be more severe with a given storm under without project conditions. Therefore, the shoreline recession-damage relationship was modified to accommodate the expected shoreline position in future years with respect to the reference shoreline. Future year damages were simulated by determining the location of the shoreline in future years using the different erosion rates. Future long-term recession is halted at the year a without project seawall or protective

structure is encountered. Replacement armor is included, following the assumption that property owners would repair existing armor or install new armor once their properties become threatened. The model only allows replacement armor once, with subsequent years of no armor. In some instances, future damages could be less, if a coastal armor replacement index is selected which provides greater protection than the current coastal armor type. From a frequency-damage curve average annual equivalent damages for each project condition were calculated. Using this information, a frequency-damage relationship was constructed for each year of the project life. The resulting estimates of expected damages were converted to an average annual equivalent basis using the FY2008 interest rate of 4.875% (4 7/8%) and 2008 price levels for a 50-year period of analysis starting in 2010. The estimation of damage reduction benefits attributable to the with project condition was determined by comparing the without project damages to those for the with project conditions. The difference between the two is damage reduction benefits.

Assumptions

20. The assumptions used in the development of the estimate of annual storm damages are listed in the following paragraphs.

21. The shoreline recession rate calculated from historical data will remain constant for the duration of the study period.

22. Damages to improvements would not occur until shoreline recession has exceeded the seaward edge of the improvement.

23. When the shoreline receded halfway through a damageable structure of two stories or less built slab-on-grade, the structure would be considered a total loss [a single family house for example].

24. When the shoreline receded completely through a damageable structure with more than two stories built on deeply embedded pilings, the structural value of only the bottom two floors would be considered lost [a condominium as an example].

25. If a damageable structure of two stories or less built slab-on-grade is less than one-half undermined, damage would be assumed to be equal to the product of the structure's value and the ratio of the horizontal distance eroded through the structure divided by one-half the distance from the structure's seaward face to it's landward face.

26. If a damageable structure of two stories or more built on deeply embedded pilings is less than completely undermined, damage would be assumed to be equal to the product of the value of the structure's first two stories and the ratio of the horizontal distance eroded through the structure divided by the distance from the structure's seaward face to it's landward face.

27. All market values of damageable structures were estimated using a version of the cost approach to value [replacement cost new less depreciation], where replacement cost new implies replacing a building using materials and standards having a utility equivalent to the subject structure prior to the damaging event.

28. Seawalls, revetments and other coastal armor would stop all damages from long term erosion and from storm events that would cause shoreline erosion less than or equal to their protective value.

29. Although shorefront areas continue to develop through time, damage estimates are limited to existing buildings and structures.

30. Repair costs to the coastal armor were determined by current engineering estimates of replacement and/or repair costs of such work.

31. After a damageable structure fails, the shorefront development, roads, parking lots, etc., would be repaired to a condition similar to and in the same location as the pre-storm condition. The SDM assumes the damaged element would be rebuilt by the next cycle (year).

32. If no coastal armor is existing, the distance to coastal armor is set at 134 feet or equal to the 5-year storm event. This distance is required by the model and sets the location of replacement armor. This assumption in practice would approximate a property owner that allowed some erosion to occur before funding a coastal armor project for their property.

33. Local ordinances for construction of new coastal armor were researched in the selection of a replacement armor type.

34. The Mid-Reach analysis was performed not using the condemnation function available within the SDM program. Team discussions took place about what would be the most likely future without project condition. It was agreed that following the history of very few condemnations in Florida, no condemnation would be included either manually or using the function. Instead, it was agreed that property owners were more likely to armor their properties rather than be bought out. For the model runs, it is assumed that once threatened, all residential and commercial properties will build replacement armor. Vacant parcels and public lands (parks) will have no armor.

Storm Damage Model Input

35. The collected information and assumptions were assembled into the input format for the storm damage model. Each reach was input separably so that the damages in the future without project and future with project conditions could be

examined for each reach. An example input file for the storm damage model is shown in **Table B-4**.

36. Shoreline Position. The assessment of damages to the existing development is based on the present conditions. Continuous erosion and shoreline position change results in reduced beach width and hence reduced protective value between a structure and the referenced shoreline. Therefore, damage to development is expected to be more severe with a given storm in future time periods. 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 historical shoreline position change rate for the study area. **Table B-3** shows the rates by reach used to calculate the shoreline positions over the project life. Therefore, the shoreline position input information is different for each reach. In the risk mode of operation, the SDM applies a normal distribution to the shoreline position. For each iteration the model randomly selects a shoreline position within the normal distribution with the given standard deviation. Standard deviations and ranges of uncertainty are assigned to certain variables in the risk file described in **Table B-5**.

37. Storm Frequency Recessions. Recession rates (frequency recession) are also given in **Tables B-4**. The recession rates are the same for all reaches. The number of storm return periods and associated shoreline recessions is also given in the risk data file. The standard deviation is given in the risk file and used to randomly select a recession for each return period in each iteration.

38. Coastal Protective Armor. Field inspections were made to determine the existing type and the general location of coastal armor. The coastal protective armor types were grouped and categorized by the level of protection each provided, the unit cost, the ability of the armor to halt shoreline position change, and a damage factor. The level of protection provided by each armor type was based on field inspection and engineering judgment and represents the amount of shoreline recession each type of armor would prevent until failure. In the risk mode, this variable is randomized using a uniform distribution. The end points of the distribution are assigned in the risk data file. The unit replacement cost per linear foot was based on engineering cost estimates. The replacement cost is variable based on parameters input into the risk file to account for uncertainty in the cost. The damage factor was the percent of armor repair/replacement needed after failure.

39. Backfill Cost. A cost of backfill is included to account for fill behind replacement coastal armor in future years. In risk mode, the SDM randomizes the unit costs of the backfill with a normal distribution. The mean value is input in the SDM input file and the standard deviation is assigned in the risk data file.

40. Damageable Structure Values. The structure values tabulated in **Table B-2** are used in the SDM input file along with other values used to describe each property.

The structure values used in this analysis contain the best available up-to-date information collected by Real Estate Division to reflect replacement cost less depreciation. In risk mode, additional parameters are used to describe the structure cost uncertainty. The model internally calculates the standard deviation associated with the structure value given in the main input file.

41. Physical Dimensions. The physical dimensions pertaining to damageable structures were defined by structure locations relative to the referenced shoreline and coastal armor, lot widths, and if the damageable structure was built slab-on grade or above the ground on pilings. The data that defined the lot widths and distances to the shoreline were provided from aerial photography and the Brevard County Property Tax Office. Lot widths were defined in linear feet along the oceanfront. Examples of physical dimensions are shown in **Tables B-4**. In risk mode, the model applies a normal distribution to the distances from the armor and structure to the reference shoreline. The normal distribution is based upon a standard deviation of the measured distances. In the case of damageable structures such as single-family homes or condominiums built slab-on-grade, the full value distance point is the mid-point or center of the damageable structures. If a damageable structure was built on pilings, the full value distance would be the landward face of the structure.

Table B-4: Example Input to Storm Damage Model

Reach 6 - Brevard Mid-Reach

2010, 50 - Baseline Year, period of analysis

1.8 - Shoreline position in Year Zero

Year	Shoreline Position	Year	Shoreline Position	Year	Shoreline Position	Year	Shoreline Position	Year	Shoreline Position
2010	2.4	2011	3.0	2012	3.6	2013	4.2	2014	4.8
2015	5.4	2016	6.0	2017	6.6	2018	7.2	2019	7.8
2020	8.4	2021	9.0	2022	9.6	2023	10.2	2024	10.8
2025	11.4	2026	12.0	2027	12.6	2028	13.2	2029	13.8
2030	14.4	2031	15.0	2032	15.6	2033	16.2	2034	16.8
2035	17.4	2036	18.0	2037	18.6	2038	19.2	2039	19.8
2040	20.4	2041	21.0	2042	21.6	2043	22.2	2044	22.8
2045	23.4	2046	24.0	2047	24.6	2048	25.2	2049	25.8
2050	26.4	2051	27.0	2052	27.6	2053	28.2	2054	28.8
2055	29.4	2056	30.0	2057	30.6	2058	31.2	2059	31.8

11 - Number of probabilities

Probability	Recession (ft)	Return Period (yrs)
0	500	
0.005	214	"200 year"
0.007	209	"150 year"
0.01	196	"100 year"
0.013	184	"75 year"
0.02	164	"50 year"
0.04	156	"25 year"
0.1	148	"10 year"
0.2	134	"5 year"
0.5	111	"2 year"
1	24	"1 year"

7 - Number of Armor Types

Armor No.	Description of Armor	Unit Cost	Level of Protection	Erosion Halted?	% Replace
1	"No Coastal Armor"	$0	0	0	0
2	"CSP-Small"	$1,070	135	1	1
3	"CSP-Medium"	$1,610	150	1	1
4	"RR-Minimum"	$750	120	0	1
5	"Geotextile Tubes"	$320	135	1	1
6	"RR-Small"	$1,070	150	1	1
7	"RR-Large"	$1,860	175	1	1

$1.22 - Cost of Backfill per cubic yard

Site Name	Total Value	Lot Width	Number Floors	Existing Armor	Replacem't Armor	Dist Armor	Dist Front	Dist Failure	Type Parcel	Land Value	Duplicate	DEP Monument	Condemn on/off
"Pineda Phase I"	$2,048,030	400	1	1	5	134	170	190	"VC"	-1	0	"R-75.4"	0
"Pineda Phase II"	$5,002,103	330	4	1	5	134	155	215	"VC"	-1	0		0
"Pineda Phase III"	$6,073,504	270	4	1	5	134	155	220	"VC"	-1	0	"R-76"	0
"Oceanus I"	$2,689,886	240	2	3	5	80	85	110	"VC"	-1	0		0
"Oceanus II"	$2,689,886	240	2	3	5	80	180	210	"VC"	-1	1		0
"Oceanus III"	$2,689,886	240	2	3	5	80	85	110	"VC"	-1	0		0
"Oceanus IV"	$2,689,886	240	2	3	5	80	180	210	"VC"	-1	1	"R-77"	0
"Sandpiper Towers I"	$7,808,395	250	6	3	5	40	60	215	"VC"	-1	0		0
"Flores de Playa"	$11,757,889	250	5	1	5	134	185	275	"VC"	-1	0		0
"Ocean Residence N"	$1,470,275	230	2	1	5	134	160	190	"VC"	-1	0		0
"Opal Seas"	$12,261,042	260	6	1	5	134	175	270	"VC"	-1	0	"R-78"	0
"Park - State of FL"	$14,016	150	1	1	1	134	183	189	"PC"	-1	0		0
"Sea Gull Park	$4,672	50	1	1	1	134	190	195	"PC"	-1	0		0
"Silver Sands I"	$8,310,786	350	5	1	5	90	190	260	"VC"	-1	0		0
"Silver Sands II"	$8,716,444	300	5	1	5	90	190	265	"VC"	-1	0		0
"Sea Breakers"	$1,808,959	200	2	2	5	110	135	190	"VC"	-1	0	"R-79"	0
"Horizon II"	$6,433,815	150	6	1	5	134	170	250	"VC"	-1	0		0
"Horizon I"	$5,778,748	220	6	1	5	134	165	245	"VC"	-1	0		0
"Horizon III"	$6,197,992	150	6	1	5	134	155	240	"VC"	-1	0		0
"Horizon IV"	$7,113,716	220	7	1	5	134	155	240	"VC"	-1	0		0
"SPRA Park	$119,045	200	1	1	1	125	130	131	"PC"	-1	0	"R-80"	0
"parking lot"	$119,045	75	1	1	1	125	150	190	"PC"	-1	1		0
"parking lot"	$119,045	75	1	1	1	125	150	190	"PC"	-1	1		0
"Las Brisas I"	$1,314,198	230	1	1	5	134	140	170	"VC"	-1	0		0
"Las Brisas II"	$1,354,957	190	1	1	5	134	140	170	"VC"	-1	0		0
"Monaco Condo"	$3,962,091	90	7	1	5	134	140	230	"VC"	-1	0		0
"Monaco Condo"	$3,962,091	150	7	1	5	134	140	230	"VC"	-1	0		0
"Monaco Condo"	$4,015,466	85	7	1	5	134	140	230	"VC"	-1	0		0
"Monaco Condo"	$4,015,466	110	7	1	5	134	140	230	"VC"	-1	0	"R-81"	0
"TIITF - State of FL"	$1	100	1	1	1	134	135	136	"PN"	-1	0		0
"City of Satellite Beach"	$1	1100	1	1	1	134	135	136	"PN"	-1	0	"R-82"	0
"Brevard County"	$1	135	1	1	1	134	135	136	"PN"	-1	0		0
"Brevard County"	$74,590	115	1	1	1	134	145	150	"PC"	-1	0		0
"City of Satellite Beach"	$1	440	1	1	1	134	135	136	"PN"	-1	0	"R-83"	0

Table B-5: Risk File

Reach 6 - Brevard Mid-Reach, risk specification file	
0.06	std dev of shoreline position 10% of value
0.1	armor cost uncertainty
0.1	structure value uncertainty
2.5	std dev of distance measurements
0.125	std dev of backfill cost
11	number of probabilities in storm recession curve
19	std dev of recession
20	std dev of recession
21	std dev of recession
29	std dev of recession
31	std dev of recession
32	std dev of recession
13	std dev of recession
3	std dev of recession
3	std dev of recession
3	std dev of recession
3	std dev of recession
1,0,0	armor number, lower limit of protection, upper limit of protection
2,111,148	armor number, lower limit of protection, upper limit of protection
3,140,160	armor number, lower limit of protection, upper limit of protection
4,90,140	armor number, lower limit of protection, upper limit of protection
5,111,148	armor number, lower limit of protection, upper limit of protection
6,140,160	armor number, lower limit of protection, upper limit of protection
7,160,190	armor number, lower limit of protection, upper limit of protection
9999,9999,9999	end

ASSESSMENT OF STORM DAMAGES

42. The Storm Damage Model simulated damages that were based on the existing and future year conditions and computed average annual equivalent damages associated with those conditions. The resulting damages were displayed in a spreadsheet as damages to structures, damages to the coastal armor, damages to the backfill (land area between the coastal armor and the structure), and damages as a result of loss of land. Damages forecasted to affect structures near the shoreline included damage to buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments and bulkheads etc. Although individual “damage elements” such as pools, patios, parking, utilities, etc., were not separately evaluated and quantified in the SDM analysis, damages to armor such as seawalls, revetments, and bulkheads were accounted for by the model. Damages to armor were calculated based on estimated cost per linear foot of individual armor types present. The values for each reach in the future without project condition are shown in **Table B-6**.

43. SDM model runs were developed to simulate the future with project condition and associated damages. The model allows user input of a future shoreline position

that can be used to simulate a beach fill condition. In a typical beach nourishment project, a design fill is constructed and a sacrificial advanced fill is placed seaward of the design fill. The advanced fill is allowed to erode naturally until close to the design fill, then a renourishment construction project replaces the advanced fill. In the Brevard County Mid-Reach analysis, the storm damage benefits are derived from the design fill only with no benefit calculated for the advanced fill. The alternatives evaluated were described in terms of the design fill seaward advancement of the mean high water line. **Table B-7** displays the assumptions used in the SDM for the with project shoreline extensions. The first future with project alternative is "Alternative Plan number 3 with a 10 foot extension of the MHW in Reach 1. This means that the with project condition is a 10 foot seaward movement of the mean high water line. Other beach fill alternatives were evaluated in the same manner with the appropriate movement of the shoreline position. In the Dune and Vegetation alternative, the future with project condition will be the addition of small amount of fill landward of the mean high water line. The effect of this fill will be to halt the shoreline position change in future years. The input parameters for the SDM used a 1 foot extension of the mean high water line to approximate this alternative, as an input value of 0 feet is not allowed in the model. The combination alternatives consider a seawall in the future with project condition. The input file for this alternative was modified to place a coastal armor type of the appropriate level of protection in the existing armor column.

44. During the course of the study Reach 5 was separated into Reach 5A and Reach 5B. One of the alternatives is a seawall, which is a coastal armor type that is constructed parallel to the shoreline along the bluff or dune line. This type of construction is within the Coastal Management Zone which is permitted by the State of Florida Department of Environmental Protection. Construction is restricted to properties that are vulnerable to the 15-year storm. Approximately 28% of the properties along the Mid-Reach study area are vulnerable to the 15-year storm. However, many are scattered in a fashion that makes implementation engineeringly unfeasible. A portion of Reach 5 totally 3,320 feet of shoreline fit the criteria and was separated out for analysis as Reach 5A. Reach 5B is the remainder of the parcels within Reach 5 that do not fit the criteria for a seawall. For a complete analysis of all alternatives, Reach 5A and Reach 5B were run using the SDM and benefits calculated in the future without project condition and the future with project condition.

DEVELOPMENT OF STORM DAMAGE REDUCTION BENEFITS

45. Damage reduction benefits are defined as the difference between estimated average annual equivalent damages under without project conditions and the estimated average annual equivalent damages that will remain if some selected project alternative is in place. In the without project condition, assessment of damages to existing development is a function of the protection afforded by existing widths of beach and dunes. As a result of future erosion, damages to development in the future will tend to be more severe with a given storm due to the fact that the

amount of beach protection between a structure and the shoreline will decrease with time. After the relationships between recession and damage are determined, relationships between probability and damages are then determined by assigning probabilities from the appropriate frequency-recession relationship. This computational process results in without and with project frequency-damage curves for the existing condition and each future time increment analyzed. The frequency-damage relationships are integrated to produce average annual equivalent damages for the without and with project conditions.

46. Storm damage reduction benefits are defined as the total primary benefits derived from the project. Storm damage reduction benefits are summarized in **Table B-6**. The alternative that displays the largest difference between the with and without project average annual equivalent damages is the alternative which will give the greatest primary benefits.

NATIONAL ECONOMIC DEVELOPMENT BENEFITS

47. National Economic Development (NED) benefits are defined in the *Principles & Guidelines Manual* as increases in the total value of goods and services to the Nation from some project which results from a given alternative being selected. Although the optimum project is determined on primary benefits, the total benefits are a summation of both primary and incidental benefits. In addition to the storm damage reduction benefits, recreation benefits were calculated for the Mid-Reach study area. Recreation benefits are secondary benefits and can be added to primary benefits provided they do not equal more than fifty percent of the total NED benefits for project justification.

48. The recreational benefit analysis is provided as an attachment to this appendix. The travel cost method was used to determine the value of a beach visit and the methodology used for the recreational benefit analysis presented in the attachment. The travel cost method consists of deriving a demand curve by using the variable costs of travel and the value of time as proxies for price or willingness to pay for a beach visit.The value of a beach visit based on this analysis was $2.35. This compares to other travel cost method analyses for Broward County Segment III project with a beach visit value of $3.87 and $3.91 for Broward County Segment II.[1] The value may appear to be a little low compared to other reports but there are other quality beaches that are in close proximity to these beaches.

49. Recreation benefits were calculated for each reach and added to the storm damage reduction benefits to produce the total benefits shown in **Table B-6**. Under the with-project condition all project reaches are parking limited. Because parking constraints limit participation, recreational benefits remain constant even if the

[1] Broward County, Florida, Shore Protection Project Segments II and III, General Reevaluation Report Appendixes A through G, prepared by Coastal Planning & Engineering, Inc/ Olsen Associates, June 2003.

proposed project width is increased. The recreational benefit analysis in attachment 2 was completed in 2006 using a discount rate of 5.125 percent. The recreational benefits in **Table B-6** have been updated to 2008 price levels and discounted at 4.875% for this analysis.

50. The total project net benefits and benefit to cost ratios for five of the alternatives are displayed in **Table B-8**. The table also lists the estimated acres of impacted hard bottoms that will be mitigated. The costs shown in **Table B-8** include the costs associated with the mitigation. **Table B-9** display in detail how the average annual equivalents were computed for the periodic renourishments.

Table B-6: Storm Damage Model Benefits Summary

Alternative Plan Description	Alternative Plan Number	SDM AAEQ Damages	SDM AAEQ Benefit	AAEQ Recreation Benefit	Total AAEQ Benefit	SDM AAEQ Damages	SDM AAEQ Benefit	AAEQ Recreation Benefit	Total AAEQ Benefit
		Reach 1				Reach 2			
No Action	0	$678,150				$889,260			
Highest NED Plan feasible	19	$261,220	$416,930	$322,900	$739,830	$231,400	$657,870	$21,300	$679,170
Second Highest NED	3	$261,220	$416,930	$322,900	$739,830	$172,400	$716,860	$21,300	$738,160
Third Highest NED	35	$261,220	$416,930	$322,900	$739,830	$322,670	$566,590	$21,300	$587,890
Local Option 1	67	$54,640	$623,520	$322,900	$946,420	$361,060	$528,210	$21,300	$549,510
Local Option 6	71	$261,220	$416,930	$322,900	$739,830	$231,400	$657,870	$21,300	$679,170
		Reach 3				Reach 4			
No Action	0	$5,137,950				$1,626,900			
Highest NED Plan feasible	19	$698,300	$4,439,660	$234,200	$4,673,860	$843,590	$783,310	$192,900	$976,210
Second Highest NED	3	$698,300	$4,439,660	$234,200	$4,673,860	$843,590	$783,310	$192,900	$976,210
Third Highest NED	35	$698,300	$4,439,660	$234,200	$4,673,860	$843,590	$783,310	$192,900	$976,210
Local Option 1	67	$2,113,970	$3,023,990	$234,200	$3,258,190	$681,000	$945,900	$192,900	$1,138,800
Local Option 6	71	$1,175,860	$3,962,090	$234,200	$4,196,290	$617,230	$1,009,670	$192,900	$1,202,570
		Reach 5				Reach 6			
No Action	0	$5,127,530				$1,675,650			
Highest NED Plan feasible	19	$1,505,310	$3,622,230	$3,800	$3,626,030	$908,820	$766,830	$210,000	$976,830
Second Highest NED	3	$1,505,220	$3,622,310	$3,800	$3,626,110	$908,820	$766,830	$210,000	$976,830
Third Highest NED	35	$1,505,310	$3,622,230	$3,800	$3,626,030	$908,820	$766,830	$210,000	$976,830
Local Option 1	67	$1,690,120	$3,437,410	$3,800	$3,441,210	$685,590	$990,060	$210,000	$1,200,060
Local Option 6	71	$1,505,310	$3,622,230	$3,800	$3,626,030	$908,820	$766,830	$210,000	$976,830
		All Reaches							
No Action	0	$15,135,450							
Highest NED Plan feasible	19	$4,448,620	$10,686,820	$985,100	$11,671,920				
Second Highest NED	3	$4,389,550	$10,745,900	$985,100	$11,731,000				
Third Highest NED	35	$4,539,900	$10,595,550	$985,100	$11,580,650				
Local Option 1	67	$5,586,370	$9,549,080	$985,100	$10,534,180				
Local Option 6	71	$4,699,830	$10,435,610	$985,100	$11,420,710				

Table B-7: Shoreline extension by Reach

Alternative Plan Description	Alternative Plan Number	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6
No Action	0	no action	no action	no action	no action	no action	no action
Highest NED Plan feasible	19	10 foot	20 foot	30 foot	dune	10 foot	dune
Second Highest NED	3	10 foot	30 foot	30 foot	dune	10 foot	dune
Third Highest NED	35	10 foot	10 foot	30 foot	dune	10 foot	dune
Local Option 1	67	S-3B 90 foot	7 foot	7 foot	7 foot	7 foot	7 foot
Local Option 6	72	10 foot	20 foot	20 foot	10 foot	10 foot	dune

Table B-8: Summary of Cost and Benefits

Alternative Plan	Alternative Plan Number	Total First Cost	AAEQ Cost	AAEQ Benefit	Net Benefits	Benefit-Cost Ratio	Hardbottom Impact (Acres)
No Action Plan	0						
Highest NED plan feasible	19	$22,747,650	$2,898,830	$11,671,920	$8,773,090	4.03	2.9
Second highest NED	3	$23,696,660	$2,973,710	$11,731,000	$8,757,290	3.94	3.1
Third highest NED	35	$22,052,680	$2,853,700	$11,580,650	$8,726,950	4.06	2.8
Local Option 1	67	$33,249,260	$3,913,720	$10,534,180	$6,620,450	2.69	3.2
Local Option 6	72	$24,307,660	$3,050,370	$11,420,710	$8,370,340	3.74	3.0

Table B-9: Average Annual Equivalent Calculations

S-3A Beachface Fill			
3			
assumptions:			
yearly inspection	$5,000	per mile	yearly
surveys	$10,000	per mile	2 years
Periodic	$5,117,641	adv nour cost	3 years
	$40,000	Year 1	
Mitig Post Const Phys Survey	$36,000	Year 2	
	$37,800	Year 3	
	$102,000	Year 1	
Miti Post Const Bio Survey	$138,000	Year 2	
	$144,900	Year 3	
First Cost:	$23,696,661		
		First Cost:	$23,696,661
CRF (i=4.875%, n=50)			0.053722
		Annualized First Cost:	$1,273,039
Year	Expenditure	Worth Factor	Present Worth
0		1.000000	$0
1	$180,900	0.953516	$172,491
2	$251,800	0.909193	$228,935
3	$5,300,341	0.866930	$4,595,025
4	$38,900	0.826632	$32,156
5	$77,800	0.788207	$61,322
6	$5,117,641	0.751568	$3,846,254
7	$38,900	0.716632	$27,877
8	$77,800	0.683320	$53,162
9	$5,117,641	0.651557	$3,334,433
10	$38,900	0.621270	$24,167
11	$77,800	0.592391	$46,088
12	$5,117,641	0.564854	$2,890,721
13	$38,900	0.538598	$20,951
14	$77,800	0.513561	$39,955
15	$5,117,641	0.489689	$2,506,053
16	$38,900	0.466926	$18,163
17	$77,800	0.445222	$34,638
18	$5,117,641	0.424526	$2,172,573
19	$38,900	0.404793	$15,746
20	$77,800	0.385976	$30,029
21	$5,117,641	0.368035	$1,883,469
22	$38,900	0.350927	$13,651
23	$77,800	0.334614	$26,033
24	$5,117,641	0.319060	$1,632,836
25	$38,900	0.304229	$11,835
26	$77,800	0.290087	$22,569
27	$5,117,641	0.276603	$1,415,554
28	$38,900	0.263745	$10,260
29	$77,800	0.251485	$19,566
30	$5,117,641	0.239795	$1,227,187
31	$38,900	0.228649	$8,894
32	$77,800	0.218020	$16,962
33	$5,117,641	0.207886	$1,063,885
34	$38,900	0.198222	$7,711
35	$77,800	0.189008	$14,705
36	$5,117,641	0.180222	$922,314
37	$38,900	0.171845	$6,685
38	$77,800	0.163857	$12,748
39	$5,117,641	0.156240	$799,582
40	$38,900	0.148978	$5,795
41	$77,800	0.142053	$11,052
42	$5,117,641	0.135449	$693,181
43	$38,900	0.129153	$5,024
44	$77,800	0.123150	$9,581
45	$5,117,641	0.117425	$600,940
46	$38,900	0.111967	$4,356
47	$77,800	0.106762	$8,306
48	$5,117,641	0.101799	$520,973
49	$38,900	0.097067	$3,776
50	$77,800	0.092555	$7,201
	Total Accumulated		
	Present Worth =		$31,137,369
	CRF (i=4.875%, n=50)		0.053722282
Average Annual Equivalent (AAEQ)			$1,672,771
plus annualized first cost			$1,273,039
plus interest during construction			$27,900
TOTAL AAEQ =			$2,973,709

S-3A Beachface Fill			
19			
assumptions:			
yearly inspection	$5,000	per mile	yearly
surveys	$10,000	per mile	2 years
Beachface	$5,049,903	adv nour cost	3 years
	$40,000	Year 1	
Mitig Post Const Phys Survey	$36,000	Year 2	
	$37,800	Year 3	
	$102,000	Year 1	
Miti Post Const Bio Survey	$138,000	Year 2	
	$144,900	Year 3	
First Cost:	$22,747,645		
		First Cost:	$22,747,645
CRF (i=4.875%, n=50)			0.053722
		Annualized First Cost:	$1,222,055
Year	Expenditure	Worth Factor	Present Worth
0		1.000000	$0
1	$180,900	0.953516	$172,491
2	$251,800	0.909193	$228,935
3	$5,232,603	0.866930	$4,536,301
4	$38,900	0.826632	$32,156
5	$77,800	0.788207	$61,322
6	$5,049,903	0.751568	$3,795,344
7	$38,900	0.716632	$27,877
8	$77,800	0.683320	$53,162
9	$5,049,903	0.651557	$3,290,298
10	$38,900	0.621270	$24,167
11	$77,800	0.592391	$46,088
12	$5,049,903	0.564854	$2,852,459
13	$38,900	0.538598	$20,951
14	$77,800	0.513561	$39,955
15	$5,049,903	0.489689	$2,472,882
16	$38,900	0.466926	$18,163
17	$77,800	0.445222	$34,638
18	$5,049,903	0.424526	$2,143,816
19	$38,900	0.404793	$15,746
20	$77,800	0.385976	$30,029
21	$5,049,903	0.368035	$1,858,539
22	$38,900	0.350927	$13,651
23	$77,800	0.334614	$26,033
24	$5,049,903	0.319060	$1,611,223
25	$38,900	0.304229	$11,835
26	$77,800	0.290087	$22,569
27	$5,049,903	0.276603	$1,396,818
28	$38,900	0.263745	$10,260
29	$77,800	0.251485	$19,566
30	$5,049,903	0.239795	$1,210,943
31	$38,900	0.228649	$8,894
32	$77,800	0.218020	$16,962
33	$5,049,903	0.207886	$1,049,803
34	$38,900	0.198222	$7,711
35	$77,800	0.189008	$14,705
36	$5,049,903	0.180222	$910,106
37	$38,900	0.171845	$6,685
38	$77,800	0.163857	$12,748
39	$5,049,903	0.156240	$788,998
40	$38,900	0.148978	$5,795
41	$77,800	0.142053	$11,052
42	$5,049,903	0.135449	$684,006
43	$38,900	0.129153	$5,024
44	$77,800	0.123150	$9,581
45	$5,049,903	0.117425	$592,986
46	$38,900	0.111967	$4,356
47	$77,800	0.106762	$8,306
48	$5,049,903	0.101799	$514,077
49	$38,900	0.097067	$3,776
50	$77,800	0.092555	$7,201
	Total Accumulated		
	Present Worth =		$30,740,990
	CRF (i=4.875%, n=50)		0.053722282
Average Annual Equivalent (AAEQ)			$1,651,476
plus annualized first cost			$1,222,055
plus interest during construction			$25,300
TOTAL AAEQ =			$2,898,832

Table B-9: Average Annual Equivalent Calculations (continued)

S-3A Beachface Fill			
35			
assumptions:			
yearly inspection	$5,000	per mile	yearly
surveys	$10,000	per mile	2 years
Beachface	$5,027,319	adv nour cost	3 years
Mitig Post Const Phys Survey	$40,000	Year 1	
	$36,000	Year 2	
	$37,800	Year 3	
Miti Post Const Bio Survey	$102,000	Year 1	
	$138,000	Year 2	
	$144,900	Year 3	
First Cost:	$22,052,679		
		First Cost:	$22,052,679
CRF (i=4.875%, n=50)			0.053722
		Annualized First Cost:	$1,184,720
Year	Expenditure	Worth Factor	Present Worth
0		1.000000	$0
1	$180,900	0.953516	$172,491
2	$251,800	0.909193	$228,935
3	$5,210,019	0.866930	$4,516,722
4	$38,900	0.826632	$32,156
5	$77,800	0.788207	$61,322
6	$5,027,319	0.751568	$3,778,371
7	$38,900	0.716632	$27,877
8	$77,800	0.683320	$53,162
9	$5,027,319	0.651557	$3,275,584
10	$38,900	0.621270	$24,167
11	$77,800	0.592391	$46,088
12	$5,027,319	0.564854	$2,839,702
13	$38,900	0.538598	$20,951
14	$77,800	0.513561	$39,955
15	$5,027,319	0.489689	$2,461,823
16	$38,900	0.466926	$18,163
17	$77,800	0.445222	$34,638
18	$5,027,319	0.424526	$2,134,228
19	$38,900	0.404793	$15,746
20	$77,800	0.385976	$30,029
21	$5,027,319	0.368035	$1,850,227
22	$38,900	0.350927	$13,651
23	$77,800	0.334614	$26,033
24	$5,027,319	0.319060	$1,604,017
25	$38,900	0.304229	$11,835
26	$77,800	0.290087	$22,569
27	$5,027,319	0.276603	$1,390,571
28	$38,900	0.263745	$10,260
29	$77,800	0.251485	$19,566
30	$5,027,319	0.239795	$1,205,528
31	$38,900	0.228649	$8,894
32	$77,800	0.218020	$16,962
33	$5,027,319	0.207886	$1,045,108
34	$38,900	0.198222	$7,711
35	$77,800	0.189008	$14,705
36	$5,027,319	0.180222	$906,036
37	$38,900	0.171845	$6,685
38	$77,800	0.163857	$12,748
39	$5,027,319	0.156240	$785,470
40	$38,900	0.148978	$5,795
41	$77,800	0.142053	$11,052
42	$5,027,319	0.135449	$680,947
43	$38,900	0.129153	$5,024
44	$77,800	0.123150	$9,581
45	$5,027,319	0.117425	$590,334
46	$38,900	0.111967	$4,356
47	$77,800	0.106762	$8,306
48	$5,027,319	0.101799	$511,778
49	$38,900	0.097067	$3,776
50	$77,800	0.092555	$7,201
	Total Accumulated		
	Present Worth =		$30,608,837
	CRF (i=4.875%, n=50)		0.053722282
Average Annual Equivalent (AAEQ)			$1,644,377
plus annualized first cost			$1,184,720
plus interest during construction			$24,600
TOTAL AAEQ =			$2,853,697

Local Option 1			
67			
assumptions:			
yearly inspection	$5,000	per mile	yearly
surveys	$10,000	per mile	2 years
Beachface	$4,587,080	adv nour cost	3 years
Conventional	$3,991,153	cost	6 years
Mitig Post Const Phys Survey	$40,000	Year 1	
	$36,000	Year 2	
	$37,800	Year 3	
Miti Post Const Bio Survey	$102,000	Year 1	
	$138,000	Year 2	
	$144,900	Year 3	
First Cost:	$33,249,263		
		First Cost:	$33,249,263
CRF (i=4.875%, n=50)			0.053722
		Annualized First Cost:	$1,786,226
Year	Expenditure	Worth Factor	Present Worth
0		1.000000	$0
1	$180,900	0.953516	$172,491
2	$251,800	0.909193	$228,935
3	$4,769,780	0.866930	$4,135,066
4	$38,900	0.826632	$32,156
5	$77,800	0.788207	$61,322
6	$8,578,233	0.751568	$6,447,124
7	$38,900	0.716632	$27,877
8	$77,800	0.683320	$53,162
9	$4,587,080	0.651557	$2,988,743
10	$38,900	0.621270	$24,167
11	$77,800	0.592391	$46,088
12	$8,578,233	0.564854	$4,845,450
13	$38,900	0.538598	$20,951
14	$77,800	0.513561	$39,955
15	$4,587,080	0.489689	$2,246,243
16	$38,900	0.466926	$18,163
17	$77,800	0.445222	$34,638
18	$8,578,233	0.424526	$3,641,684
19	$38,900	0.404793	$15,746
20	$77,800	0.385976	$30,029
21	$4,587,080	0.368035	$1,688,204
22	$38,900	0.350927	$13,651
23	$77,800	0.334614	$26,033
24	$8,578,233	0.319060	$2,736,973
25	$38,900	0.304229	$11,835
26	$77,800	0.290087	$22,569
27	$4,587,080	0.276603	$1,268,800
28	$38,900	0.263745	$10,260
29	$77,800	0.251485	$19,566
30	$8,578,233	0.239795	$2,057,021
31	$38,900	0.228649	$8,894
32	$77,800	0.218020	$16,962
33	$4,587,080	0.207886	$953,589
34	$38,900	0.198222	$7,711
35	$77,800	0.189008	$14,705
36	$8,578,233	0.180222	$1,545,990
37	$38,900	0.171845	$6,685
38	$77,800	0.163857	$12,748
39	$4,587,080	0.156240	$716,687
40	$38,900	0.148978	$5,795
41	$77,800	0.142053	$11,052
42	$10,573,810	0.135449	$1,432,216
43	$38,900	0.129153	$5,024
44	$77,800	0.123150	$9,581
45	$4,587,080	0.117425	$538,639
46	$38,900	0.111967	$4,356
47	$77,800	0.106762	$8,306
48	$4,587,080	0.101799	$466,962
49	$38,900	0.097067	$3,776
50	$77,800	0.092555	$7,201
	Total Accumulated		
	Present Worth =		$38,741,780
	CRF (i=4.875%, n=50)		0.053722282
Average Annual Equivalent (AAEQ)			$2,081,297
plus annualized first cost			$1,786,226
plus interest during construction			$46,200
TOTAL AAEQ =			$3,913,723

Table B-9: Average Annual Equivalent Calculations (continued)

Local Option 6			
72			
assumptions:			
yearly inspection	$5,000	per mile	yearly
surveys	$10,000	per mile	2 years
Beachface	$5,259,942	adv nour cost	3 years
	$40,000	Year 1	
Mitig Post Const	$36,000	Year 2	
Phys Survey	$37,800	Year 3	
	$102,000	Year 1	
Miti Post Const	$138,000	Year 2	
Bio Survey	$144,900	Year 3	
First Cost:	$24,307,663		
		First Cost:	$24,307,663
CRF (i=4.875%, n=50)			0.053722
		Annualized First Cost:	$1,305,863
Year	Expenditure	Worth Factor	Present Worth
0		1.000000	$0
1	$180,900	0.953516	$172,491
2	$251,800	0.909193	$228,935
3	$5,442,642	0.866930	$4,718,390
4	$38,900	0.826632	$32,156
5	$77,800	0.788207	$61,322
6	$5,259,942	0.751568	$3,953,203
7	$38,900	0.716632	$27,877
8	$77,800	0.683320	$53,162
9	$5,259,942	0.651557	$3,427,151
10	$38,900	0.621270	$24,167
11	$77,800	0.592391	$46,088
12	$5,259,942	0.564854	$2,971,100
13	$38,900	0.538598	$20,951
14	$77,800	0.513561	$39,955
15	$5,259,942	0.489689	$2,575,736
16	$38,900	0.466926	$18,163
17	$77,800	0.445222	$34,638
18	$5,259,942	0.424526	$2,232,983
19	$38,900	0.404793	$15,746
20	$77,800	0.385976	$30,029
21	$5,259,942	0.368035	$1,935,840
22	$38,900	0.350927	$13,651
23	$77,800	0.334614	$26,033
24	$5,259,942	0.319060	$1,678,238
25	$38,900	0.304229	$11,835
26	$77,800	0.290087	$22,569
27	$5,259,942	0.276603	$1,454,915
28	$38,900	0.263745	$10,260
29	$77,800	0.251485	$19,566
30	$5,259,942	0.239795	$1,261,310
31	$38,900	0.228649	$8,894
32	$77,800	0.218020	$16,962
33	$5,259,942	0.207886	$1,093,467
34	$38,900	0.198222	$7,711
35	$77,800	0.189008	$14,705
36	$5,259,942	0.180222	$947,960
37	$38,900	0.171845	$6,685
38	$77,800	0.163857	$12,748
39	$5,259,942	0.156240	$821,815
40	$38,900	0.148978	$5,795
41	$77,800	0.142053	$11,052
42	$5,259,942	0.135449	$712,456
43	$38,900	0.129153	$5,024
44	$77,800	0.123150	$9,581
45	$5,259,942	0.117425	$617,650
46	$38,900	0.111967	$4,356
47	$77,800	0.106762	$8,306
48	$5,259,942	0.101799	$535,459
49	$38,900	0.097067	$3,776
50	$77,800	0.092555	$7,201
		Total Accumulated	
		Present Worth =	$31,970,063
	CRF (i=4.875%, n=50)		0.053722282
Average Annual Equivalent (AAEQ)			$1,717,505
plus annualized first cost			$1,305,863
plus interest during construction			$27,000
TOTAL AAEQ =			$3,050,368

FINAL REVISED NED AND LPP

51. The total project net benefits and benefit to cost ratio were updated using the FY10 discount rate of 4 3/8 (4.375) percent and March 2010 price levels. MCACES MII cost estimates were prepared for the NED plan and the locally preferred plan (LPP). The MCACES MII estimates are in March 2010 price levels. The Total Project Cost Summary (TPCS) was updated to October 2010 price levels. For economic considerations the March 2010 price levels and the FY 2010 discount rate of 4.375 were used in this report which is the discount rate and price levels at time of report submission. The annual operation and maintenance (O&M) cost and the assumptions used to estimate annualized O&M are presented in Table B-10. The O&M include cost for aerial beach profile surveys, yearly inspections surveys and water quality certification permit surveys. Table B-11 display in how the average annual equivalents were computed for the monitoring cost of mitigation and periodic renourishments. The summary of storm damage reduction benefits are presented in Table B-12. The summary of the updated benefits and cost are presented in Table B-13. The recreation benefits in Table B-13 were updated using the appropriate FY10 discount rate of 4 3/8 (4.375) percent and March 2010 price levels. The NED plan has a benefit to cost ratio of 3.02 and the LPP has a benefit to cost ratio of 2.96. Even though the LPP had a slightly lower total cost the NED had more storm damage reduction benefits and therefore higher net benefits.

Table B-10: Annual O&M cost

assumptions:			
Yearly inspection	$5,000	per mile	yearly
Surveys	$10,000	per mile	yearly
WQC surveys	$20,000	per year after 3 years	
Year	Total Expenditure	Present Worth Factor	Present Worth
0		1.000000	$0
1	$116,700	0.958084	$111,808
2	$116,700	0.917925	$107,122
3	$116,700	0.879449	$102,632
4	$136,700	0.842586	$115,181
5	$136,700	0.807268	$110,353
6	$136,700	0.773430	$105,728
7	$136,700	0.741011	$101,296
8	$136,700	0.709951	$97,050
9	$136,700	0.680192	$92,982
10	$136,700	0.651681	$89,085
11	$136,700	0.624365	$85,351
12	$136,700	0.598194	$81,773
13	$136,700	0.573120	$78,346
14	$136,700	0.549097	$75,062
15	$136,700	0.526081	$71,915
16	$136,700	0.504030	$68,901
17	$136,700	0.482903	$66,013
18	$136,700	0.462661	$63,246
19	$136,700	0.443268	$60,595
20	$136,700	0.424688	$58,055
21	$136,700	0.406887	$55,621
22	$136,700	0.389832	$53,290
23	$136,700	0.373492	$51,056
24	$136,700	0.357836	$48,916
25	$136,700	0.342837	$46,866
26	$136,700	0.328467	$44,901
27	$136,700	0.314699	$43,019
28	$136,700	0.301508	$41,216
29	$136,700	0.288870	$39,488
30	$136,700	0.276761	$37,833
31	$136,700	0.265161	$36,247
32	$136,700	0.254046	$34,728
33	$136,700	0.243397	$33,272
34	$136,700	0.233195	$31,878
35	$136,700	0.223420	$30,542
36	$136,700	0.214056	$29,261
37	$136,700	0.205083	$28,035
38	$136,700	0.196487	$26,860
39	$136,700	0.188251	$25,734
40	$136,700	0.180360	$24,655
41	$136,700	0.172800	$23,622
42	$136,700	0.165557	$22,632
43	$136,700	0.158617	$21,683
44	$136,700	0.151969	$20,774
45	$136,700	0.145599	$19,903
46	$136,700	0.139496	$19,069
47	$136,700	0.133649	$18,270
48	$136,700	0.128047	$17,504
49	$136,700	0.122680	$16,770
50	$136,700	0.117537	$16,067
	Total Accumulated		
	Present Worth =		$2,702,209
	CRF (i=4.375%, n=50)		0.049577164
Average Annual Equivalent (AAEQ)			$133,968

Table B-11: Average Annual Equivalent Calculations

NED PLAN			
Beachface	$8,217,706	adv nour cost	3 years
mitigation	$142,000	Year 1	
monitoring	$174,000	year 2	
	$182,700	year 3	
First Cost:	$32,413,704		
		First Cost:	$32,413,704
	CRF (i=4.375%, n=50)		
		Annualized First Cost:	$1,606,980
Year	Total Expenditure	Present Worth Factor	Present Worth
0	$0	1	$0
1	$142,000	0.958083832	$136,048
2	$174,000	0.91792463	$159,719
3	$8,400,406	0.879448747	$7,387,726
4	$0	0.842585626	$0
5	$0	0.807267666	$0
6	$8,217,706	0.773430099	$6,355,821
7	$0	0.741010873	$0
8	$0	0.709950537	$0
9	$8,217,706	0.680192131	$5,589,619
10	$0	0.651681084	$0
11	$0	0.62436511	$0
12	$8,217,706	0.598194118	$4,915,783
13	$0	0.573120113	$0
14	$0	0.549097114	$0
15	$8,217,706	0.526081067	$4,323,179
16	$0	0.504029765	$0
17	$0	0.482902769	$0
18	$8,217,706	0.462661336	$3,802,015
19	$0	0.443268345	$0
20	$0	0.424688235	$0
21	$8,217,706	0.406886932	$3,343,677
22	$0	0.389831791	$0
23	$0	0.373491536	$0
24	$8,217,706	0.357836202	$2,940,593
25	$0	0.34283708	$0
26	$0	0.328466664	$0
27	$8,217,706	0.3146986	$2,586,100
28	$0	0.301507641	$0
29	$0	0.288869596	$0
30	$8,217,706	0.276761289	$2,274,343
31	$0	0.265160517	$0
32	$0	0.254046004	$0
33	$8,217,706	0.243397369	$2,000,168
34	$0	0.233195084	$0
35	$0	0.22342044	$0
36	$8,217,706	0.214055511	$1,759,045
37	$0	0.205083125	$0
38	$0	0.196486826	$0
39	$8,217,706	0.188250851	$1,546,990
40	$0	0.180360097	$0
41	$0	0.172800093	$0
42	$8,217,706	0.165556975	$1,360,498
43	$0	0.158617461	$0
44	$0	0.151968825	$0
45	$8,217,706	0.145598875	$1,196,489
46	$0	0.139495928	$0
47	$0	0.133648793	$0
48	$8,217,706	0.128046748	$1,052,250
49	$0	0.122679519	$0
50	$0	0.117537264	$0
		Total Accumulated	$0
		Present Worth =	$52,730,063
	CRF (i=4.375%, n=50)		
	Average		$2,614,207
plus annualized first cost			$1,606,980
plus interest during construction			$34,343
TOTAL AAEQ =			$4,255,529

The Locally Preferred Plan (LPP)			
Beachface	$8,216,773	adv nour cost	3 years
mitigation	$142,000	Year 1	
monitoring	$174,000	year 2	
	$182,700	year 3	
First Cost:	$32,199,272		
		First Cost:	$32,199,272
	CRF (i=4.375%, n=50)		
		Annualized First Cost:	$1,596,349
Year	Total Expenditure	Present Worth Factor	Present Worth
0	$0	1	$0
1	$142,000	0.958083832	$136,048
2	$174,000	0.91792463	$159,719
3	$8,399,473	0.879448747	$7,386,906
4	$0	0.842585626	$0
5	$0	0.807267666	$0
6	$8,216,773	0.773430099	$6,355,099
7	$0	0.741010873	$0
8	$0	0.709950537	$0
9	$8,216,773	0.680192131	$5,588,984
10	$0	0.651681084	$0
11	$0	0.62436511	$0
12	$8,216,773	0.598194118	$4,915,225
13	$0	0.573120113	$0
14	$0	0.549097114	$0
15	$8,216,773	0.526081067	$4,322,689
16	$0	0.504029765	$0
17	$0	0.482902769	$0
18	$8,216,773	0.462661336	$3,801,583
19	$0	0.443268345	$0
20	$0	0.424688235	$0
21	$8,216,773	0.406886932	$3,343,297
22	$0	0.389831791	$0
23	$0	0.373491536	$0
24	$8,216,773	0.357836202	$2,940,259
25	$0	0.34283708	$0
26	$0	0.328466664	$0
27	$8,216,773	0.3146986	$2,585,807
28	$0	0.301507641	$0
29	$0	0.288869596	$0
30	$8,216,773	0.276761289	$2,274,085
31	$0	0.265160517	$0
32	$0	0.254046004	$0
33	$8,216,773	0.243397369	$1,999,941
34	$0	0.233195084	$0
35	$0	0.22342044	$0
36	$8,216,773	0.214055511	$1,758,845
37	$0	0.205083125	$0
38	$0	0.196486826	$0
39	$8,216,773	0.188250851	$1,546,814
40	$0	0.180360097	$0
41	$0	0.172800093	$0
42	$8,216,773	0.165556975	$1,360,344
43	$0	0.158617461	$0
44	$0	0.151968825	$0
45	$8,216,773	0.145598875	$1,196,353
46	$0	0.139495928	$0
47	$0	0.133648793	$0
48	$8,216,773	0.128046748	$1,052,131
49	$0	0.122679519	$0
50	$0	0.117537264	$0
		Total Accumulated	$0
		Present Worth =	$52,724,129
			$0
	CRF (i=4.375%, n=50)		$0
			$0
	Average		$2,613,913
			$0
plus annualized first cost			$1,596,349
plus interest during construction			$34,147
0			$0
TOTAL AAEQ =			$4,244,408

Table B-12: Storm Damage Benefits by Reach

	NO ACTION	NED		LPP	
	SDM AAEQ Damages	SDM AAEQ Damages	SDM AAEQ Benefit	SDM AAEQ Damages	SDM AAEQ Benefit
Reach 1	$808,472	$273,576	$534,896	$273,576	$534,896
Reach 2	$963,137	$180,942	$782,195	$242,848	$720,289
Reach 3	$5,592,317	$733,086	$4,859,231	$1,234,460	$4,357,857
Reach 4	$1,758,350	$885,373	$872,977	$647,883	$1,110,467
Reach 5	$5,569,987	$1,579,075	$3,990,912	$1,579,075	$3,990,912
Reach 6	$1,805,060	$953,157	$851,903	$953,157	$851,903
Total	$16,497,323	$4,605,209	$11,892,114	$4,930,999	$11,566,324

Notes: AAEQ: Average annual equivalent

Table B-13 Summary of Project Costs and Benefits
(Mar 2010 price levels and 4 3/8 percent)

	NED Plan - Alternative 19	LPP - Local Option 6
Mob/Demob	$2,031,970	$2,031,970
LERRD	$86,100	$86,100
PED	$384,990	$384,990
Engineering Monitoring	$778,840	$778,840
Beach Nourishment Fill	$19,578,660	$19,381,030
Construction Management (S&I)	$2,441,400	$2,424,600
Mitigation	$7,111,740	$7,111,740
Total First Cost	$32,413,700	$32,199,270
Mob/Demob	$708,420	$708,290
LERRD	$86,100	$86,100
PED	$384,990	$384,990
Engineering Monitoring	$140,840	$140,840
Periodic Nourishment Fill	$6,301,510	$6,300,780
Construction Management (S&I)	$595,840	$595,770
Total Each Periodic Nourishment (3 yrs)	$8,217,710	$8,216,770
Annual OMRR&R	$133,970	$133,970
Total Project Cost	$163,896,990	$163,667,640
Interest During Construction	$34,340	$34,150
AAEQ Cost (4 3/8%)	$4,255,530	$4,244,410
Primary AAEQ Benefit	$11,830,210	$11,566,320
Incidental AAEQ Benefit (Recreation)	$1,013,900	$1,013,900
Total AAEQ Benefit	$12,844,110	$12,580,220
Net Benefits	$8,588,580	$8,335,820
Benefit-Cost Ratio	3.02	2.96

Notes: LERRD**:** Land**,** Easements**,** Rights-Of-Way**,** Relocation**,** and Disposal Areas
PED: Planning, Engineering and Design
AAEQ: Average annual equivalent
OMRR&R **:** Operation and Maintenance, Repair, Replacement and Rehabilitation

ATTACHMENT 1

COST EFFECTIVENESS AND INCREMENTAL COST ANALYSIS (CE/ICA)

A mitigation reef is necessary to mitigate the impacts to the nearshore rock from beach renourishment. Cost effectiveness and incremental cost analysis of the mitigation measures was performed using IWR-PLAN decision support software. Engineering Regulation (ER) 1105-2-100 provides guidance for selection of the most cost effective mitigation measure. The mitigation measures which produce expected habitat units are referred to as mitigation plans in this analysis. These mitigation plans are associated with varying acreage which produces varying habitat units. Cost effectiveness and incremental cost analysis begins with a comparison of the average annual costs and outputs of mitigation plans to identify the least cost plan for every level of output (habitat units) considered. Mitigation plans are compared to identify those that would produce greater levels of output at the same cost, or at a lesser cost, as other alternative mitigation plans. Alternative mitigation plans identified through this comparison are the cost effective alternative mitigation plans. Next, through incremental cost analysis, the cost effective alternative plans are compared to identify the most economically efficient alternative plans, that is, the "Best Buy" alternative plans that produce the "biggest bang for the buck." Cost effective plans are compared by examining the additional (incremental) costs for the additional (incremental) amounts of output produced by successively larger cost effective plans. The plans with the lowest incremental costs per unit of output for successively larger levels of output are the "Best Buy" plans. The results of these calculations and comparisons of costs and outputs between alternative plans provide a basis for addressing the decision question "Is it worth it?," i.e., are the additional outputs worth the costs incurred to achieve them?

COSTS

Cost estimates were prepared for two types of proposed mitigation reefs. The proposed mitigation reefs are the Limestone and Marine Mattress and the Articulated Concrete Mattress. Cost estimates for each alternative mitigation acreage plan's construction/implementation have been developed by the Jacksonville District. For this analysis it was assumed that there would be insignificant expenditures for periodically recurring costs for OMRR&R (operation, maintenance, repair, replacement, and rehabilitation) of the mitigation reef. The O&M average annual cost does include the estimated cost of the pre-construction physical survey, post-construction physical survey and the post-construction biological surveys. Details about the mitigation reef construction alternatives and detailed cost can be found in Attachments 1 and 2.

For economic evaluation of alternative plans on a comparable basis, these cost estimates are further refined through present worth calculations, use of appropriate price levels, and consideration of the timing of project expenditures. For purposes of this report and analysis, the cost are expressed in 2008 price levels, and are based on costs estimated to be incurred over a 50-year period of analysis. The timing of when a plan's costs are

incurred is important. Construction and other initial implementation costs cannot simply be added to periodically recurring costs for project operation and maintenance. Also, construction costs incurred in a given year of the project can't simply be added to construction costs incurred in other years if meaningful and direct comparisons of the costs of the different alternatives are to be made. A common practice of equating sums of money across time with their equivalent at an earlier single point in time is the process known as discounting. Through this mathematical process, which involves the use of an interest rate (or discount rate) officially prescribed by Federal policy for use in water resource planning analysis (currently set at 4.875% per year), the cost time streams of each alternative are mathematically translated into a present worth value. An annual value, equivalent to the present worth, can also be computed for the 50-year period of analysis. This average annual value represents an equivalent way of expressing the costs of a plan or alternative. The various costs estimated to be incurred over time to put each plan into place and operating have been computed and expressed as both a present worth value and an average annual equivalent value. Engineering Regulation (ER) 1105-2-100 requires that interest during construction (IDC) be computed which represents the opportunity cost of capital incurred during the construction period. Interest was computed for construction, supervision and administrative (S/A) and planning engineering and design (PED) costs from the middle of the month in which the expenditures were incurred until the first of the month following the estimated construction completion date. Corps guidance (ER 1105-2-100) also requires that average annual equivalent costs be used for cost effectiveness and incremental cost analyses (CE/ICA). Construction, interest during construction (IDC) costs, total investment, present worth, and average annual equivalent costs for varying mitigation reef acreage are presented in Table 1.

Table 1: CALCULATION OF COSTS USED IN COST EFFECTIVENESS ANALYSIS ($)
Articulated Concrete Mattress

Acres	4.64	5	6	7	8	9
Construction	$6,462,910	$6,944,480	$8,282,170	$9,626,470	$10,970,770	$12,315,070
S/A	$674,050	$724,270	$863,780	$1,003,990	$1,144,190	$1,284,390
PED	$792,990	$852,080	$1,016,220	$1,181,160	$1,346,110	$1,511,050
Total Construction	$7,929,950	$8,520,830	$10,162,170	$11,811,620	$13,461,070	$15,110,510
IDC	$136,720	$150,520	$198,440	$257,730	$293,720	$364,450
Total Investment	$8,066,670	$8,671,350	$10,360,610	$12,069,350	$13,754,780	$15,474,960
Average Annual Equivalent Cost	$433,360	$465,840	$556,600	$648,390	$738,940	$831,350
O & M Annual Cost	$25,360	$25,360	$25,360	$25,360	$25,360	$25,360
Total Annual Cost	$458,720	$491,200	$581,950	$673,750	$764,290	$856,710
Benefits Average Annual (habitat units)	2.900	3.125	3.750	4.375	5.000	5.625
Construction Schedule (Months)	7	7	8	9	9	10

Table 1: CALCULATION OF COSTS USED IN COST EFFECTIVENESS ANALYSIS ($) (Continued)

Limestone and Marine Mattress

Acres	4.64	5	6	7	8	9
Construction	$9,949,690	$10,729,670	$12,896,290	$14,985,720	$17,075,150	$19,164,580
S/A	$1,037,700	$1,119,050	$1,345,010	$1,562,930	$1,780,840	$1,998,760
PED	$1,220,820	$1,316,520	$1,582,370	$1,838,740	$2,095,110	$2,351,480
Total Construction	$12,208,210	$13,165,240	$15,823,660	$18,387,380	$20,951,100	$23,514,820
IDC	$322,600	$347,890	$491,450	$656,770	$846,560	$1,061,050
Total Investment	$12,530,810	$13,513,140	$16,315,120	$19,044,150	$21,797,660	$24,575,860
Average Annual Equivalent Cost	$673,180	$725,960	$876,490	$1,023,100	$1,171,020	$1,320,270
O & M Annual Cost	$25,360	$25,360	$25,360	$25,360	$25,360	$25,360
Total Annual Cost	$698,540	$751,310	$901,840	$1,048,450	$1,196,380	$1,345,630
Benefits Average Annual (habitat units)	2.900	3.125	3.750	4.375	5.000	5.625
Construction Schedule (Months)	11	11	13	15	17	19

OUTPUTS (HABITAT UNITS)

Outputs (expressed as habitat units) used for CE/ICA are displayed in Table 2 for both the Limestone and Marine Mattress (LMM) and the Articulated Concrete Mattress (ACM). The basis for the average annual output (expressed as habitat units) used for CE/ICA calculations are based on the mitigation ratio calculated following the State of Florida Uniform Mitigation Assessment Method (UMAM). The detailed documentation of the application of UMAM in this analysis is found in Attachment 3. For this analysis the required mitigation for full compensation was calculated to be 2.9 habitat units. The 2.9 habitat units equate to 4.64 acres of the Articulated Concrete Mattress or 4.64 acres of Limestone and Marine Mattress based on the UMAM analysis. Table 2, Table 3, and Figure 1 show costs and outputs for a range of alternative levels for 4.64 acres to 9 acres of mitigation and the associated habitat units.

TABLE 2: ECOLOGICAL OUTPUTS (AVERAGE ANNUAL HABITAT UNITS) USED FOR CE/ICA (Sorted by cost per habitat unit)

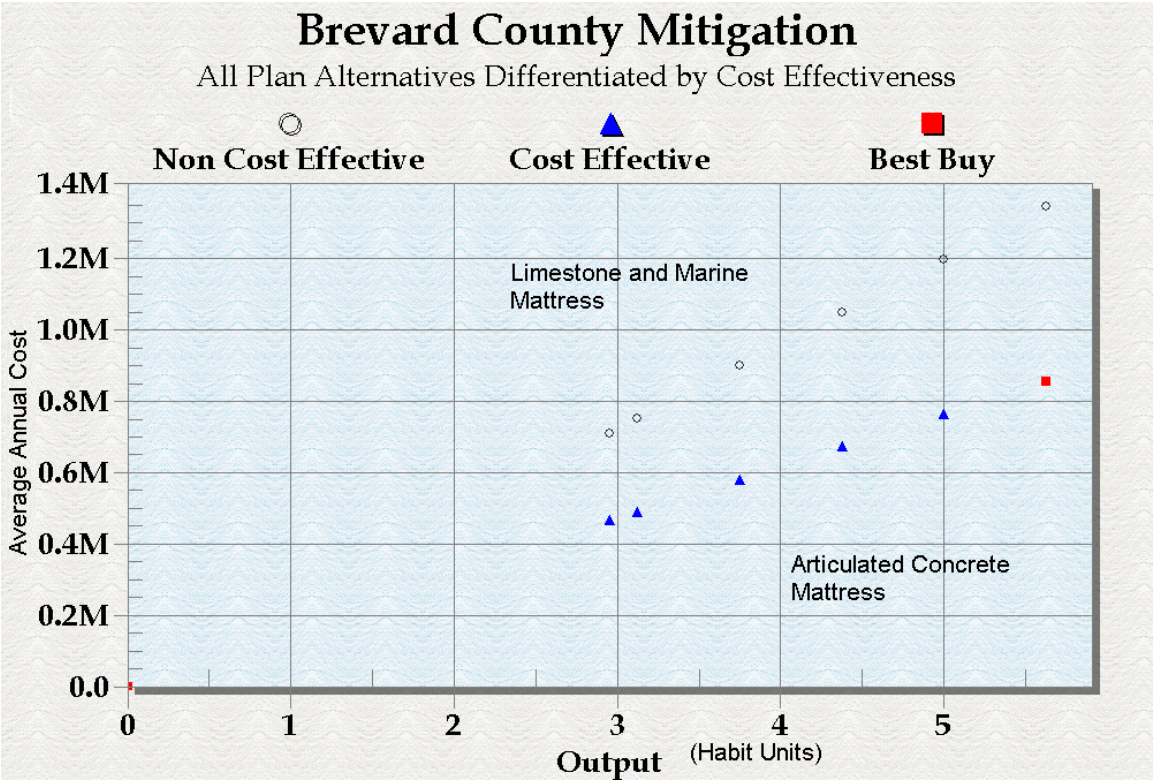
Mitigation Type	Mitigation Acreage	Average Annual Cost ($)	Habitat Units	Average Cost per Habitat Unit ($)	Cost Effective
No Action		0	0.000	0	
ACM	9	856,706	5.625	152,303	Yes
ACM	8	764,294	5.000	152,859	Yes
ACM	7	673,749	4.375	154,000	Yes
ACM	6	581,952	3.750	155,187	Yes
ACM	5	491,201	3.125	157,184	Yes
ACM	4.64	458,716	2.900	158,178	Yes
LMM	9	1,345,628	5.625	239,223	No
LMM	8	1,196,376	5.000	239,275	No
LMM	7	1,048,451	4.375	239,646	No
LMM	5	751,312	3.125	240,420	No
LMM	6	901,841	3.750	240,491	No
LMM	4.64	698,540	2.900	240,876	No

TABLE 3: ECOLOGICAL OUTPUTS (AVERAGE ANNUAL HABITAT UNITS) USED FOR CE/ICA (Sorted by mitigation acreage within type)

Mitigation Type	Mitigation Acreage	Average Annual Cost ($)	Habitat Units	Average Cost per Habitat Unit ($)	Cost Effective
No Action		0	0.000	0	
ACM	4.64	458,716	2.900	158,178	Yes

ACM	5	491,201	3.125	157,184	Yes
ACM	6	581,952	3.750	155,187	Yes
ACM	7	673,749	4.375	154,000	Yes
ACM	8	764,294	5.000	152,859	Yes
ACM	9	856,706	5.625	152,303	Yes
LMM	4.64	698,540	2.900	240,876	No
LMM	5	751,312	3.125	240,420	No
LMM	6	901,841	3.750	240,491	No
LMM	7	1,048,451	4.375	239,646	No
LMM	8	1,196,376	5.000	239,275	No
LMM	9	1,345,628	5.625	239,223	No

FIGURE 1: ALTERNATIVE PLANS – CE/ICA AVERAGE ANNUAL HABITAT UNITS AND AVERAGE ANNUAL COSTS FOR ALL ALTERNATIVES



Alternative plans are compared to identify those that would produce greater levels of output at the same cost, or at a lesser cost, as other alternative plans. All the articulated concrete mattress alternatives are cost effective since the articulated concrete mattress alternatives cost less for the same level of outputs (habitat units) than the limestone

marine mattress. There were two best buy plans identified by the IWR-PLAN. The best buy plans identified were the no action and the 9 acres of articulated concrete mattress since the average cost per habitat unit decrease as the mitigation acreage increase. The 9 acres of articulated concrete mattress yielded 5.625 habitat units at an average annual cost of $856,706 and an average annual incremental cost of $152,303 per habitat unit. Even though 9 acres of articulated concrete mattress is considered a best buy, only 4.64 acres of articulated concrete mattress would be needed to achieve the 2.9 habitat units for full compensation. The recommended 4.64 acres of the articulated concrete mattress with an average annual cost of $458,716 is $239,824 less than the $698,540 average annual cost of the limestone marine mattress that would be needed to achieve the 2.9 habitat units for full compensation. The average annual incremental cost of the recommended plan of 4.64 acres would be $158,178 per habitat unit.

TABLE 4: INCREMENTAL ANALYSIS USING AVERAGE ANNUAL COST FOR COST EFFECTIVE ALTERNATIVES (Sorted by habitat unit)

Mitigation Type	Mitigation Acreage	Average Annual Cost ($)	Incremental Average Annual Cost ($)	Habitat Units	Incremental Average Annual Cost per Habitat Unit	Incremental Habitat Unit per acre	Average Cost per Habitat Unit ($)
ACM	4.64	458,716		2.900			158,178
ACM	5	491,201	n/a	3.125	n/a	n/a	157,184
ACM	6	581,952	90,751	3.750	145,202	0.625	155,187
ACM	7	673,749	91,797	4.375	146,875	0.625	154,000
ACM	8	764,294	90,545	5.000	144,872	0.625	152,859
ACM	9	856,706	92,412	5.625	147,859	0.625	152,303

Table 4 shows the average annual cost, incremental cost for each additional mitigation acre, incremental cost per habitat unit and average cost per habitat unit for varying acres of mitigation articulated concrete mattress. The incremental cost per habitat unit of adding additional mitigation acreage ranges from $145,202 to $147,859. . Table 4 also shows the incremental cost of adding each additional acre of mitigation articulated concrete mattress ranges from $90,546 to $92,412. Even though the average cost per habitat unit may decrease slightly with additional mitigation acreage only 4.64 acres are needed to achieve full compensation.

TOTAL PROJECT COSTS

The following tables and figure show the CE/ICA using the Total Project Cost. The 9 acres of articulated concrete mattress yielded 5.625 habitat units at a total project cost of $15,947,020 and an incremental total project cost of $2,835,026 per habitat unit. Even though 9 acres of articulated concrete mattress is considered a best buy, only 4.64 acres of articulated concrete mattress would be needed to achieve the 2.9 habitat units for full

compensation. The recommended 4.64 acres of the articulated concrete mattress with a total project cost of $8,538,730 is $ 4,464,140 less than the $13,002,870 total project cost of the limestone marine mattress that would be needed to achieve the 2.9 habitat units for full compensation. The incremental total project cost of the recommended plan of 4.64 acres would be a $2,944,390 per habitat unit.

Table 5: CALCULATION OF TOTAL PROJECT COSTS USED IN COST EFFECTIVENESS ANALYSIS ($)
Articulated Concrete Mattress

Acres	ACM-4.64	ACM-5	ACM-6	ACM-7	ACM-8	ACM-9
Construction	$6,462,910	$6,944,480	$8,282,170	$9,626,470	$10,970,770	$12,315,070
S/A	$674,050	$724,270	$863,780	$1,003,990	$1,144,190	$1,284,390
PED	$792,990	$852,080	$1,016,220	$1,181,160	$1,346,110	$1,511,050
Total Construction	$7,929,950	$8,520,830	$10,162,170	$11,811,620	$13,461,070	$15,110,510
IDC Construction	$136,720	$150,520	$198,440	$257,730	$293,720	$364,450
Project Implementation cost	$8,066,670	$8,671,350	$10,360,610	$12,069,350	$13,754,780	$15,474,960
O&M Cost (Present Worth)	$472,060	$472,060	$472,060	$472,060	$472,060	$472,060
Total Project Cost	$8,538,730	$9,143,410	$10,832,670	$12,541,410	$14,226,840	$15,947,020
Benefits (habitat units)	2.900	3.125	3.750	4.375	5.000	5.625
Construction Schedule (Months)	7	7	8	9	9	10

Table 6: CALCULATION OF TOTAL PROJECT COSTS USED IN COST EFFECTIVENESS ANALYSIS ($) (Continued)

Limestone and Marine Mattress

Acres	LMM-4.64	LMM-5	LMM-6	LMM-7	LMM-8	LMM-9
Construction	$9,949,690	$10,729,670	$12,896,290	$14,985,720	$17,075,150	$19,164,580
S/A	$1,037,700	$1,119,050	$1,345,010	$1,562,930	$1,780,840	$1,998,760
PED	$1,220,820	$1,316,520	$1,582,370	$1,838,740	$2,095,110	$2,351,480
Total Construction	$12,208,210	$13,165,240	$15,823,660	$18,387,380	$20,951,100	$23,514,820
IDC Construction	$322,600	$347,890	$491,450	$656,770	$846,560	$1,061,050
Project Implementation Cost	$12,530,810	$13,513,140	$16,315,120	$19,044,150	$21,797,660	$24,575,860
O&M Cost (Present Worth)	$472,060	$472,060	$472,060	$472,060	$472,060	$472,060
Total Project Cost	$13,002,870	$13,985,200	$16,787,180	$19,516,210	$22,269,720	$25,047,920
Benefits (habitat units)	2.900	3.125	3.750	4.375	5.000	5.625
Construction Schedule (Months)	11	11	13	15	17	19

TABLE 7: ECOLOGICAL OUTPUTS (HABITAT UNITS) AND TOTAL PROJECT COST USED FOR CE/ICA (Sorted by cost per habitat unit)

Mitigation Type	Mitigation Acreage	Total Project Cost ($)	Habitat Units	Average Cost per Habitat Unit ($)	Cost Effective
No Action		0	0.000	0	
ACM	9	15,947,020	5.625	2,835,026	Yes
ACM	8	14,226,840	5.000	2,845,368	Yes
ACM	7	12,541,410	4.375	2,866,608	Yes
ACM	6	10,832,670	3.750	2,888,712	Yes
ACM	5	9,143,410	3.125	2,925,891	Yes
ACM	4.64	8,538,730	2.900	2,944,390	Yes
LMM	9	25,047,920	5.625	4,452,964	No
LMM	8	22,269,720	5.000	4,453,944	No
LMM	7	19,516,210	4.375	4,460,848	No
LMM	5	13,985,200	3.125	4,475,264	No
LMM	6	16,787,180	3.750	4,476,581	No
LMM	4.64	13,002,870	2.900	4,483,748	No

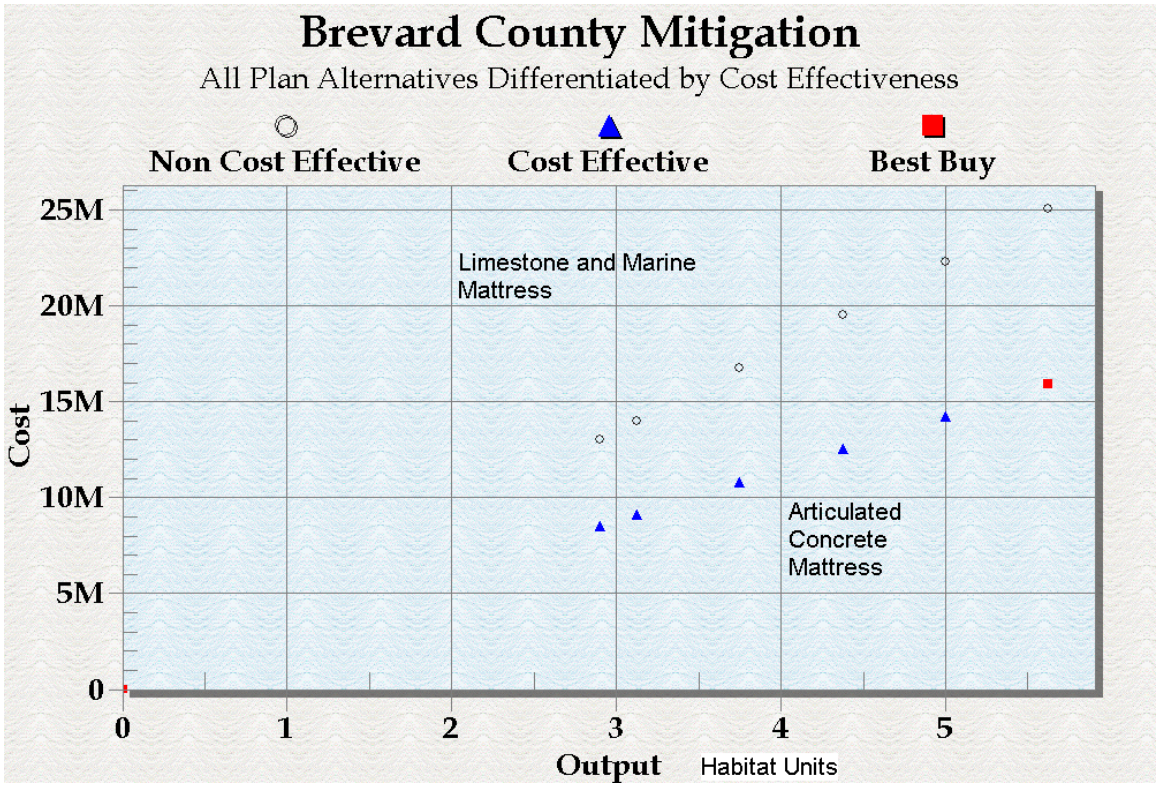
TABLE 8: ECOLOGICAL OUTPUTS (HABITAT UNITS) USED FOR CE/ICA (Sorted by mitigation acreage within type)

Mitigation Type	Mitigation Acreage	Total Project Cost ($)	Habitat Units	Average Cost per Habitat Unit ($)	Cost Effective
No Action		0	0.000	0	
ACM	4.64	8,538,730	2.900	2,944,390	Yes
ACM	5	9,143,410	3.125	2,925,891	Yes
ACM	6	10,832,670	3.750	2,888,712	Yes
ACM	7	12,541,410	4.375	2,866,608	Yes
ACM	8	14,226,840	5.000	2,845,368	Yes
ACM	9	15,947,020	5.625	2,835,026	Yes
LMM	4.64	13,002,870	2.900	4,483,748	No
LMM	5	13,985,200	3.125	4,475,264	No
LMM	6	16,787,180	3.750	4,476,581	No
LMM	7	19,516,210	4.375	4,460,848	No
LMM	8	22,269,720	5.000	4,453,944	No
LMM	9	25,047,920	5.625	4,452,964	No

TABLE 9: INCREMENTAL ANALYSIS USING TOTAL PROJECT COST FOR COST EFFECTIVE ALTERNATIVES (Sorted by habitat unit)

Mitigation Type	Mitigation Acreage	Total Project Cost ($)	Incremental Total Cost ($)	Habitat Units	Incremental Total Cost per Habitat Unit	Incremental Habitat Unit per acre	Total Cost per Habitat Unit ($)
ACM	4.64	8,538,730		2.900			2,944,390
ACM	5	9,143,410	n/a	3.125	n/a	n/a	2,925,891
ACM	6	10,832,670	1,689,260	3.750	2,702,816	0.625	2,888,712
ACM	7	12,541,410	1,708,740	4.375	2,733,984	0.625	2,866,608
ACM	8	14,226,840	1,685,430	5.000	2,696,688	0.625	2,845,368
ACM	9	15,947,020	1,720,180	5.625	2,752,288	0.625	2,835,026

FIGURE 2: ALTERNATIVE PLANS – CE/ICA HABITAT UNITS FOR ALL ALTERNATIVES USING TOTAL PROJECT COSTS


Brevard County Mitigation
All Plan Alternatives Differentiated by Cost Effectiveness
Non Cost Effective
Cost Effective
Best Buy
25M
20M
15M
10M
5M
0
Cost
Limestone and Marine Mattress
Articulated Concrete Mattress
0
1
2
3
4
5
Output
Habitat Units

Attachment 2

Economic Analysis of

Incidental Project Benefits

Brevard County, Florida
Federal Shore Protection Project;
Mid-Reach
Economic Analysis of
Incidental Project Benefits

Olsen Associates, Inc.
4438 Herschel Street
Jacksonville, FL 32210
(904) 387-6114

DRAFT: June 22, 2006

(Prior to selection of plan)

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1. Recreational Benefits. Recreational usage of the beaches in Brevard County contributes millions of dollars annually to the local economy and the State of Florida. Generation of recreational benefits is not a primary project purpose, but all benefits associated with Federal shore protection projects are evaluated in order to determine the net benefits generated by the projects. In order to identify the recreational benefits generated by the selected plan demands for saltwater beach usage along the Brevard County Mid-Reach were projected through the year 2060 in ten-year increments. These beach demands were then compared to the with- and without-project recreational beach capacity along the Mid-Reach throughout the 50-year duration of the project. An average economic value per beach visit was determined and used to compute the dollar value of the visits attributable to the proposed project relative to the without-project condition. The resulting average annual value of beach visits attributable to the project is the recreational benefit.

2. Annual Beach Demand. Annual beach activity on a countywide basis is a combination of Brevard County resident, other Florida resident, and tourist participation. The countywide saltwater beach demand for Brevard County, CD, was determined by

$$CD = \left(P_c N_c + P_s N_s + P_t N_t\right)K \qquad (1)$$

where,

P_c = constant from the Florida Statewide Comprehensive Outdoor Recreation Plan (SCORP), denotes participation rate by county residents;

N_c = county population from State Statistical Abstract (BEBR, 2005);

P_s = constant from SCORP, denotes participation from residents of other Florida counties who recreate on Brevard County beaches;

N_s = State population, less Brevard County Population (BEBR, 2005);

P_t = constant from SCORP, denotes participation rate for tourists who visit Brevard beaches;

N_t = Tourist population for Brevard County, from Brevard County (2002); and

K = constant as determined from actual counts (value of 1.0 used herein).

3. **Tables 1** and **2** shows the projected population, beach demand, and participation rates for Brevard County as provided by various State of Florida agencies and as described below. In Table 1, the County and State population projections were developed from the 2005 Florida Statistical Abstract (BEBR, 2005). Published values include the years 2010 through 2030, whereby data points for 2002 and 2040-2060 were linearly extrapolated.

Table 1 – Brevard County population and saltwater beach demand, 2010 to 2060 (units are given in thousands).

		YEAR								
		2002	2010	2015	2020	2025	2030	2040	2050	2060
Resident Population	N_c	512.6	577.3	620.6	663.5	704.5	742.7	827.8	910.7	993.6
Resident Demand	P_cN_c		2,020.6	2,172.1	2,322.3	2,465.8	2,599.5	2,897.2	3,187.5	3,477.7
Other Florida Population	N_s	16,200.6	19,077.8	20,659.7	22,230.6	23,744.7	25,155.8	28,269.8	31,318.0	34,366.2
Other Florida Demand	P_sN_s		1,144.7	1,239.6	1,333.8	1,424.7	1,509.3	1,696.2	1,879.1	2,062.0
Tourist Population	N_t	1,587.6	2,286.6	2,723.5	3,160.4	3,597.3	4,034.2	4,908.0	5,781.8	6,655.6
Tourist Demand	P_tN_t		6,494.0	7,734.8	8,975.6	10,216.4	11,457.2	13,938.7	16,420.3	18,901.9
Total Demand (CD)			9,659.2	11,146.5	12,631.7	14,106.8	15,566.0	18,532.1	21,486.9	24,441.6
Mid-Reach Demand (visits/yr)			1,120.5	1,293.0	1,465.3	1,636.4	1,805.7	2,149.7	2,492.5	2,835.2

Table 2 – Resident and tourist participation rates (SCORP Region 6).

		Participation Rate (Uses per Visitor)
County Resident	P_c	3.5
In-state Tourist	P_s	0.06
Out-of-State Tourist	P_t	2.84

4. The total tourist population for Brevard County was adopted from a 2002 study of the county-wide, economic impact of tourism (PMG Associates, 2002). The published 2002 tourist population of 4,447,000 *excludes* those visitors associated with visits to either the Kennedy Space Center or the Cruise Port at Canaveral Harbor. According to a second study of tourism conducted via survey by the City of Cocoa Beach, Florida in 2002, approximately 35.7 percent of the respondents were visitors who do not reside in the State of Florida (City of Cocoa Beach, 2002). Thus, the out-of-state tourist population was estimated to be about 1,587,580 visitors in 2002. Projections of the future tourist population were based on changes in the number of total visitors to the State of Florida between 1999 and 2005, which exhibited an average annual growth of approximately 5.5 percent (Visit Florida[1], personal communication). Within this period, estimates of beach-oriented tourist visits are available from Florida Atlantic University (FAU, 2005) for the years 2000 through 2003 (**Table 3**). For those years, the average annual rates of rates of growth in total tourist visits and beach-oriented tourist trips were 5.2 and 6.0 percent, respectively. Comparison of these values indicates that the rate of total tourist growth is a conservative proxy estimate of the beach-oriented tourist growth.

Table 3 – Estimated tourist visits 1999 to 2005.

Year	Estimated Total State Visitors (millions)	Estimated Beach-Oriented Tourist Trips (millions)
1999	58.9	
2000	72.8	23.6
2001	69.5	24.9
2002	73.9	28.4
2003	74.6	27.2
2004	79.7	
2005	85.0	

[1] Visit Florida is the official tourism and marketing corporation of the State of Florida. Due to a recent change in the manner of estimating tourist visits, records of visitation are comparable only as far back as 1999.

5. The demand listed in **Table 1** was computed using participation rates applied to each population category, as listed in **Table 2**. Participation rates denote the average annual number of beach visits (user occasions) attributable to each member of a given population. In previous years, the Florida Statewide Comprehensive Outdoor Recreation Plan (SCORP) published resident and non-resident participation rates, by study region, for saltwater beach use. The most recent SCORP completed for the year 2000 does not list participation rates and instead reports only a total saltwater beach demand for the entire east-central Florida region (FDEP 2002). Data for Region VI of the SCORP report were utilized for the present study. Region VI includes the coastal counties of Volusia and Brevard Counties.

6. The participation rates most recently published in the SCORP data were utilized in computing demand for the present study (DNR 1989) and are equivalent to the values adopted in the prior Feasibility Study for the Brevard County Federal Shore Protection Project (USACE 1996).

7. The total 2010 county-wide demand of about 9,659,211 annual beach visits computed herein is in general agreement with that computed in the 1996 Brevard County Feasibility Study (USACE 1996). That report predicted that the 1998 county-wide beach demand would be about 7,328,200 uses, suggesting a moderate 2.65 average annual percent increase from 1998 to year one (2010) of the present study. This analysis is also in agreement with a 1989 report prepared by Olsen Associates which estimated the 1990 county-wide beach demand at 9,500,000 uses (Bodge and Savage 1989).

8. According to the 2000 SCORP data, total saltwater beach demand for east-central Florida (Region VI) in the year 2010 is predicted to be approximately 31,093,300 user occasions (FDEP 2002). Based upon the distribution of recreational beaches within Region VI, (Bodge and Savage 1989; USACE 1996), the 2000 SCORP demand attributable to Brevard County is estimated to be about 10,198,590 user occasions (Bodge and Savage 1989 and USACE 1996). This value is in agreement with beach use demand

computed via estimates of population density and user participation rates, described in **Table 2** and adopted herein.

9. The distribution of public beach area was examined in order to apportion county-wide demand to the Mid-Reach. The majority of Brevard County's beaches, however, are accessible to the public due to the ongoing Brevard County Federal Shore Protection Project's North (R1 to R53) and South Reaches (R118.3 to R139). The beach area along the North Reach and South Reach segments currently provides for a respective capacity of 223,117 and 74,783 beach users per day[2]. The public-accessible shoreline along Patrick Air Force Base provides enough beach area for approximately 41,574 users per day, bringing the total public beach area capacity of Brevard County, not including the Mid-Reach, to nearly 340,000 users per day[3]. In comparison, the Mid-Reach currently provides enough publicly owned beach area to support about 12,911 users per day (see **Table 6**), or less than 4 percent of the county-wide capacity due to the limited alongshore length of publicly owned in the without-project condition. Comparison with previous studies of Mid-Reach beach usage indicates that allocating beach demand by beach area results in a significant and non-realistic underestimation of Mid-Reach beach participation because the allocation of beach-use participation in the County is principally prescribed by available access (parking) not by public beach area (USACE 1996, Bodge & Savage 1989). For the present study, the demand for beach usage within the Mid-Reach was apportioned from the total county-wide demand as a function of the distribution of public beach parking, which has been demonstrated as being an important factor in explaining how users select their placement on a beach (Pendleton, 2001). Public beach parking along the Mid-Reach constitutes approximately 11.6 percent of the total public beach parking spaces in the County. It was thus assumed that the Mid-Reach experiences approximately 11.6 percent of the County's beach use demand, resulting in about 1,120,468 visits in 2010 (see **Table 1**). This allocation of demand provides a more realistic estimation and is similar to that used in the 1996 Brevard County Feasibility

[2] Beach area was computed as the product of alongshore length and cross-shore beach width. Beach width was computed from the most recent available surveys and includes the dry beach between +11 ft, NGVD and the MHW shoreline.

[3] Brevard County has over 5,400 public parking spaces, suggesting that non Mid-Reach parking spaces can support over 43,200 persons per day (not including notional access).

Study which apportions 13.0 percent of the total county-wide beach use demand to the Mid-Reach (USACE 1996). By comparison, the Mid-Reach comprises about 19 percent of Brevard's beach length.

10. *Demand Allocation Based on Supply.* For each project year, the beach use demand was further apportioned along the Mid-Reach shoreline as a function of available public beach area capacity at each access location, with availability limited by either parking capacity or beach area for both with- and without project conditions. This least density usage approach ensures proportional distribution of participation over the study area beaches. It presumes that if one segment of beach is overcrowded, then all segments are overcrowded; and that the opposite is also true. This approach likewise implies that a participant will find useable beach if it is available in the study area. No attractiveness indexes are used to distribute participation, although it is recognized that participants may exhibit a preference for a given park because of differences in access and facilities and that the more desirable beaches will be occupied first. In a with-project condition, additional public beach is created in the study area and excess demand can be accommodated at the various access points within the limits of available parking capacity. In this way, the allocation of beach demand between access points varies for each year, and for each project alternative, as a function of the available beach-use capacity (supply) at each access point. Benefits attributable to a given project alternative are the excess (unmet) demand which is satisfied by the project.

11. Specifically, for a given project alternative, the beach-use demand was computed for each access point. The beach-use demand ascribed to each access point, for a given demand day, is a function of the access point's available beach-use capacity relative to the total available Mid-Reach capacity, times the total beach-use demand for that day. Or, (daily beach-use demand at access "A") = (available capacity at "A") / (total available Mid-Reach capacity) x (total Mid-Reach demand), in units of users per day. In this way, the beach-use demand ascribed to each access is allocated so that the density of demand is the same at all parks within the project area, and the sum-total of all demand does not exceed the project area's total beach-use demand. When the demand at a given

access point exceeds the access point's available capacity, excess (unmet) demand which is not met by the particular project alternative exists. Excess daily demand, at each access, is the difference between the daily beach-use demand and the access point's available capacity. Or, (excess demand at access "A") = (daily beach-use demand at access "A") – (available capacity at "A"). At each access point, the number of daily beach visits attributable to the project is the difference between excess demand present under without- and with-project conditions. Or, (daily beach visits attributable to the project at "A") = (without-project excess demand at "A") – (with-project excess demand at "A").

12. Daily Beach Activity Demand. Daily beach activity demand varies considerably from day-to-day with the greatest demand occurring on weekends, holidays, and during other special events. Daily demand also varies seasonally throughout the year. The distribution of beach visitation during the year in Brevard County was adopted from that given by the economic analysis completed by Bodge and Savage (1989). **Table 4** presents the annual distribution of beach usage in terms of nine use categories. Daily usage is computed by applying the percent of the total usage per day to the annual demand presented in **Table 1**.

Table 4 – Annual distribution of beach visits in Brevard County.

					2010	2020	2030	2040	2050	2060
User Group	% of Peak Use	No. Days	% of Total Annual Use	Percent Total/day	Daily Demand (uses/day)					
1	100.0	1	1.5	1.50	16,807	21,979	27,085	32,246	37,387	42,528
2	88.3	11	14.8	1.35	15,075	19,715	24,294	28,924	33,535	38,147
3	76.5	10	11.7	1.17	13,109	17,144	21,126	25,152	29,162	33,172
4	64.7	7	6.9	0.99	11,045	14,443	17,799	21,190	24,569	27,947
5	53.0	16	12.9	0.81	9,034	11,814	14,558	17,332	20,096	22,859
6	41.2	22	13.8	0.63	7,028	9,191	11,326	13,485	15,635	17,785
7	29.4	19	8.6	0.45	5,072	6,632	8,173	9,730	11,282	12,833
8	17.7	26	7.0	0.27	3,017	3,945	4,861	5,788	6,711	7,633
9	5.9	253	22.8	0.09	1,010	1,320	1,627	1,937	2,246	2,555
TOTAL		**365**	**100**							

13. With- and Without-project Beach Capacity. With- and without-project recreational beach capacities were computed for existing and future predicted conditions. Beach capacity is determined at each public beach access location by the publicly accessible

beach area or the public beach parking/access capacity, whichever is smaller. Year one (2010) with- and without-project constrained beach capacities are approximately 14,500 and 8,776 users per day, respectively (see **Tables 6** and **7**).

14. In evaluating the without-project condition each public access point was separately evaluated in terms of available public parking and existing beach area. Constrained beach area capacities computed at each access point are summed for each sub-reach in **Table 6**. For the with-project simulation, public parking and beach area were combined along project reaches within the Mid-Reach in order to account for the public's anticipated use of the project beach up to ¼ mile alongshore in both directions from the access. Because of the inherent subjectivity in assigning capacity to areas where multiple ¼ mile radii overlap, only the capacity of each sub-reach is shown in **Table 7**.

15. *Beach Area.* Available beach area was computed using data gathered from recent aerial photographs and a February 2005 beach survey. Beach area was computed as the effective alongshore length of publicly accessible shoreline multiplied by the measured cross-shore width of dry beach. In computing area-limited beach capacity, it was assumed that in order to recreate each beach visitor requires a minimum of 100 square feet of dry beach and this area can be used by two persons per day. This unconstrained beach area computation is shown as an example for project year one (2010) in **Table 6**.

16. Beach width was measured from the vegetation line or toe of the dune/bluff (typically, about +11 ft, NGVD) to the MHW shoreline. Average annual shoreline change rates were applied to the measured beach width in order to project existing conditions from 2005 to 2010 (year one of the economic simulation). Shoreline change rates along prescribed segments within the Mid-Reach are presented in **Table 5**. These rates were also applied, as required, to the beach width for the duration of the simulation, years 2010 through 2060. All beach widths are given in **Table 6**.

17. Beach length for without-project conditions was assumed to be the alongshore length of publicly owned property. For with-project simulations, the project easements allow

public beach use along the project length, within which the public is reasonably anticipated to use up to a ¼ mile alongshore from each public beach access point in the project area. The aforementioned grouping of access points under with-project conditions allows consideration of overlapping ¼ mile usage zones and is arranged such that beach users from any given parking space utilize the project only within ¼ mile of the beach access.

Table 5 – Measured shoreline change rates within the Mid-Reach (from USACE).

	Reach 1	Reach 2	Reach 3	Reach 4	Reach 5	Reach 6
Reach Limits	R118.3-R109	R109-R105.5	R105.5-R99	R99-R93	R93-R83	R83-R75.4
Rec Rate (ft/yr)	-0.7	-0.6	-0.8	-0.8	-1.0	-0.6

18. *Public Parking and Beach Access Capacity.* Aerial photographs and ground verification as well as updated parking data obtained from Brevard County were used to locate and account for public beach access parking spaces in the study area. It is assumed that each public parking space can accommodate four persons per vehicle and is turned over twice per day (USACE 1996). Thus, each public parking space provides a daily capacity of eight users per day. **Appendix A** presents the aerial photographs used in the study, the approximate location and number of parking spaces at each access point, as well as a graphical interpretation of the corresponding with-project ¼ mile usage radii.

19. In Brevard County, many beach users do not depend on public parking for beach access. Instead they arrive at the beach on foot, on bike, or are dropped-off by cars or city busses. The terms notional parking and notional visitors describe the ability of the public to access the beach by means other than public parking. Based on the number of parking spaces in the project area, the Mid-Reach can accommodate approximately 6,640 visitors per day through public parking access (830 spaces x 8 persons/space/day = 6,640 persons/day). Using the frequency distribution listed in **Table 4**, peak daily visitation is expected to be about 16,807 visitors in year one. This implies that at peak usage, about 10,167 users access the beach by means other than public parking. Thus the notional parking factor, or ratio of notional users to parking users, is 1.53 (10,167 ÷ 6,640 = 1.53). The notional capacity for each access is therefore computed by multiplying the parking

capacity by the notional factor, 1.53. The total capacity is then the sum of parking and notional capacities.

20. This method for computing notional beach visitors follows the approach applied in the General Reevaluation Report (GRR) for Broward County, Florida Federal Shore Protection Project, Segment II (USACE 2003). In that instance, a notional parking factor of 1.75 was applied to the available parking capacity to compute the notional capacity. The notional factor of 1.53 computed for the Mid-Reach is smaller than for Broward County owing to the lesser density of population and development in Brevard versus Broward County (Segment II).

21. The notional factor of 1.53 suggests that about 60% of the Mid-Reach beach users access the beach by other than public parking. This ratio is comparable to that indicated by a 1991 beach user survey completed for Sarasota County, Florida which found that about 50 percent of the total beach users do not require public parking. Development along both Sarasota and Brevard County beaches is considered to be medium density; that is, a mix of multi- and single-family dwellings. (USACE 1996.)

22. All of the Mid-Reach shoreline is within ¼ mile of a public beach access excepting 1,985-ft located in Reach 5, approximately between monument locations R83.9 and R86.1. No recreational benefits were computed for this short section of shoreline. This segment is reflected in **Table 7** as follows: The Patrick street access point in Reach 6 allows access to a point approximately 32,265 feet north of R118.3, as indicated. The Grant street access point allows use to a point approximately 30,280 feet from R118.3. The gap between the two ¼ mile use radii is about 1,985 feet long (32,265 – 30,280 = 1,985), as shown in **Table 7**.

23. *Maximum Daily Capacity*. The maximum daily beach use capacity was computed for each access, or group of access points as the number of beach uses per day that can be accommodated by either (1) the publicly accessible beach area or (2) the public beach parking and notional access, whichever is smaller. This comparison was made for each

year of the analysis, for both the without- and with-project conditions. In the without-project condition, the size of the available beach area was modified for each year as a function of the local shoreline change rate. The public beach parking and notional access capacity was held constant for each year. Maximum beach capacity at each access point throughout the project life (in 10-year increments) is given for the without-project condition in **Table 6**.

24. Projected beach capacities for the with-project alternative are presented in **Table 7**. In the tables, beach capacity has been grouped and sub-totaled for various project reaches within the Mid-Reach in order to allow for direct comparison between without- and with-project alternatives. The capacity projection values shown in **Table 7** represent a project equivalent to maintaining the current location of the MHW shoreline. Because in this instance advanced placement is planned for the project, the economic model assumes the effective shoreline change rate to be zero feet per year. Beach usage under with-project conditions is limited by available parking, which satisfies all of the anticipated demand throughout year one, with about 67 days of unmet demand by year 50. Although the construction of new parking facilities is not planned for the project, construction of additional parking spaces would provide an opportunity to further satisfy unmet demand throughout the project.

25. A uniform maintenance of the existing shoreline may not coincide with the actual proposed project; however, such a condition does represent the minimum project whereby each project reach which will realize recreational benefits. More importantly, under this with-project condition all project reaches are parking limited for the duration of the 50-year simulation. Because parking constraints limit participation, recreational benefits will be constant along a given reach even if the proposed project width is increased.

26. *Beach Use Demand vs. Capacity*. Excess (unmet) demand was computed by comparing with-and without-project capacities with daily beach demands for each user group and simulation year. Excess demand met by the with-project condition can be

considered to be the additional visitors attributable to the project. The total excess demand computed for with- and without-project conditions is presented in **Tables 8** and **9**, respectively. **Tables 10** and **11** divide the total excess demand into demand along each proposed project reach for without- and with-project conditions, respectively. Each of the with-project excess demand projections represents a minimum value and will increase to the without-project quantity should a given reach no longer be included in the final project design.

27. In the without-project condition, beach usage is limited by both available parking and beach area and varies from one access point to the next. Construction of a nourished project reach results in beach use being limited only due to parking constraints (versus beach area). Because construction of new parking is not a planned part of the proposed project, all of the future unmet demand cannot be met by project construction. However, in the with-project condition, the unmet beach use demand along the Mid-Reach is expected to be very small relative to the total demands on the beaches. If all project reaches are maintained at current level of beach width, demand is completely met in year one of the project and is expected to expand to about 67 days by year 50.

Table 6 – Projected beach capacity for without-project conditions (2010-2060).

Name	Mid-point Mon (R-)	Dist. North of R118.3 (ft)	Approx. Public Parking Spaces	Notional & Parking Capacity	Erosion Rate (ft/yr)	Public Prop. Length (ft)	2010			2020		2030		2040		2050		2060	
							Beach Area Capacity (ppd)	Beach Width (ft)	Capacity (visits)	Beach Width (ft)	Capacity (visits)	Beach Width (ft)	Capacity (visits)	Beach Width (ft)	Capacity (visits)	Beach Width (ft)	Capacity (visits)	Beach Width (ft)	Capacity (visits)
Patrick AFB	74.9	40,890	50	1,012	*-0.6*	1,000	1744	87	1012	81	1012	75	1012	69	1012	63	1012	57	1012
SE 1st St	78.2	37,750	20	405	-0.6	200	316	79	316	73	292	67	268	61	244	55	220	49	196
Berkley	80	35,900	50	1,012	-0.6	200	277	69	277	63	253	57	229	51	205	45	181	39	157
Patrick	82.5	33,585	20	405	-0.6	60	96	80	96	74	89	68	82	62	74	56	67	50	60
REACH 6				2,834			2,433		**1,701**		**1,646**		**1,591**		**1,536**		**1,481**		**1,425**
Grant	87.5	28,960	23	466	-1.0	50	73	73	73	63	63	53	53	43	43	33	33	23	23
Park	88.9	27,579	4	81	-1.0	50	58	58	58	48	48	38	38	28	28	18	18	8	8
Ellwood	90	26,910	0	20	-1.0	5	7	69	7	59	6	49	5	39	4	29	3	19	2
Norwood	91	26,020	0	20	-1.0	5	7	70	7	60	6	50	5	40	4	30	3	20	2
Cassia	91.5	25,575	0	20	-1.0	5	7	72	7	62	6	52	5	42	4	32	3	22	2
REACH 5				607			152		**152**		**129**		**106**		**83**		**60**		**37**
Pelican Beach Park	93.1	24,030	170	3,441	-0.8	680	1,217	90	1,217	82	1,109	74	1,000	66	891	58	782	50	673
Desoto	94.5	22,735	11	223	-0.8	50	106	106	106	98	98	90	90	82	82	74	74	66	66
Magellan	95.4	21,984	12	243	-0.8	50	112	112	112	104	104	96	96	88	88	80	80	72	72
REACH 4b				3,906			1,435		**1,435**		**1,311**		**1,186**		**1,061**		**936**		**811**
Sunrise	96.1	21,355	12	243	-0.8	50	103	103	103	95	95	87	87	79	79	71	71	63	63
Palmetto	96.9	20,595	25	506	-0.8	250	452	90	452	82	412	74	372	66	332	58	292	50	252
Eau Gallie Ave	97.5	20,000	6	121	-0.8	50	85	85	85	77	77	69	69	61	61	53	53	45	45
Bicentennial	98.9	18,645	42	850	-0.8	250	279	56	279	48	239	40	199	32	159	24	119	16	79
REACH 4a				1,720			919		**919**		**823**		**727**		**631**		**535**		**439**
Pinetree	99.2	18,350	0	20	-0.8	50	57	57	20	49	20	41	20	33	20	25	20	17	17
Palm Springs	100.9	16,650	2	40	-0.8	10	19	96	19	88	18	80	16	72	14	64	13	56	11
REACH 3b				61			76		**39**		**38**		**36**		**35**		**33**		**28**
Atlantic	102.2	15,400	12	243	-0.8	100	213	107	213	99	197	91	181	83	165	75	149	67	133
Millenium Park	103	14,600	25	506	*-0.8*	50	80	80	80	72	72	64	64	56	56	48	48	40	40
Wallace	104.4	13,438	20	405	-0.8	50	105	105	105	97	97	89	89	81	81	73	73	65	65
Eau Gallie Cswy	105.2	12,766	65	1,316	-0.8	1,250	2,698	108	1,316	100	1,316	92	1,316	84	1,316	76	1,316	68	1,316
REACH 3a				2,469			3,096		**1,714**		**1,682**		**1,650**		**1,618**		**1,586**		**1,554**
Rasisson Suites	106	11,710	18	364	-0.6	50	108	108	108	102	102	96	96	90	90	84	84	78	78
Coral Way East	107.8	10,048	6	121	-0.6	50	104	104	104	98	98	92	92	86	86	80	80	74	74
REACH 2				486			212		**212**		**200**		**188**		**176**		**164**		**152**
Holiday Inn South	109.2	8,688	0	20	-0.7	10	19	94	19	87	17	80	16	73	15	66	13	59	12
Harris	109.4	8,456	6	121	-0.7	50	96	96	96	89	89	82	82	75	75	68	68	61	61
REACH 1c				142			115		**115**		**106**		**98**		**90**		**81**		**73**
Paradise Beach Park	109.8	7,992	0	20	-0.7	650	1,302	100	20	93	20	86	20	79	20	72	20	65	20
Paradise Beach Park	110.8	7,088	225	4,554	-0.7	1,350	2,660	99	2,660	92	2,471	85	2,282	78	2,093	71	1,904	64	1,715
Beach	112	5,920	0	20	-0.7	4	9	118	9	111	9	104	8	97	8	90	7	83	7
Surf Walk	112.5	5,475	0	20	-0.7	4	9	116	9	109	9	102	8	95	8	88	7	81	7
REACH 1b				4,615			3,980		**2,699**		**2,509**		**2,319**		**2,129**		**1,939**		**1,748**
Poinsetta	113.4	4,650	0	20	-0.7	4	9	116	9	109	9	102	8	95	8	88	7	81	6
Coconut	115.6	2,506	0	20	-0.7	6	16	131	16	124	15	117	14	110	13	103	12	96	11
Terrace Shores	115.9	2,269	6	121	-0.7	50	138	138	121	131	121	124	121	117	117	110	110	103	103
Flug	118.8	-456	0	20	*-0.7*	126	312	124	20	117	20	110	20	103	20	96	20	89	20
Franklin	119.9	-1,441	0	20	*-0.7*	6	16	132	16	125	15	118	14	111	13	104	13	97	12
REACH 1a				202			490		**182**		**180**		**178**		**171**		**162**		**152**
TOTAL Mid-Reach				17,042			12,911		**9,170**		**8,624**		**8,079**		**7,529**		**6,976**		**6,421**

Table 7 – Projected beach capacity for with-project conditions (2010-2060). Assumes all reaches are maintained by the project

Name	Mid-point Mon (R-)	Dist. North of R118.3 (ft)	Approx. Public Parking Spaces	Notional & Parking Capacity	Erosion Rate (ft/yr)	Public Prop. Length (ft)	Southern Limit (x=)	Northern Limit (x=)	Reach Length (ft)	Fill Width (ft)	Beach Area Capacity (ppd)	2010 Beach Width (ft)	2010 Capacity (visits)	2020 Beach Width (ft)	2020 Capacity (visits)	2030 Beach Width (ft)	2030 Capacity (visits)	2040 Beach Width (ft)	2040 Capacity (visits)	2050 Beach Width (ft)	2050 Capacity (visits)	2060 Beach Width (ft)	2060 Capacity (visits)
Patrick AFB	74.9	40,890	50	1,012	0.0	1,000		40,350		1		88											
SE 1st St	78.2	37,750	20	405	0.0	200				1		80											
Berkley	80	35,900	50	1,012	0.0	200				1		70											
Patrick	82.5	33,585	20	405	0.0	60	32,265			1		81											
REACH 6				**2,834**	0.0		32,265	40,350	8,085	1	12,916	**80**	2,834	80	2,834	80	2,834	80	2,834	80	2,834	80	2,834
1,985' Gap in Access																							
Grant	87.5	28,960	23	466	0.0	50		30,280		1		74											
Park	88.9	27,579	4	81	0.0	50				1		59											
Ellwood	90	26,910	0	20	0.0	5				1		70											
Norwood	91	26,020	0	20	0.0	5				1		71											
Cassia	91.5	25,575	0	20	0.0	5	24,130			1		73											
REACH 5				**607**	0.0		24,130	30,280	6,150	1	8,530	**69**	607	69	607	69	607	69	607	69	607	69	607
Pelican Beach Park	93.1	24,030	170	3,441	0.0	680		24,130		1		91											
Desoto	94.5	22,735	11	223	0.0	50				1		107											
Magellan	95.4	21,984	12	243	0.0	50	21,380			1		113											
REACH 4b				**3,906**	0.0				2,750	1	5,693	**104**	3,906	104	3,906	104	3,906	104	3,906	104	3,906	104	3,906
Sunrise	96.1	21,355	12	243	0.0	50		21,380		1		104											
Palmetto	96.9	20,595	25	506	0.0	250				1		91											
Eau Gallie Ave	97.5	20,000	6	121	0.0	50				1		86											
Bicentennial	98.9	18,645	42	850	0.0	250	18,550			1		57											
REACH 4a				**1,720**	0.0				2,830	1	4,791	**85**	1,720	85	1,720	85	1,720	85	1,720	85	1,720	85	1,720
Pinetree	99.2	18,350	0	20	0.0	50		18,550		1		58											
Palm Springs	100.9	16,650	2	40	0.0	10	16,000			1		97											
REACH 3b				**61**	0.0				2,550	1	3,948	**77**	61	77	61	77	61	77	61	77	61	77	61
Atlantic	102.2	15,400	12	243	0.0	100		16,000		1		108											
Millenium Park	103	14,600	25	506	*0.0*	50				1		81											
Wallace	104.4	13,438	20	405	0.0	50				1		106											
Eau Gallie Cswy	105.2	12,766	65	1,316	0.0	1,250	12,370			1		109											
REACH 3a				**2,469**	0.0				3,630	1	6,592	**91**	2,469	91	2,469	91	2,469	91	2,469	91	2,469	91	2,469
Rasisson Suites	106	11,710	18	364	0.0	50		12,370		1		109											
Coral Way East	107.8	10,048	6	121	0.0	50	8,920			1		105											
REACH 2				**486**	0.0		8,920	12,370	3,450	1	7,383	**107**	486	107	486	107	486	107	486	107	486	107	486
Holiday Inn South	109.2	8,688	0	20	0.0	10		8,920		1		95											
Harris	109.4	8,456	6	121	0.0	50	8,431			1		97											
REACH 1c				**142**	0.0				489	1	939	**96**	142	96	142	96	142	96	142	96	142	96	142
Paradise Beach Park	109.8	7,992	0	20	0.0	650		8,431		1		101											
Paradise Beach Park	110.8	7,088	225	4,554	0.0	1,350				1		100											
Beach	112	5,920	0	20	0.0	4				1		119											
Surf Walk	112.5	5,475	0	20	0.0	4	5,473			1		117											
REACH 1b				**4,615**	0.0				2,958	1	6,303	**107**	4,615	107	4,615	107	4,615	107	4,615	107	4,615	107	4,615
Poinsetta	113.4	4,650	0	20	0.0	4		5,473		1		117											
Coconut	115.6	2,506	0	20	0.0	6				1		132											
Terrace Shores	115.9	2,269	6	121	0.0	50				1		139											
Flug	118.8	-456	0	20	*0.0*	126				1		125											
Franklin	119.9	-1,441	0	20	*0.0*	6	-645			1		133											
REACH 1a				**202**	0.0				6,118	1	15,184	**124**	202	124	202	124	202	124	202	124	202	124	202
REACH 1				**17,042**									17,042		17,042		17,042		17,042		17,042		17,042

Table 8 – Projected total excess (unmet) annual beach demand, without-project.

		WITHOUT PROJECT CONDITIONS Excess Annual Demand (users/year)					
User Group	Number of Days	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	1	7,637	13,355	19,006	24,717	30,411	36,108
2	11	64,962	121,992	178,367	235,342	292,146	348,984
3	10	39,397	85,193	130,471	176,230	221,855	267,513
4	7	13,124	40,733	68,037	95,629	123,146	150,685
5	16	0	51,030	103,664	156,854	209,907	263,011
6	22	0	12,471	71,441	131,028	190,480	250,003
7	19	0	0	1,784	41,829	81,801	121,833
8	26	0	0	0	0	0	31,524
9	253	0	0	0	0	0	0
TOTAL	**365**	**125,120**	**324,773**	**572,770**	**861,630**	**1,149,745**	**1,469,660**

Table 9 – Minimum projected total excess (unmet) annual beach demand, with-project. Assumes all project reaches are maintained by the project.

		WITH PROJECT CONDITIONS Excess Annual Demand (uses/year)					
User Group	Number of Days	2010	2020	2030	2040	2050	2060
1	1	0	4,937	10,043	15,204	20,345	25,486
2	11	0	29,398	79,774	130,696	181,424	232,151
3	10	0	1,016	40,840	81,097	121,199	161,301
4	7	0	0	5,295	29,036	52,686	76,336
5	16	0	0	0	4,641	48,856	93,071
6	22	0	0	0	0	0	16,336
7	19	0	0	0	0	0	0
8	26	0	0	0	0	0	0
9	253	0	0	0	0	0	0
TOTAL	**365**	**0**	**35,351**	**135,952**	**260,674**	**424,510**	**604,682**

Table 10 – Projected excess (unmet) annual beach demand, by reach, without-project.

	Excess Annual Demand (User occasions)					
Reach	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	40,884	105,272	183,956	273,419	359,493	451,728
2	2,893	7,532	13,329	20,143	27,029	34,792
3	23,919	64,748	119,516	189,085	266,751	362,052
4	32,132	80,363	135,641	193,692	242,534	286,304
5	2,078	4,868	7,535	9,531	9,935	8,533
6	23,215	61,991	112,793	175,761	244,004	326,250
TOTAL	**125,120**	**324,773**	**572,770**	**861,630**	**1,149,745**	**1,469,660**

Table 11 – Minimum projected excess (unmet) annual beach demand, by reach, with-project. Assumes all project reaches are maintained by the project.

	Excess Annual Demand (User occasions)					
Reach	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
1	0	10,286	39,559	75,849	123,521	175,947
2	0	1,008	3,875	7,430	12,100	17,236
3	0	5,248	20,183	38,699	63,021	89,769
4	0	11,672	44,887	86,066	140,159	199,646
5	0	1,260	4,844	9,288	15,125	21,544
6	0	5,878	22,605	43,342	70,584	100,541
TOTAL	**0**	**35,351**	**135,952**	**260,674**	**424,510**	**604,682**

28. Recreation Benefits Computation. Excess beach use demand that is satisfied during the life of the proposed project is considered to be an incidental recreation benefit. The number of additional beach uses attributable to the project is computed as the difference between unmet demand without the project and unmet demand with the project. The project schedule of excess demand for with- and without-project conditions is attached as **Appendix B**, of which the first page includes a sample computation. With-project excess demand assumes all reaches will be nourished by the project. The final step in the recreational benefit analysis is to determine a willingness to pay, or assign a value to the recreational usage generated by the project.

29. *Value per Visit.* Several established methodologies are available for determining an appropriate dollar value per each additional beach visit. The most widely accepted method is the travel cost method (TCM). The TCM operates on the assumption that per capita beach usage decreases as a function of travel distance to the site (i.e. the out-of-pocket and opportunity costs, associated with travel, increase with distance). In short, this method involves a detailed accounting of beach participation as a function of travel distance; estimating of the opportunity cost of time associated with a recreational trip; and computing the out-of-pocket expenses related to travel. Detailed data regarding participation rates and the variation in demand for beach use with travel distance are not available for Brevard County; thus, computation of the TCM in determining an average value per beach visit was not practicable for the present study.

30. Two alternative approaches to assigning a value for a beach visit are the contingent valuation method (CVM) and the unit day value method (UDV). The CVM involves polling beach users regarding their willingness to pay. Conducting such a survey has not been conducted in this area and is not in the scope of this report. In contrast, the UDV approach is wholly subjective and requires assigning a point total to various characteristics of the project area. This method is reliant upon expert opinion of the following aspects of the project site and surrounding area: activities, facilities, relative scarcity, ease of access, and aesthetic factors. The point total attributable to a given project alternative is converted to a dollar per visit value. This dollar amount is based on

an established range and relies on the Consumer Price Index (CPI) to adjust this value to the current worth[4]. Application of the selected value to estimated annual use over the project life, in the context of the with- and without-project framework of analysis, provides the estimate of recreation benefits. The level of expert, subjective opinion and public involvement required for a UDV analysis is not feasible for the present study[5].

31. The present study relies upon an established value of a beach visit in Brevard County. The 1996 Feasibility Study of the Brevard County Shore Protection Project derived a value of $1.87 per beach visit in 1996 dollars by considering previous TCM studies completed for surrounding counties (USACE, 1996). Given the lack of data upon which to perform a full TCM analysis and its acceptability for use in developing accepted UDV valuations, the CPI was selected over alternate means as a conservative approach to adjusting the historically published value of a beach visit to one which would reasonably reflect the cost-per-visit in year one of the project (USACE, 2005). Use of the CPI in this manner is consistent with EGM06-03. The CPI published monthly by the United States Department of Labor and Statistics (BLS)[6] measures the average cost of goods and services from one time period to the next across a constant market.

32. A potential alternative to using the CPI involves adjusting the cost of a beach visit by the historic change in vehicular operating costs per mile (i.e. cost of travel). Using data gathered from the Federal Highway Administration, the Texas Comptroller of Public Accounts issued a 2004 report which cites a 90 percent increase in the average operating cost per mile of a motor vehicle between 1981 and 2001 (22.675 to 43.125 cents/mi)[7]. Over this same period, the average CPI increased by about 94.8 percent, from 90.9 in 1981 to 177.1 in 2001. Based on this data, the CPI appears to reasonably reflect changes in the operating cost of a motor vehicle and travel costs. The CPI is widely used to adjust

[4] USACE Economic Guidance Memorandum, 06-03, Unit Day Values for Recreation, Fiscal Year 2006. (EGM06-03) states, "Values provided for FY 2006 may be used to convert points to a UDV dollar amount…The table [valuation] was adjusted from Table K-3-1, Federal Register Vol. 44, No. 242, p.72962, December 4, 1979, using the CPI factor."
[5] USACE Economic Guidance Memorandum, 03-04, Unit Day Values for Recreation, Fiscal Year 2003. (EGM03-04) states, "…public involvement should occur in the value determination process."
[6] Online at http://www.bls.gov
[7] http://www.window.state.tx.us/specialrpt/mileage/#fnB9

not only changes in the price of goods and services but also the wages and benefits for millions of Americans (i.e. opportunity cost of time). Accordingly, the 1996 value of beach visitation was adjusted to 2005 valuation by considering changes over time in the respective average annual CPI published by the BLS (2005 is the most recent annual average CPI figure available). The value of a beach visit in 2006 (present year) was then linearly extrapolated from the published CPI data (see **Figure 1**). It is recognized that the base year of the project is 2010; however, all economic analyses assume valuation at current (2006) levels. The analysis suggests that each beach visit attributable to the project in 2006 will be valued at $2.35. This estimate is conservative relative to the published range of unit day values for FY2006, which places the value of each general recreation beach visit between $3.19 and $9.57 (USACE, 2005).

33. The resulting average cost of a beach visit is multiplied by the average annual increase in participation attributed to the project in order to determine the average recreation benefit for each year of a project's 50-year life-cycle. From this point, the present worth of the resulting revenue stream was computed and summed resulting in the average annual equivalent benefit. An interest rate of 5.125 percent was used to convert average annual incidental benefits to present worth. **Table 12** presents the results of the 50-year simulation for uniform maintenance of the current MHW position.

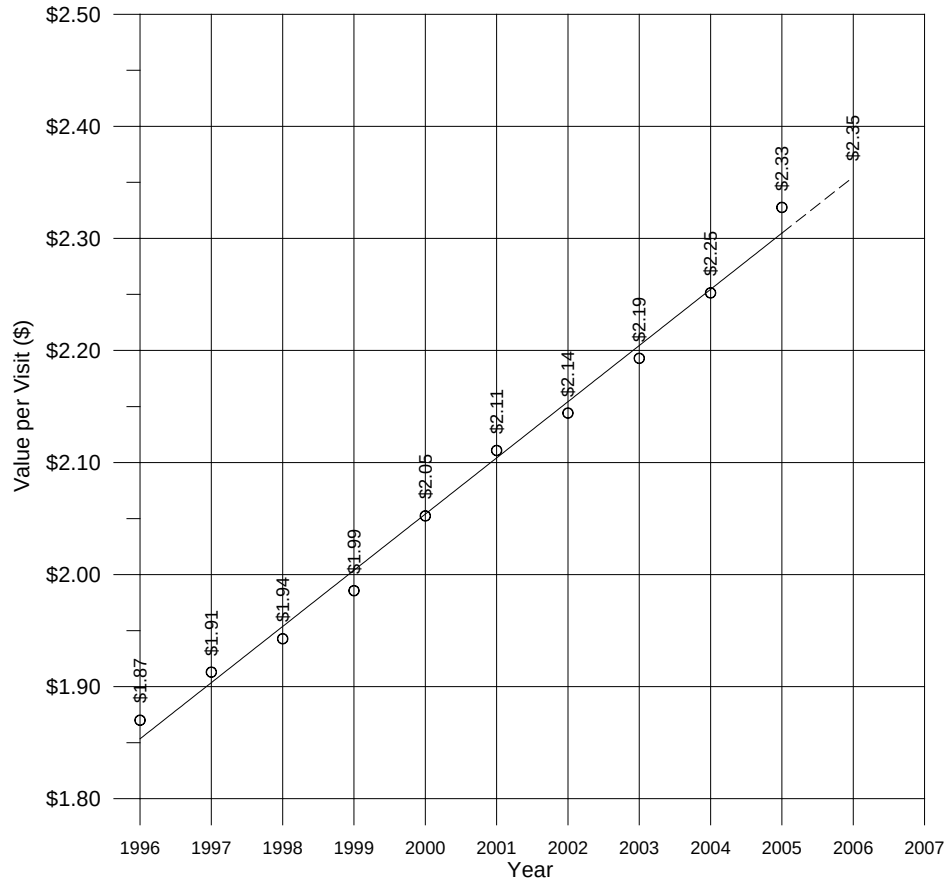


Figure 1 – Adjustment of the 1996 USACE beach visit valuation using the CPI.

Table 12 – Schedule of incidental benefits for uniform maintenance of existing MHWL along the Mid-Reach.

Total Average Annual Recreation Benefits

Interest Rate:	5.125%		
Project Life (yrs):	50		
Capital Recovery Factor		0.05583807	

Project Year	Visits Attributable to Project	Benefit ($)	Present Valuation ($)
0	**125,120**	294,033	294,000
1	141,551	332,644	316,400
2	157,981	371,255	335,900
3	174,411	409,866	352,800
4	190,841	448,477	367,200
5	207,272	487,088	379,400
6	223,702	525,699	389,500
7	240,132	564,310	397,700
8	256,562	602,921	404,200
9	272,992	641,532	409,100
10	**289,423**	680,143	412,600
11	304,162	714,781	412,500
12	318,902	749,419	411,400
13	333,641	784,057	409,400
14	348,381	818,695	406,700
15	363,120	853,333	403,200
16	377,860	887,971	399,100
17	392,599	922,608	394,500
18	407,339	957,246	389,300
19	422,078	991,884	383,700
20	**436,818**	1,026,522	377,800
21	453,232	1,065,094	372,900
22	469,645	1,103,667	367,500
23	486,059	1,142,239	361,800
24	502,473	1,180,811	355,800
25	518,887	1,219,384	349,500
26	535,301	1,257,956	343,000
27	551,714	1,296,529	336,300
28	568,128	1,335,101	329,400
29	584,542	1,373,673	322,400
30	**600,956**	1,412,246	315,300
31	613,384	1,441,451	306,100
32	625,812	1,470,657	297,100
33	638,240	1,499,863	288,200
34	650,667	1,529,069	279,500
35	663,095	1,558,274	271,000
36	675,523	1,587,480	262,600
37	687,951	1,616,686	254,400
38	700,379	1,645,891	246,400
39	712,807	1,675,097	238,500
40	**725,235**	1,704,303	230,800
41	739,210	1,737,143	223,800
42	753,184	1,769,982	216,900
43	767,158	1,802,822	210,200
44	781,133	1,835,662	203,600
45	795,107	1,868,501	197,100
46	809,081	1,901,341	190,800
47	823,056	1,934,181	184,600
48	837,030	1,967,020	178,600
49	851,004	1,999,860	172,700
50	**864,979**	2,032,700	167,000
		TOTAL	$ 15,659,200
	Annual Equivalent Benefit		$ 874,400

34. The results suggest that the maximum average annual recreational benefits for any beach project along the Mid-Reach are about $874,400. This assumes the entire Mid-Reach is made accessible to the public (via project easements) resulting in a parking limited condition for each project reach. Projects of differing dimension (width) do not realize additional recreation benefits because access is fixed by parking limitations throughout the 50-year project life.

35. Alternatives considering construction of new coastal armor do not provide additional beach visits and can not accrue incidental benefits along armored reaches. Likewise, project alternatives which do not place beach nourishment along one or more reaches may not realize recreational benefits along unnourished reaches. In order to consider average annual incidental benefits for such alternatives, each proposed project reach was analyzed independently, per the methodology discussed above.

36. On a per-reach basis, the average annual equivalent benefits attributable to any project alternative containing beach fill are presented in **Table 13**. In computing the total annual recreational benefits attributable to project alternatives which either armor the coastline or do not provide sand nourishment or public beach use through easements along a specific reach, the corresponding dollar benefit listed in **Table 13** must be subtracted from the total benefit established for the complete nourishment condition ($874,300/yr).

Table 13 – Average annual equivalent incidental benefits available, by reach, for any parking limited beach project.

Reach	Average Equivalent Benefit
1	$ 286,600
2	$ 18,900
3	$ 207,000
4	$ 172,300
5	$ 3,700
6	$ 185,800
TOTAL	**$ 874,300**

References

BEBR (2005). Florida Statistical Abstract 2005. Bureau of Economic and Business Research, Warrington College of Business, University of Florida. Gainesville, Fl.

City of Cocoa Beach, Florida (2002). "City of Cocoa Beach Economic Impact of Tourism." City report detailing findings of tourist survey. City of Cocoa Beach, Florida.

DNR (1989). Outdoor Recreation in Florida – 1989. State of Florida, Department of Natural Resources, Division of Recreation and Parks. Tallahassee, Fl. December 1989.

FAU (2005). "Economics of Beach Tourism in Florida." Prepared by the Catanese Center at Florida Atlantic University. July 2005.

FDEP (2002). Outdoor Recreation in Florida – 2000. Florida's Statewide Comprehensive Outdoor Recreation Plan. State of Florida, Department of Environmental Protection, Division of Recreation and Parks. Tallahassee, Fl. Feb. 2002.

Pendleton, L. (2001). "Managing Beach Amenities to Reduce Exposure to Coastal Hazards: Storm Water Pollution." School of International Relations and the Wrigley Institute for Environmental Studies. University of Southern California. Los Angeles, CA. 90089-0253. February 4, 2001.

PMG Associates. (2002). "Economic Impact Analysis of tourism – 2002. Brevard County, Florida." Prepared by PMG Assoc., 2151 West Hillsboro Blvd, Suite 301, Deerfield Beach, Fl.

Bodge, K.R. and Savage, R.J. (1989). "Economic Analysis of Beach Restoration along Brevard County, Florida." Olsen Associates, Inc. 4438 Herschel St., Jacksonville, FL. December 1989.

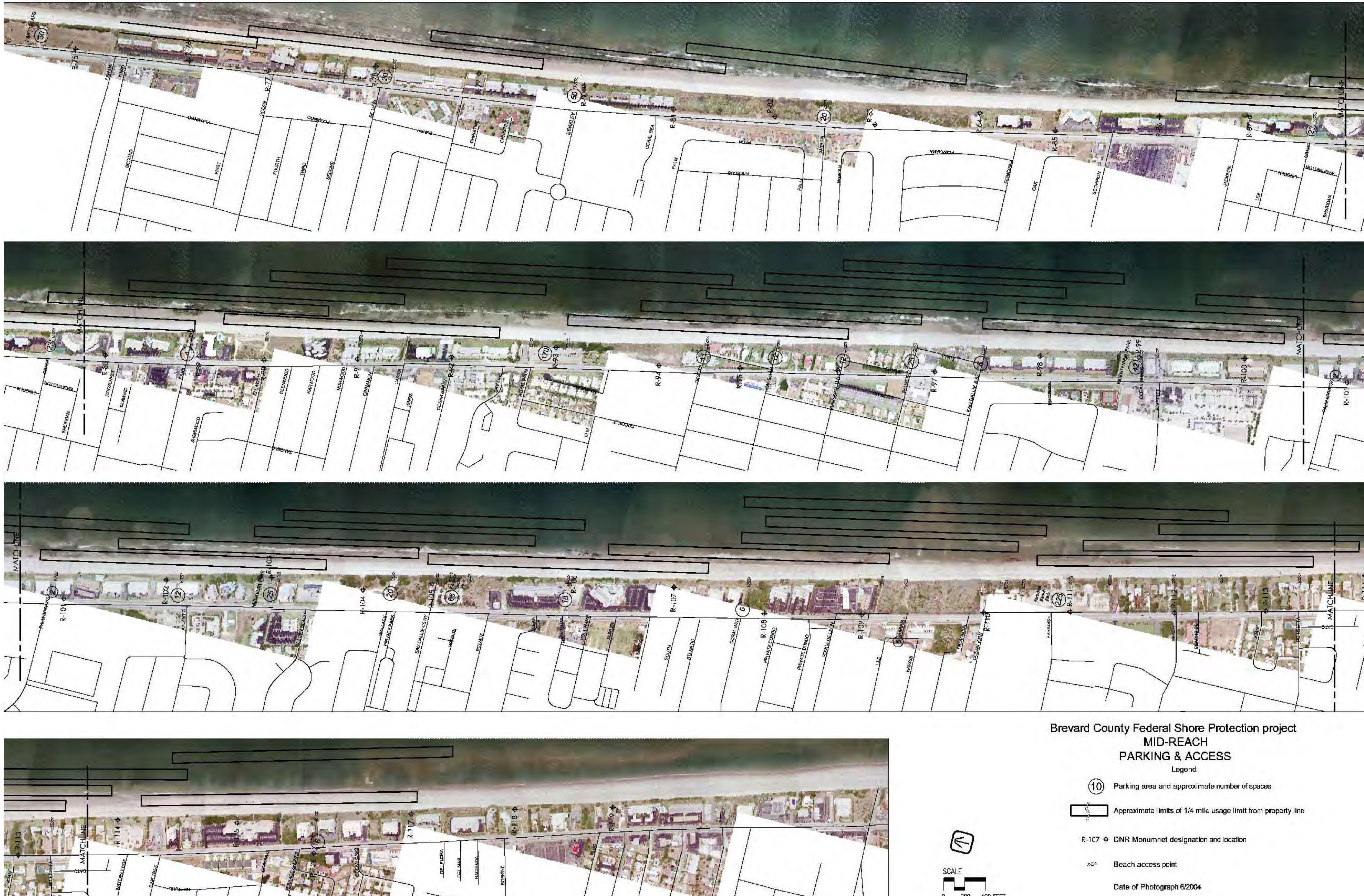
USACE (1996). "Brevard County, Florida Shore Protection Project, Review Study. Feasibility Report with Final Environmental Impact Statement." U.S. Army Corps of Engineers, Jacksonville District. December 1996.

USACE (2003). "Broward County, Florida Shore Protection Project. Segment II and III Renourishment. General Reevaluation Report with Final Environmental Impact Statement: Appendix C." Prepared by Coastal Planning & Engineering/Olsen Associates, Inc. J/V. Prepared for Broward County, Florida. June 2003.

USACE (2005). "Economic Guidance Memorandum, 06-03, Unit Day Values for Recreation, Fiscal year 2006." U.S. Army Corps of Engineering. CECW-CP memorandum EGM06-03. Harry E. Kitch, P.E. Deputy, Planning Community of Practice. Director of Civil Works. 24 October, 2005

Appendix A:

Location of parking and beach access for the Brevard County Mid-Reach. The with-project ¼ mile usage radii are drawn from the northern and southern property boundaries for each access point.



Brevard County Federal Shore Protection project
MID-REACH
PARKING & ACCESS

Legend:

(10) Parking area and approximate number of spaces

Approximate limits of 1/4 mile usage limit from property line

R-107 ⌖ DNR Monumnet designation and location

Beach access point

Date of Photograph 6/2004

SCALE 0 200 400 FEET

Appendix B:

Projected excess demand for a uniform 1-foot MHW extension along project reaches 1 though 6.

In computing excess demand, the following tables compare the available parking-constrained beach area capacity with the demand for the user group of interest throughout the project life. A sample calculation for the Patrick AFB access point, base year 2010, user group 1, without-project condition follows:

Given User Group 1, Year 2010:

Total daily demand = 16,807 uses/day [Table 4]
Number of days/year in user group = 1 day/year [Table 4]
PAFB Daily Area Capacity (constrained) = 864 uses/day [Table 6]
Total Mid-Reach Area Capacity (constrained) = 8,776 uses/day [Table 6]

Find, excess annual demand at PAFB access:

Percent demand allocated to PAFB access = (PAFB Capacity / Total capacity)

Percent demand allocated to PAFB access: 864 / 8,776 = .09845

Daily Demand = Fraction * Total Demand

Daily Demand = .09845 * 16,807

Daily Demand = 1,655 users/day [App. B: W/O project: User Group 1]

Excess Daily Demand = Daily Demand – Daily Capacity

Excess Daily Demand = 1,655 – 864

Excess Daily Demand = 791 users/day (not shown in table)

Excess Annual Demand = Excess Daily Demand * Days/year

Excess Annual Demand = 791 users/day * 1 day/year

Excess Annual Demand = 791 users/year [App. B: W/O project: User Group 1]

Computation is repeated for with- and without project conditions; for each year, user group, access point or group of access points.

Without project: User Group 1, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
1	1.50	1	1.5

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	1,855	1,012	843	2,579	1,012	1,567	3,393	1,012	2,381	4,334	1,012	3,322	5,423	1,012	4,411	6,703	1,012	5,691
SE 1st St	580	316	263	745	292	453	899	268	631	1,046	244	802	1,180	220	960	1,300	196	1,104
Berkley	508	277	231	645	253	392	768	229	539	879	205	674	971	181	790	1,041	157	884
Patrick	176	96	80	226	89	137	273	82	192	318	74	244	360	67	293	397	60	337
REACH 6	**3,118**	**1,701**	**1,417**	**4,195**	**1,646**	**2,549**	**5,334**	**1,591**	**3,743**	**6,578**	**1,536**	**5,042**	**7,934**	**1,481**	**6,454**	**9,441**	**1,425**	**8,016**
Grant	134	73	61	161	63	98	178	53	125	185	43	142	178	33	145	154	23	130
Park	106	58	48	122	48	74	128	38	90	120	28	92	97	18	79	53	8	45
Ellwood	13	7	6	15	6	9	16	5	11	17	4	13	15	3	12	12	2	10
Norwood	13	7	6	15	6	9	17	5	12	17	4	13	16	3	13	13	2	11
Cassia	13	7	6	16	6	10	17	5	12	18	4	14	17	3	14	14	2	12
REACH 5	**279**	**152**	**127**	**329**	**129**	**200**	**356**	**106**	**250**	**357**	**83**	**273**	**323**	**60**	**263**	**247**	**37**	**210**
Pelican Beach Park	2,231	1,217	1,014	2,825	1,109	1,717	3,352	1,000	2,352	3,816	891	2,925	4,192	782	3,409	4,460	673	3,786
Desoto	195	106	89	251	98	153	303	90	213	353	82	271	399	74	325	440	66	374
Magellan	204	112	93	264	104	160	320	96	225	375	88	287	426	80	347	474	72	402
REACH 4b	**2,631**	**1,435**	**1,195**	**3,340**	**1,311**	**2,029**	**3,975**	**1,186**	**2,789**	**4,544**	**1,061**	**3,483**	**5,017**	**936**	**4,081**	**5,374**	**811**	**4,563**
Sunrise	190	103	86	243	95	148	293	87	206	340	79	261	383	71	311	420	63	357
Palmetto	829	452	377	1,050	412	638	1,247	372	875	1,422	332	1,090	1,565	292	1,273	1,669	252	1,417
Eau Gallie Ave	156	85	71	196	77	119	231	69	162	261	61	200	284	53	231	298	45	253
Bicentennial	511	279	232	609	239	370	667	199	468	681	159	522	638	119	519	524	79	445
REACH 4a	**1,685**	**919**	**766**	**2,099**	**823**	**1,275**	**2,439**	**727**	**1,711**	**2,705**	**631**	**2,073**	**2,870**	**535**	**2,334**	**2,911**	**439**	**2,471**
Pinetree	37	20	17	52	20	31	68	20	48	87	20	66	108	20	88	113	17	96
Palm Springs	35	19	16	45	18	27	53	16	38	61	14	47	68	13	56	74	11	63
REACH 3b	**72**	**39**	**33**	**96**	**38**	**59**	**121**	**36**	**85**	**148**	**35**	**114**	**177**	**33**	**144**	**187**	**28**	**159**
Atlantic	391	213	178	502	197	305	607	181	426	707	165	542	799	149	650	882	133	749
Millenium Park	146	80	67	183	72	111	214	64	150	240	56	184	257	48	209	264	40	225
Wallace	192	105	87	247	97	150	298	89	209	347	81	266	391	73	318	430	65	365
Eau Gallie Cswy	2,411	1,316	1,096	3,353	1,316	2,037	4,411	1,316	3,095	5,635	1,316	4,319	7,050	1,316	5,735	8,714	1,316	7,398
REACH 3a	**3,141**	**1,714**	**1,427**	**4,286**	**1,682**	**2,604**	**5,530**	**1,650**	**3,881**	**6,928**	**1,618**	**5,311**	**8,497**	**1,586**	**6,912**	**10,290**	**1,554**	**8,737**
Rasisson Suites	199	108	90	261	102	159	323	96	227	387	90	297	453	84	368	520	78	441
Coral Way East	190	104	86	249	98	151	307	92	215	366	86	281	426	80	347	487	74	414
REACH 2	**389**	**212**	**177**	**510**	**200**	**310**	**630**	**188**	**442**	**754**	**176**	**578**	**879**	**164**	**715**	**1,007**	**152**	**855**
Holiday Inn South	34	19	16	44	17	27	54	16	38	62	15	48	71	13	57	78	12	66
Harris	176	96	80	227	89	138	275	82	193	321	75	246	364	68	296	404	61	343
REACH 1c	**210**	**115**	**96**	**271**	**106**	**165**	**329**	**98**	**231**	**384**	**90**	**294**	**435**	**81**	**354**	**482**	**73**	**409**
Paradise Beach Park	37	20	17	52	20	31	68	20	48	87	20	66	108	20	88	134	20	114
Paradise Beach Park	4,875	2,660	2,215	6,297	2,471	3,826	7,650	2,282	5,368	8,964	2,093	6,871	10,204	1,904	8,300	11,359	1,715	9,644
Beach	17	9	8	23	9	14	28	8	20	33	8	25	39	7	31	44	7	37
Surf Walk	17	9	8	22	9	14	27	8	19	33	8	25	38	7	31	43	7	37
REACH 1b	**4,947**	**2,699**	**2,248**	**6,394**	**2,509**	**3,885**	**7,774**	**2,319**	**5,455**	**9,117**	**2,129**	**6,988**	**10,389**	**1,939**	**8,450**	**11,581**	**1,748**	**9,832**
Poinsetta	17	9	8	22	9	13	27	8	19	32	8	25	38	7	31	43	6	36
Coconut	29	16	13	38	15	23	47	14	33	56	13	43	66	12	54	76	11	64
Terrace Shores	223	121	101	309	121	188	407	121	286	499	117	383	587	110	478	679	103	577
Flug	37	20	17	52	20	31	68	20	48	87	20	66	108	20	88	134	20	114
Franklin	29	16	13	38	15	23	48	14	33	57	13	44	67	13	55	77	12	66
REACH 1a	**334.4**	**182.5**	**152**	**459.3**	**180.2**	**279**	**596.7**	**178.0**	**419**	**731.8**	**170.9**	**561**	**866.1**	**161.6**	**704**	**1,009.2**	**152.4**	**857**
TOTAL	**16,807**	9,170	**7,637**	**21,979**	8,624	**13,355**	**27,085**	8,079	**19,006**	**32,246**	7,529	**24,717**	**37,387**	6,976	**30,411**	**42,528**	6,421	**36,108**

Without project: User Group 2, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
2	1.35	11	14.8

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	1,664	1,012	7,169	2,313	1,012	14,315	3,043	1,012	22,343	3,888	1,012	31,634	4,865	1,012	42,379	6,012	1,012	55,004
SE 1st St	520	316	2,240	668	292	4,134	807	268	5,922	938	244	7,635	1,059	220	9,223	1,166	196	10,666
Berkley	456	277	1,964	579	253	3,582	689	229	5,060	788	205	6,415	871	181	7,588	934	157	8,545
Patrick	158	96	680	203	89	1,255	245	82	1,800	286	74	2,323	323	67	2,811	356	60	3,257
REACH 6	**2,797**	**1,701**	**12,053**	**3,763**	**1,646**	**23,285**	**4,784**	**1,591**	**35,125**	**5,900**	**1,536**	**48,007**	**7,117**	**1,481**	**62,000**	**8,468**	**1,425**	**77,471**
Grant	120	73	518	144	63	894	160	53	1,174	166	43	1,350	159	33	1,389	138	23	1,260
Park	95	58	411	110	48	680	114	38	840	108	28	877	87	18	756	48	8	438
Ellwood	11	7	49	13	6	83	15	5	107	15	4	121	14	3	120	11	2	101
Norwood	12	7	50	14	6	85	15	5	111	15	4	126	15	3	126	12	2	110
Cassia	12	7	51	14	6	87	16	5	114	16	4	130	15	3	133	13	2	118
REACH 5	**250**	**152**	**1,079**	**296**	**129**	**1,829**	**320**	**106**	**2,346**	**320**	**83**	**2,603**	**290**	**60**	**2,524**	**221**	**37**	**2,026**
Pelican Beach Park	2,001	1,217	8,624	2,534	1,109	15,680	3,006	1,000	22,072	3,423	891	27,850	3,760	782	32,753	4,000	673	36,597
Desoto	175	106	754	225	98	1,393	272	90	1,998	317	82	2,579	358	74	3,120	395	66	3,614
Magellan	183	112	790	237	104	1,464	287	96	2,109	336	88	2,736	382	80	3,330	425	72	3,887
REACH 4b	**2,360**	**1,435**	**10,169**	**2,996**	**1,311**	**18,538**	**3,566**	**1,186**	**26,179**	**4,076**	**1,061**	**33,164**	**4,500**	**936**	**39,202**	**4,820**	**811**	**44,098**
Sunrise	170	103	733	218	95	1,350	263	87	1,930	305	79	2,483	343	71	2,991	377	63	3,447
Palmetto	743	452	3,203	942	412	5,828	1,119	372	8,214	1,276	332	10,380	1,404	292	12,230	1,497	252	13,700
Eau Gallie Ave	140	85	602	176	77	1,088	207	69	1,522	234	61	1,905	255	53	2,217	267	45	2,443
Bicentennial	459	279	1,977	546	239	3,382	599	199	4,395	611	159	4,972	572	119	4,986	470	79	4,297
REACH 4a	**1,512**	**919**	**6,514**	**1,882**	**823**	**11,648**	**2,188**	**727**	**16,061**	**2,426**	**631**	**19,740**	**2,574**	**535**	**22,424**	**2,611**	**439**	**23,887**
Pinetree	33	20	143	46	20	286	61	20	447	78	20	633	97	20	848	101	17	926
Palm Springs	31	19	136	40	18	248	48	16	352	55	14	449	61	13	534	66	11	606
REACH 3b	**65**	**39**	**279**	**86**	**38**	**535**	**109**	**36**	**799**	**133**	**35**	**1,081**	**159**	**33**	**1,382**	**167**	**28**	**1,532**
Atlantic	350	213	1,510	451	197	2,789	545	181	3,999	634	165	5,162	717	149	6,245	791	133	7,236
Millenium Park	131	80	566	164	72	1,017	192	64	1,411	215	56	1,748	230	48	2,007	237	40	2,170
Wallace	173	105	743	222	97	1,371	267	89	1,963	311	81	2,530	351	73	3,054	386	65	3,529
Eau Gallie Cswy	2,163	1,316	9,320	3,007	1,316	18,609	3,956	1,316	29,045	5,054	1,316	41,124	6,324	1,316	55,092	7,816	1,316	71,505
REACH 3a	**2,817**	**1,714**	**12,140**	**3,844**	**1,682**	**23,786**	**4,960**	**1,650**	**36,419**	**6,214**	**1,618**	**50,564**	**7,622**	**1,586**	**66,399**	**9,230**	**1,554**	**84,441**
Rasisson Suites	178	108	768	234	102	1,449	290	96	2,129	347	90	2,827	406	84	3,536	466	78	4,263
Coral Way East	170	104	734	223	98	1,380	275	92	2,022	329	86	2,675	382	80	3,332	437	74	3,998
REACH 2	**349**	**212**	**1,502**	**457**	**200**	**2,829**	**565**	**188**	**4,151**	**676**	**176**	**5,502**	**788**	**164**	**6,868**	**903**	**152**	**8,262**
Holiday Inn South	31	19	133	40	17	246	48	16	353	56	15	456	63	13	552	70	12	641
Harris	158	96	680	203	89	1,259	247	82	1,810	288	75	2,345	327	68	2,848	362	61	3,316
REACH 1c	**189**	**115**	**813**	**243**	**106**	**1,505**	**295**	**98**	**2,163**	**344**	**90**	**2,801**	**390**	**81**	**3,400**	**432**	**73**	**3,956**
Paradise Beach Park	33	20	143	46	20	286	61	20	447	78	20	633	97	20	848	120	20	1,100
Paradise Beach Park	4,373	2,660	18,845	5,649	2,471	34,953	6,862	2,282	50,382	8,041	2,093	65,426	9,152	1,904	79,733	10,189	1,715	93,214
Beach	16	9	67	20	9	126	25	8	184	30	8	243	35	7	301	39	7	361
Surf Walk	15	9	66	20	9	124	25	8	181	29	8	238	34	7	296	39	7	354
REACH 1b	**4,437**	**2,699**	**19,121**	**5,735**	**2,509**	**35,488**	**6,973**	**2,319**	**51,193**	**8,178**	**2,129**	**66,539**	**9,318**	**1,939**	**81,178**	**10,387**	**1,748**	**95,029**
Poinsetta	15	9	65	20	9	123	24	8	179	29	8	236	34	7	293	38	6	350
Coconut	26	16	111	34	15	210	42	14	309	50	13	411	59	12	515	68	11	623
Terrace Shores	200	121	860	278	121	1,718	365	121	2,681	448	117	3,643	527	110	4,588	609	103	5,574
Flug	33	20	143	46	20	286	61	20	447	78	20	633	97	20	848	120	20	1,100
Franklin	26	16	113	34	15	213	43	14	314	51	13	418	60	13	524	69	12	635
REACH 1a	**300.0**	**182.5**	1,293	**412.0**	**180.2**	2,549	**535.2**	**178.0**	3,929	**656.4**	**170.9**	5,341	**776.9**	**161.6**	6,768	**905.3**	**152.4**	8,282
TOTAL	**15,075**	9,170	**64,962**	**19,715**	8,624	**121,992**	**24,294**	8,079	**178,367**	**28,924**	7,529	**235,342**	**33,535**	6,976	**292,146**	**38,147**	6,421	**348,984**

Without project: User Group 3, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
3	1.17	10	11.7

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	1,447	1,012	4,348	2,012	1,012	9,997	2,646	1,012	16,343	3,381	1,012	23,688	4,230	1,012	32,182	5,228	1,012	42,163
SE 1st St	452	316	1,359	581	292	2,887	701	268	4,332	816	244	5,717	921	220	7,004	1,014	196	8,176
Berkley	396	277	1,191	503	253	2,501	599	229	3,702	686	205	4,803	757	181	5,763	812	157	6,550
Patrick	137	96	412	176	89	876	213	82	1,317	248	74	1,740	281	67	2,135	310	60	2,497
REACH 6	**2,432**	**1,701**	**7,310**	**3,272**	**1,646**	**16,261**	**4,160**	**1,591**	**25,693**	**5,131**	**1,536**	**35,948**	**6,189**	**1,481**	**47,083**	**7,364**	**1,425**	**59,385**
Grant	105	73	314	126	63	624	139	53	859	144	43	1,011	139	33	1,055	120	23	966
Park	83	58	249	96	48	475	100	38	615	94	28	657	75	18	574	42	8	336
Ellwood	10	7	29	12	6	58	13	5	78	13	4	90	12	3	91	10	2	77
Norwood	10	7	30	12	6	59	13	5	81	13	4	94	13	3	96	10	2	84
Cassia	10	7	31	12	6	61	14	5	84	14	4	98	13	3	101	11	2	91
REACH 5	**218**	**152**	**654**	**257**	**129**	**1,277**	**278**	**106**	**1,716**	**278**	**83**	**1,949**	**252**	**60**	**1,917**	**193**	**37**	**1,553**
Pelican Beach Park	1,740	1,217	5,230	2,204	1,109	10,950	2,614	1,000	16,145	2,976	891	20,854	3,269	782	24,872	3,479	673	28,053
Desoto	152	106	458	196	98	973	237	90	1,461	276	82	1,931	311	74	2,369	344	66	2,771
Magellan	159	112	479	206	104	1,023	250	96	1,543	292	88	2,049	332	80	2,529	370	72	2,980
REACH 4b	**2,052**	**1,435**	**6,167**	**2,605**	**1,311**	**12,946**	**3,101**	**1,186**	**19,149**	**3,544**	**1,061**	**24,834**	**3,913**	**936**	**29,770**	**4,192**	**811**	**33,804**
Sunrise	148	103	444	190	95	943	229	87	1,412	265	79	1,859	299	71	2,271	328	63	2,642
Palmetto	646	452	1,942	819	412	4,070	973	372	6,008	1,109	332	7,773	1,221	292	9,288	1,302	252	10,501
Eau Gallie Ave	121	85	365	153	77	760	180	69	1,114	204	61	1,427	221	53	1,684	232	45	1,873
Bicentennial	399	279	1,199	475	239	2,362	521	199	3,215	531	159	3,723	498	119	3,786	408	79	3,294
REACH 4a	**1,315**	**919**	**3,951**	**1,637**	**823**	**8,135**	**1,902**	**727**	**11,749**	**2,110**	**631**	**14,782**	**2,238**	**535**	**17,029**	**2,271**	**439**	**18,311**
Pinetree	29	20	87	40	20	200	53	20	327	68	20	474	85	20	644	88	17	710
Palm Springs	27	19	82	35	18	173	42	16	258	48	14	336	53	13	406	58	11	465
REACH 3b	**56**	**39**	**169**	**75**	**38**	**373**	**95**	**36**	**585**	**116**	**35**	**810**	**138**	**33**	**1,049**	**146**	**28**	**1,174**
Atlantic	305	213	916	392	197	1,947	474	181	2,925	552	165	3,866	623	149	4,743	688	133	5,547
Millenium Park	114	80	343	143	72	710	167	64	1,032	187	56	1,309	200	48	1,524	206	40	1,663
Wallace	150	105	451	193	97	958	233	89	1,436	270	81	1,894	305	73	2,319	335	65	2,705
Eau Gallie Cswy	1,881	1,316	5,652	2,615	1,316	12,996	3,440	1,316	21,246	4,395	1,316	30,795	5,499	1,316	41,837	6,797	1,316	54,812
REACH 3a	**2,450**	**1,714**	**7,362**	**3,343**	**1,682**	**16,611**	**4,314**	**1,650**	**26,640**	**5,404**	**1,618**	**37,864**	**6,628**	**1,586**	**50,423**	**8,026**	**1,554**	**64,728**
Rasisson Suites	155	108	466	204	102	1,012	252	96	1,557	302	90	2,117	353	84	2,685	405	78	3,268
Coral Way East	148	104	445	194	98	964	239	92	1,479	286	86	2,003	333	80	2,530	380	74	3,065
REACH 2	**303**	**212**	**911**	**398**	**200**	**1,976**	**492**	**188**	**3,036**	**588**	**176**	**4,120**	**686**	**164**	**5,215**	**785**	**152**	**6,333**
Holiday Inn South	27	19	81	35	17	172	42	16	258	49	15	341	55	13	419	61	12	491
Harris	137	96	412	177	89	879	214	82	1,324	251	75	1,756	284	68	2,163	315	61	2,542
REACH 1c	**164**	**115**	**493**	**211**	**106**	**1,051**	**256**	**98**	**1,582**	**299**	**90**	**2,097**	**339**	**81**	**2,582**	**376**	**73**	**3,033**
Paradise Beach Park	29	20	87	40	20	200	53	20	327	68	20	474	85	20	644	105	20	843
Paradise Beach Park	3,803	2,660	11,429	4,912	2,471	24,409	5,967	2,282	36,853	6,992	2,093	48,992	7,959	1,904	60,549	8,860	1,715	71,453
Beach	13	9	41	18	9	88	22	8	134	26	8	182	30	7	229	34	7	277
Surf Walk	13	9	40	17	9	86	21	8	132	25	8	178	30	7	225	34	7	271
REACH 1b	**3,859**	**2,699**	**11,596**	**4,987**	**2,509**	**24,783**	**6,063**	**2,319**	**37,446**	**7,111**	**2,129**	**49,826**	**8,103**	**1,939**	**61,647**	**9,033**	**1,748**	**72,844**
Poinsetta	13	9	40	17	9	86	21	8	131	25	8	177	29	7	223	33	6	268
Coconut	22	16	67	29	15	146	37	14	226	44	13	308	51	12	391	59	11	477
Terrace Shores	174	121	522	241	121	1,200	318	121	1,961	389	117	2,728	458	110	3,484	530	103	4,273
Flug	29	20	87	40	20	200	53	20	327	68	20	474	85	20	644	105	20	843
Franklin	23	16	68	30	15	149	37	14	229	45	13	313	52	13	398	60	12	487
REACH 1a	**260.9**	**182.5**	**784**	**358.2**	**180.2**	**1,780**	**465.4**	**178.0**	**2,874**	**570.8**	**170.9**	**3,999**	**675.6**	**161.6**	**5,139**	**787.2**	**152.4**	**6,348**
TOTAL	13,109	9,170	**39,397**	17,144	8,624	**85,193**	21,126	8,079	**130,471**	25,152	7,529	**176,230**	29,162	6,976	**221,855**	33,172	6,421	**267,513**

Without project: User Group 4, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
4	0.99	7	6.9

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	1,219	1,012	1,448	1,695	1,012	4,780	2,229	1,012	8,522	2,848	1,012	12,854	3,564	1,012	17,864	4,405	1,012	23,750
SE 1st St	381	316	453	489	292	1,380	591	268	2,259	687	244	3,102	776	220	3,888	854	196	4,605
Berkley	334	277	397	424	253	1,196	505	229	1,930	578	205	2,607	638	181	3,199	684	157	3,689
Patrick	116	96	137	149	89	419	180	82	687	209	74	944	236	67	1,185	261	60	1,406
REACH 6	**2,049**	**1,701**	**2,435**	**2,757**	**1,646**	**7,775**	**3,505**	**1,591**	**13,398**	**4,322**	**1,536**	**19,507**	**5,214**	**1,481**	**26,135**	**6,204**	**1,425**	**33,451**
Grant	88	73	105	106	63	298	117	53	448	122	43	548	117	33	586	101	23	544
Park	70	58	83	80	48	227	84	38	320	79	28	356	64	18	319	35	8	189
Ellwood	8	7	10	10	6	28	11	5	41	11	4	49	10	3	50	8	2	44
Norwood	8	7	10	10	6	28	11	5	42	11	4	51	11	3	53	9	2	47
Cassia	9	7	10	10	6	29	11	5	44	12	4	53	11	3	56	9	2	51
REACH 5	**183**	**152**	**218**	**217**	**129**	**611**	**234**	**106**	**895**	**234**	**83**	**1,058**	**212**	**60**	**1,064**	**162**	**37**	**875**
Pelican Beach Park	1,466	1,217	1,742	1,856	1,109	5,236	2,202	1,000	8,419	2,508	891	11,316	2,754	782	13,806	2,931	673	15,802
Desoto	128	106	152	165	98	465	199	90	762	232	82	1,048	262	74	1,315	289	66	1,561
Magellan	134	112	160	173	104	489	210	96	804	246	88	1,112	280	80	1,404	311	72	1,678
REACH 4b	**1,729**	**1,435**	**2,054**	**2,195**	**1,311**	**6,190**	**2,612**	**1,186**	**9,986**	**2,986**	**1,061**	**13,476**	**3,297**	**936**	**16,525**	**3,531**	**811**	**19,041**
Sunrise	125	103	148	160	95	451	193	87	736	224	79	1,009	252	71	1,261	276	63	1,488
Palmetto	544	452	647	690	412	1,946	820	372	3,133	935	332	4,218	1,029	292	5,155	1,097	252	5,915
Eau Gallie Ave	102	85	122	129	77	363	152	69	581	172	61	774	186	53	935	196	45	1,055
Bicentennial	336	279	399	400	239	1,129	439	199	1,676	448	159	2,020	419	119	2,102	344	79	1,856
REACH 4a	**1,107**	**919**	**1,316**	**1,379**	**823**	**3,889**	**1,603**	**727**	**6,127**	**1,777**	**631**	**8,021**	**1,886**	**535**	**9,452**	**1,913**	**439**	**10,314**
Pinetree	24	20	29	34	20	96	45	20	170	57	20	257	71	20	357	74	17	400
Palm Springs	23	19	27	29	18	83	35	16	134	40	14	182	45	13	225	49	11	262
REACH 3b	**47**	**39**	**56**	**63**	**38**	**179**	**80**	**36**	**305**	**97**	**35**	**439**	**116**	**33**	**582**	**123**	**28**	**661**
Atlantic	257	213	305	330	197	931	399	181	1,525	465	165	2,098	525	149	2,633	580	133	3,125
Millenium Park	96	80	114	120	72	340	141	64	538	157	56	710	169	48	846	174	40	937
Wallace	126	105	150	162	97	458	196	89	749	228	81	1,028	257	73	1,287	283	65	1,524
Eau Gallie Cswy	1,585	1,316	1,883	2,203	1,316	6,214	2,898	1,316	11,079	3,703	1,316	16,711	4,633	1,316	23,223	5,726	1,316	30,874
REACH 3a	**2,064**	**1,714**	**2,453**	**2,816**	**1,682**	**7,942**	**3,634**	**1,650**	**13,892**	**4,553**	**1,618**	**20,546**	**5,584**	**1,586**	**27,989**	**6,762**	**1,554**	**36,460**
Rasisson Suites	131	108	155	172	102	484	212	96	812	255	90	1,149	297	84	1,490	341	78	1,841
Coral Way East	125	104	148	163	98	461	202	92	771	241	86	1,087	280	80	1,404	320	74	1,726
REACH 2	**255**	**212**	**303**	**335**	**200**	**945**	**414**	**188**	**1,583**	**495**	**176**	**2,236**	**578**	**164**	**2,895**	**662**	**152**	**3,567**
Holiday Inn South	23	19	27	29	17	82	35	16	135	41	15	185	46	13	233	51	12	277
Harris	116	96	137	149	89	420	181	82	691	211	75	953	239	68	1,200	266	61	1,432
REACH 1c	**138**	**115**	**164**	**178**	**106**	**502**	**216**	**98**	**825**	**252**	**90**	**1,138**	**286**	**81**	**1,433**	**317**	**73**	**1,708**
Paradise Beach Park	24	20	29	34	20	96	45	20	170	57	20	257	71	20	357	88	20	475
Paradise Beach Park	3,204	2,660	3,807	4,138	2,471	11,671	5,027	2,282	19,218	5,891	2,093	26,585	6,705	1,904	33,609	7,465	1,715	40,248
Beach	11	9	14	15	9	42	18	8	70	22	8	99	25	7	127	29	7	156
Surf Walk	11	9	13	15	9	41	18	8	69	21	8	97	25	7	125	28	7	153
REACH 1b	**3,251**	**2,699**	**3,863**	**4,202**	**2,509**	**11,849**	**5,108**	**2,319**	**19,527**	**5,991**	**2,129**	**27,038**	**6,827**	**1,939**	**34,218**	**7,610**	**1,748**	**41,032**
Poinsetta	11	9	13	15	9	41	18	8	68	21	8	96	25	7	124	28	6	151
Coconut	19	16	22	25	15	70	31	14	118	37	13	167	43	12	217	50	11	269
Terrace Shores	146	121	174	203	121	574	268	121	1,023	328	117	1,480	386	110	1,934	446	103	2,407
Flug	24	20	29	34	20	96	45	20	170	57	20	257	71	20	357	88	20	475
Franklin	19	16	23	25	15	71	31	14	120	38	13	170	44	13	221	51	12	274
REACH 1a	**219.8**	**182.5**	**261**	**301.8**	**180.2**	**851**	**392.1**	**178.0**	**1,499**	**480.9**	**170.9**	**2,170**	**569.2**	**161.6**	**2,853**	**663.2**	**152.4**	**3,576**
TOTAL	11,045	9,170	**13,124**	14,443	8,624	**40,733**	17,799	8,079	**68,037**	21,190	7,529	**95,629**	24,569	6,976	**123,146**	27,947	6,421	**150,685**

Without project: User Group 5, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
5	0.81	16	12.9

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	997	1,012	0	1,386	1,012	5,988	1,824	1,012	12,985	2,330	1,012	21,084	2,915	1,012	30,449	3,603	1,012	41,453
SE 1st St	312	316	0	400	292	1,729	483	268	3,442	562	244	5,088	634	220	6,626	699	196	8,038
Berkley	273	277	0	347	253	1,498	413	229	2,941	472	205	4,275	522	181	5,452	560	157	6,440
Patrick	95	96	0	122	89	525	147	82	1,046	171	74	1,548	193	67	2,020	213	60	2,455
REACH 6	**1,676**	**1,701**	**0**	**2,255**	**1,646**	**9,740**	**2,867**	**1,591**	**20,414**	**3,536**	**1,536**	**31,996**	**4,265**	**1,481**	**44,547**	**5,074**	**1,425**	**58,386**
Grant	72	73	0	87	63	374	96	53	682	99	43	900	96	33	998	83	23	949
Park	57	58	0	66	48	284	69	38	488	65	28	584	52	18	543	29	8	330
Ellwood	7	7	0	8	6	35	9	5	62	9	4	80	8	3	86	7	2	76
Norwood	7	7	0	8	6	36	9	5	64	9	4	84	9	3	91	7	2	83
Cassia	7	7	0	8	6	37	9	5	66	10	4	87	9	3	95	8	2	89
REACH 5	**150**	**152**	**0**	**177**	**129**	**765**	**192**	**106**	**1,364**	**192**	**83**	**1,735**	**174**	**60**	**1,814**	**133**	**37**	**1,527**
Pelican Beach Park	1,199	1,217	0	1,518	1,109	6,559	1,801	1,000	12,828	2,051	891	18,562	2,253	782	23,533	2,397	673	27,581
Desoto	105	106	0	135	98	583	163	90	1,161	190	82	1,719	215	74	2,242	237	66	2,724
Magellan	110	112	0	142	104	613	172	96	1,226	201	88	1,823	229	80	2,393	255	72	2,930
REACH 4b	**1,414**	**1,435**	**0**	**1,795**	**1,311**	**7,754**	**2,137**	**1,186**	**15,215**	**2,442**	**1,061**	**22,104**	**2,697**	**936**	**28,167**	**2,889**	**811**	**33,235**
Sunrise	102	103	0	131	95	565	158	87	1,122	183	79	1,655	206	71	2,149	226	63	2,598
Palmetto	445	452	0	564	412	2,438	670	372	4,774	764	332	6,918	841	292	8,787	897	252	10,325
Eau Gallie Ave	84	85	0	105	77	455	124	69	885	140	61	1,270	153	53	1,593	160	45	1,841
Bicentennial	275	279	0	327	239	1,415	359	199	2,554	366	159	3,314	343	119	3,582	281	79	3,239
REACH 4a	**906**	**919**	**0**	**1,128**	**823**	**4,873**	**1,311**	**727**	**9,335**	**1,454**	**631**	**13,156**	**1,542**	**535**	**16,112**	**1,565**	**439**	**18,003**
Pinetree	20	20	0	28	20	120	36	20	260	47	20	422	58	20	609	61	17	698
Palm Springs	19	19	0	24	18	104	29	16	205	33	14	299	37	13	384	40	11	457
REACH 3b	**39**	**39**	**0**	**52**	**38**	**224**	**65**	**36**	**464**	**80**	**35**	**721**	**95**	**33**	**993**	**100**	**28**	**1,155**
Atlantic	210	213	0	270	197	1,166	326	181	2,324	380	165	3,441	430	149	4,487	474	133	5,454
Millenium Park	79	80	0	99	72	426	115	64	820	129	56	1,165	138	48	1,442	142	40	1,635
Wallace	103	105	0	133	97	574	160	89	1,141	186	81	1,686	210	73	2,194	231	65	2,660
Eau Gallie Cswy	1,296	1,316	0	1,802	1,316	7,784	2,371	1,316	16,881	3,029	1,316	27,409	3,790	1,316	39,584	4,684	1,316	53,889
REACH 3a	**1,688**	**1,714**	**0**	**2,303**	**1,682**	**9,950**	**2,973**	**1,650**	**21,166**	**3,724**	**1,618**	**33,701**	**4,567**	**1,586**	**47,707**	**5,531**	**1,554**	**63,638**
Rasisson Suites	107	108	0	140	102	606	174	96	1,237	208	90	1,884	243	84	2,541	279	78	3,213
Coral Way East	102	104	0	134	98	577	165	92	1,175	197	86	1,783	229	80	2,394	262	74	3,013
REACH 2	**209**	**212**	**0**	**274**	**200**	**1,183**	**339**	**188**	**2,412**	**405**	**176**	**3,667**	**472**	**164**	**4,935**	**541**	**152**	**6,226**
Holiday Inn South	19	19	0	24	17	103	29	16	205	34	15	304	38	13	397	42	12	483
Harris	95	96	0	122	89	527	148	82	1,052	173	75	1,563	196	68	2,046	217	61	2,499
REACH 1c	**113**	**115**	**0**	**146**	**106**	**630**	**177**	**98**	**1,257**	**206**	**90**	**1,867**	**234**	**81**	**2,443**	**259**	**73**	**2,982**
Paradise Beach Park	20	20	0	28	20	120	36	20	260	47	20	422	58	20	609	72	20	829
Paradise Beach Park	2,621	2,660	0	3,385	2,471	14,621	4,112	2,282	29,281	4,818	2,093	43,606	5,485	1,904	57,288	6,106	1,715	70,251
Beach	9	9	0	12	9	53	15	8	107	18	8	162	21	7	217	24	7	272
Surf Walk	9	9	0	12	9	52	15	8	105	18	8	159	20	7	213	23	7	266
REACH 1b	**2,659**	**2,699**	**0**	**3,437**	**2,509**	**14,845**	**4,178**	**2,319**	**29,753**	**4,900**	**2,129**	**44,348**	**5,584**	**1,939**	**58,326**	**6,225**	**1,748**	**71,618**
Poinsetta	9	9	0	12	9	51	15	8	104	17	8	158	20	7	211	23	6	264
Coconut	15	16	0	20	15	88	25	14	179	30	13	274	35	12	370	41	11	469
Terrace Shores	120	121	0	166	121	719	219	121	1,558	268	117	2,428	316	110	3,296	365	103	4,201
Flug	20	20	0	28	20	120	36	20	260	47	20	422	58	20	609	72	20	829
Franklin	16	16	0	21	15	89	26	14	182	31	13	278	36	13	377	42	12	478
REACH 1a	**179.8**	**182.5**	**0**	**246.9**	**180.2**	**1,066**	**320.7**	**178.0**	**2,284**	**393.3**	**170.9**	**3,560**	**465.5**	**161.6**	**4,863**	**542.5**	**152.4**	**6,242**
TOTAL	9,034	9,170	**0**	11,814	8,624	**51,030**	14,558	8,079	**103,664**	17,332	7,529	**156,854**	20,096	6,976	**209,907**	22,859	6,421	**263,011**

Without project: User Group 6, years 2010-2060:

User Group 6 | Percent of Total 0.63 | Number of Days 22 | % Annual Total 13.8

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	776	1,012	0	1,079	1,012	1,463	1,419	1,012	8,949	1,813	1,012	17,612	2,268	1,012	27,631	2,803	1,012	39,403
SE 1st St	242	316	0	311	292	423	376	268	2,372	437	244	4,251	494	220	6,013	544	196	7,641
Berkley	212	277	0	270	253	366	321	229	2,027	368	205	3,571	406	181	4,948	435	157	6,121
Patrick	74	96	0	95	89	128	114	82	721	133	74	1,293	150	67	1,833	166	60	2,333
REACH 6	**1,304**	**1,701**	**0**	**1,754**	**1,646**	**2,380**	**2,230**	**1,591**	**14,069**	**2,751**	**1,536**	**26,728**	**3,318**	**1,481**	**40,425**	**3,948**	**1,425**	**55,498**
Grant	56	73	0	67	63	91	75	53	470	77	43	751	74	33	906	64	23	902
Park	44	58	0	51	48	69	53	38	337	50	28	488	40	18	493	22	8	314
Ellwood	5	7	0	6	6	8	7	5	43	7	4	67	6	3	78	5	2	72
Norwood	5	7	0	6	6	9	7	5	44	7	4	70	7	3	82	6	2	79
Cassia	5	7	0	7	6	9	7	5	46	7	4	73	7	3	87	6	2	85
REACH 5	**117**	**152**	**0**	**138**	**129**	**187**	**149**	**106**	**940**	**149**	**83**	**1,449**	**135**	**60**	**1,646**	**103**	**37**	**1,452**
Pelican Beach Park	933	1,217	0	1,181	1,109	1,603	1,402	1,000	8,840	1,596	891	15,505	1,753	782	21,355	1,865	673	26,217
Desoto	82	106	0	105	98	142	127	90	800	148	82	1,436	167	74	2,034	184	66	2,589
Magellan	85	112	0	110	104	150	134	96	845	157	88	1,523	178	80	2,171	198	72	2,785
REACH 4b	**1,100**	**1,435**	**0**	**1,397**	**1,311**	**1,895**	**1,662**	**1,186**	**10,485**	**1,900**	**1,061**	**18,464**	**2,098**	**936**	**25,560**	**2,247**	**811**	**31,591**
Sunrise	79	103	0	102	95	138	123	87	773	142	79	1,382	160	71	1,950	176	63	2,469
Palmetto	346	452	0	439	412	596	522	372	3,290	595	332	5,779	655	292	7,974	698	252	9,814
Eau Gallie Ave	65	85	0	82	77	111	97	69	610	109	61	1,061	119	53	1,446	125	45	1,750
Bicentennial	214	279	0	255	239	346	279	199	1,760	285	159	2,768	267	119	3,251	219	79	3,079
REACH 4a	**705**	**919**	**0**	**878**	**823**	**1,191**	**1,020**	**727**	**6,433**	**1,131**	**631**	**10,990**	**1,200**	**535**	**14,621**	**1,217**	**439**	**17,112**
Pinetree	16	20	0	22	20	29	28	20	179	36	20	352	45	20	553	47	17	663
Palm Springs	15	19	0	19	18	25	22	16	141	26	14	250	29	13	348	31	11	434
REACH 3b	**30**	**39**	**0**	**40**	**38**	**55**	**51**	**36**	**320**	**62**	**35**	**602**	**74**	**33**	**901**	**78**	**28**	**1,097**
Atlantic	163	213	0	210	197	285	254	181	1,602	296	165	2,874	334	149	4,072	369	133	5,184
Millenium Park	61	80	0	77	72	104	90	64	565	100	56	973	107	48	1,308	111	40	1,554
Wallace	80	105	0	103	97	140	125	89	786	145	81	1,409	163	73	1,991	180	65	2,528
Eau Gallie Cswy	1,008	1,316	0	1,402	1,316	1,902	1,844	1,316	11,634	2,356	1,316	22,896	2,948	1,316	35,920	3,644	1,316	51,224
REACH 3a	**1,313**	**1,714**	**0**	**1,792**	**1,682**	**2,432**	**2,313**	**1,650**	**14,587**	**2,897**	**1,618**	**28,152**	**3,553**	**1,586**	**43,292**	**4,303**	**1,554**	**60,491**
Rasisson Suites	83	108	0	109	102	148	135	96	853	162	90	1,574	189	84	2,305	217	78	3,054
Coral Way East	79	104	0	104	98	141	128	92	810	153	86	1,489	178	80	2,172	204	74	2,864
REACH 2	**162**	**212**	**0**	**213**	**200**	**289**	**264**	**188**	**1,662**	**315**	**176**	**3,063**	**368**	**164**	**4,478**	**421**	**152**	**5,918**
Holiday Inn South	14	19	0	19	17	25	22	16	141	26	15	254	30	13	360	33	12	459
Harris	74	96	0	95	89	129	115	82	725	134	75	1,305	152	68	1,857	169	61	2,375
REACH 1c	**88**	**115**	**0**	**113**	**106**	**154**	**137**	**98**	**867**	**160**	**90**	**1,559**	**182**	**81**	**2,217**	**202**	**73**	**2,834**
Paradise Beach Park	16	20	0	22	20	29	28	20	179	36	20	352	45	20	553	56	20	788
Paradise Beach Park	2,039	2,660	0	2,633	2,471	3,573	3,199	2,282	20,179	3,749	2,093	36,426	4,267	1,904	51,986	4,750	1,715	66,776
Beach	7	9	0	9	9	13	12	8	74	14	8	135	16	7	197	18	7	258
Surf Walk	7	9	0	9	9	13	11	8	72	14	8	133	16	7	193	18	7	253
REACH 1b	**2,069**	**2,699**	**0**	**2,674**	**2,509**	**3,628**	**3,251**	**2,319**	**20,504**	**3,813**	**2,129**	**37,046**	**4,344**	**1,939**	**52,928**	**4,843**	**1,748**	**68,076**
Poinsetta	7	9	0	9	9	13	11	8	72	14	8	132	16	7	191	18	6	251
Coconut	12	16	0	16	15	21	20	14	124	24	13	229	28	12	336	32	11	446
Terrace Shores	93	121	0	129	121	176	170	121	1,074	209	117	2,028	246	110	2,991	284	103	3,993
Flug	16	20	0	22	20	29	28	20	179	36	20	352	45	20	553	56	20	788
Franklin	12	16	0	16	15	22	20	14	126	24	13	233	28	13	342	32	12	455
REACH 1a	**139.9**	**182.5**	**0**	**192.1**	**180.2**	**261**	**249.5**	**178.0**	**1,574**	**306.0**	**170.9**	**2,973**	**362.2**	**161.6**	**4,413**	**422.0**	**152.4**	**5,933**
TOTAL	7,028	9,170	**0**	9,191	8,624	**12,471**	11,326	8,079	**71,441**	13,485	7,529	**131,028**	15,635	6,976	**190,480**	17,785	6,421	**250,003**

Without project: User Group 7, years 2010-2060:

User Group 7 | Percent of Total 0.45 | Number of Days 19 | % Annual Total 8.6

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	560	1,012	0	778	1,012	0	1,024	1,012	224	1,308	1,012	5,623	1,637	1,012	11,866	2,023	1,012	19,202
SE 1st St	175	316	0	225	292	0	271	268	59	316	244	1,357	356	220	2,582	392	196	3,724
Berkley	153	277	0	195	253	0	232	229	51	265	205	1,140	293	181	2,125	314	157	2,983
Patrick	53	96	0	68	89	0	82	82	18	96	74	413	109	67	787	120	60	1,137
REACH 6	**941**	**1,701**	**0**	**1,266**	**1,646**	**0**	**1,609**	**1,591**	**351**	**1,985**	**1,536**	**8,533**	**2,394**	**1,481**	**17,360**	**2,849**	**1,425**	**27,046**
Grant	40	73	0	49	63	0	54	53	12	56	43	240	54	33	389	46	23	440
Park	32	58	0	37	48	0	38	38	8	36	28	156	29	18	212	16	8	153
Ellwood	4	7	0	5	6	0	5	5	1	5	4	21	5	3	34	4	2	35
Norwood	4	7	0	5	6	0	5	5	1	5	4	22	5	3	35	4	2	38
Cassia	4	7	0	5	6	0	5	5	1	5	4	23	5	3	37	4	2	41
REACH 5	**84**	**152**	**0**	**99**	**129**	**0**	**108**	**106**	**23**	**108**	**83**	**463**	**97**	**60**	**707**	**75**	**37**	**707**
Pelican Beach Park	673	1,217	0	852	1,109	0	1,011	1,000	221	1,151	891	4,950	1,265	782	9,171	1,346	673	12,776
Desoto	59	106	0	76	98	0	92	90	20	107	82	458	120	74	874	133	66	1,262
Magellan	62	112	0	80	104	0	97	96	21	113	88	486	129	80	932	143	72	1,357
REACH 4b	**794**	**1,435**	**0**	**1,008**	**1,311**	**0**	**1,200**	**1,186**	**262**	**1,371**	**1,061**	**5,895**	**1,514**	**936**	**10,977**	**1,622**	**811**	**15,395**
Sunrise	57	103	0	73	95	0	88	87	19	103	79	441	115	71	837	127	63	1,203
Palmetto	250	452	0	317	412	0	376	372	82	429	332	1,845	472	292	3,424	504	252	4,783
Eau Gallie Ave	47	85	0	59	77	0	70	69	15	79	61	339	86	53	621	90	45	853
Bicentennial	154	279	0	184	239	0	201	199	44	206	159	884	193	119	1,396	158	79	1,500
REACH 4a	**509**	**919**	**0**	**633**	**823**	**0**	**736**	**727**	**161**	**816**	**631**	**3,509**	**866**	**535**	**6,279**	**878**	**439**	**8,339**
Pinetree	11	20	0	16	20	0	20	20	4	26	20	112	33	20	237	34	17	323
Palm Springs	11	19	0	14	18	0	16	16	4	19	14	80	21	13	150	22	11	212
REACH 3b	**22**	**39**	**0**	**29**	**38**	**0**	**37**	**36**	**8**	**45**	**35**	**192**	**53**	**33**	**387**	**56**	**28**	**535**
Atlantic	118	213	0	152	197	0	183	181	40	213	165	918	241	149	1,749	266	133	2,526
Millenium Park	44	80	0	55	72	0	65	64	14	72	56	311	77	48	562	80	40	758
Wallace	58	105	0	75	97	0	90	89	20	105	81	450	118	73	855	130	65	1,232
Eau Gallie Cswy	728	1,316	0	1,012	1,316	0	1,331	1,316	291	1,700	1,316	7,309	2,127	1,316	15,426	2,629	1,316	24,963
REACH 3a	**948**	**1,714**	**0**	**1,293**	**1,682**	**0**	**1,669**	**1,650**	**364**	**2,091**	**1,618**	**8,987**	**2,564**	**1,586**	**18,592**	**3,105**	**1,554**	**29,479**
Rasisson Suites	60	108	0	79	102	0	98	96	21	117	90	502	137	84	990	157	78	1,488
Coral Way East	57	104	0	75	98	0	93	92	20	111	86	475	129	80	933	147	74	1,396
REACH 2	**117**	**212**	**0**	**154**	**200**	**0**	**190**	**188**	**42**	**227**	**176**	**978**	**265**	**164**	**1,923**	**304**	**152**	**2,884**
Holiday Inn South	10	19	0	13	17	0	16	16	4	19	15	81	21	13	155	24	12	224
Harris	53	96	0	68	89	0	83	82	18	97	75	417	110	68	797	122	61	1,158
REACH 1c	**63**	**115**	**0**	**82**	**106**	**0**	**99**	**98**	**22**	**116**	**90**	**498**	**131**	**81**	**952**	**145**	**73**	**1,381**
Paradise Beach Park	11	20	0	16	20	0	20	20	4	26	20	112	33	20	237	40	20	384
Paradise Beach Park	1,471	2,660	0	1,900	2,471	0	2,309	2,282	504	2,705	2,093	11,629	3,079	1,904	22,325	3,428	1,715	32,542
Beach	5	9	0	7	9	0	8	8	2	10	8	43	12	7	84	13	7	126
Surf Walk	5	9	0	7	9	0	8	8	2	10	8	42	11	7	83	13	7	123
REACH 1b	**1,493**	**2,699**	**0**	**1,929**	**2,509**	**0**	**2,346**	**2,319**	**512**	**2,751**	**2,129**	**11,827**	**3,135**	**1,939**	**22,730**	**3,494**	**1,748**	**33,175**
Poinsetta	5	9	0	7	9	0	8	8	2	10	8	42	11	7	82	13	6	122
Coconut	9	16	0	11	15	0	14	14	3	17	13	73	20	12	144	23	11	217
Terrace Shores	67	121	0	93	121	0	123	121	27	151	117	648	177	110	1,285	205	103	1,946
Flug	11	20	0	16	20	0	20	20	4	26	20	112	33	20	237	40	20	384
Franklin	9	16	0	12	15	0	14	14	3	17	13	74	20	13	147	23	12	222
REACH 1a	**100.9**	**182.5**	**0**	**138.6**	**180.2**	**0**	**180.1**	**178.0**	**39**	**220.8**	**170.9**	**949**	**261.3**	**161.6**	**1,895**	**304.5**	**152.4**	**2,891**
TOTAL	5,072	9,170	**0**	6,632	8,624	**0**	8,173	8,079	**1,784**	9,730	7,529	**41,829**	11,282	6,976	**81,801**	12,833	6,421	**121,833**

Without project: User Group 8, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
8	0.27	26	7

YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	333	1,012	0	463	1,012	0	609	1,012	0	778	1,012	0	973	1,012	0	1,203	1,012	4,968
SE 1st St	104	316	0	134	292	0	161	268	0	188	244	0	212	220	0	233	196	963
Berkley	91	277	0	116	253	0	138	229	0	158	205	0	174	181	0	187	157	772
Patrick	32	96	0	41	89	0	49	82	0	57	74	0	65	67	0	71	60	294
REACH 6	**560**	**1,701**	**0**	**753**	**1,646**	**0**	**957**	**1,591**	**0**	**1,181**	**1,536**	**0**	**1,424**	**1,481**	**0**	**1,695**	**1,425**	**6,998**
Grant	24	73	0	29	63	0	32	53	0	33	43	0	32	33	0	28	23	114
Park	19	58	0	22	48	0	23	38	0	22	28	0	17	18	0	10	8	40
Ellwood	2	7	0	3	6	0	3	5	0	3	4	0	3	3	0	2	2	9
Norwood	2	7	0	3	6	0	3	5	0	3	4	0	3	3	0	2	2	10
Cassia	2	7	0	3	6	0	3	5	0	3	4	0	3	3	0	3	2	11
REACH 5	**50**	**152**	**0**	**59**	**129**	**0**	**64**	**106**	**0**	**64**	**83**	**0**	**58**	**60**	**0**	**44**	**37**	**183**
Pelican Beach Park	400	1,217	0	507	1,109	0	602	1,000	0	685	891	0	752	782	0	800	673	3,306
Desoto	35	106	0	45	98	0	54	90	0	63	82	0	72	74	0	79	66	326
Magellan	37	112	0	47	104	0	57	96	0	67	88	0	76	80	0	85	72	351
REACH 4b	**472**	**1,435**	**0**	**599**	**1,311**	**0**	**713**	**1,186**	**0**	**816**	**1,061**	**0**	**900**	**936**	**0**	**965**	**811**	**3,983**
Sunrise	34	103	0	44	95	0	53	87	0	61	79	0	69	71	0	75	63	311
Palmetto	149	452	0	188	412	0	224	372	0	255	332	0	281	292	0	300	252	1,237
Eau Gallie Ave	28	85	0	35	77	0	41	69	0	47	61	0	51	53	0	53	45	221
Bicentennial	92	279	0	109	239	0	120	199	0	122	159	0	115	119	0	94	79	388
REACH 4a	**302**	**919**	**0**	**377**	**823**	**0**	**438**	**727**	**0**	**485**	**631**	**0**	**515**	**535**	**0**	**522**	**439**	**2,158**
Pinetree	7	20	0	9	20	0	12	20	0	16	20	0	19	20	0	20	17	84
Palm Springs	6	19	0	8	18	0	10	16	0	11	14	0	12	13	0	13	11	55
REACH 3b	**13**	**39**	**0**	**17**	**38**	**0**	**22**	**36**	**0**	**27**	**35**	**0**	**32**	**33**	**0**	**34**	**28**	**138**
Atlantic	70	213	0	90	197	0	109	181	0	127	165	0	143	149	0	158	133	654
Millenium Park	26	80	0	33	72	0	38	64	0	43	56	0	46	48	0	47	40	196
Wallace	35	105	0	44	97	0	54	89	0	62	81	0	70	73	0	77	65	319
Eau Gallie Cswy	433	1,316	0	602	1,316	0	792	1,316	0	1,011	1,316	0	1,265	1,316	0	1,564	1,316	6,459
REACH 3a	**564**	**1,714**	**0**	**769**	**1,682**	**0**	**993**	**1,650**	**0**	**1,244**	**1,618**	**0**	**1,525**	**1,586**	**0**	**1,847**	**1,554**	**7,627**
Rasisson Suites	36	108	0	47	102	0	58	96	0	70	90	0	81	84	0	93	78	385
Coral Way East	34	104	0	45	98	0	55	92	0	66	86	0	77	80	0	87	74	361
REACH 2	**70**	**212**	**0**	**91**	**200**	**0**	**113**	**188**	**0**	**135**	**176**	**0**	**158**	**164**	**0**	**181**	**152**	**746**
Holiday Inn South	6	19	0	8	17	0	10	16	0	11	15	0	13	13	0	14	12	58
Harris	32	96	0	41	89	0	49	82	0	58	75	0	65	68	0	73	61	299
REACH 1c	**38**	**115**	**0**	**49**	**106**	**0**	**59**	**98**	**0**	**69**	**90**	**0**	**78**	**81**	**0**	**87**	**73**	**357**
Paradise Beach Park	7	20	0	9	20	0	12	20	0	16	20	0	19	20	0	24	20	99
Paradise Beach Park	875	2,660	0	1,130	2,471	0	1,373	2,282	0	1,609	2,093	0	1,831	1,904	0	2,039	1,715	8,420
Beach	3	9	0	4	9	0	5	8	0	6	8	0	7	7	0	8	7	33
Surf Walk	3	9	0	4	9	0	5	8	0	6	8	0	7	7	0	8	7	32
REACH 1b	**888**	**2,699**	**0**	**1,148**	**2,509**	**0**	**1,395**	**2,319**	**0**	**1,636**	**2,129**	**0**	**1,865**	**1,939**	**0**	**2,079**	**1,748**	**8,584**
Poinsetta	3	9	0	4	9	0	5	8	0	6	8	0	7	7	0	8	6	32
Coconut	5	16	0	7	15	0	8	14	0	10	13	0	12	12	0	14	11	56
Terrace Shores	40	121	0	56	121	0	73	121	0	90	117	0	105	110	0	122	103	503
Flug	7	20	0	9	20	0	12	20	0	16	20	0	19	20	0	24	20	99
Franklin	5	16	0	7	15	0	9	14	0	10	13	0	12	13	0	14	12	57
REACH 1a	**60.0**	**182.5**	**0**	**82.4**	**180.2**	**0**	**107.1**	**178.0**	**0**	**131.3**	**170.9**	**0**	**155.5**	**161.6**	**0**	**181.1**	**152.4**	748
TOTAL	3,017	9,170	**0**	3,945	8,624	**0**	4,861	8,079	**0**	5,788	7,529	**0**	6,711	6,976	**0**	7,633	6,421	**31,524**

Without project: User Group 9, years 2010-2060:

User Group 9	Percent of Total 0.09	Number of Days 253	% Annual Total 22.8																												
YEAR	2010 Without-Project			2020 Without-Project			2030 Without-Project			2040 Without-Project			2050 Without-Project			2060 Without-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
Patrick AFB	111	1,012	0	155	1,012	0	204	1,012	0	260	1,012	0	326	1,012	0	403	1,012	0
SE 1st St	35	316	0	45	292	0	54	268	0	63	244	0	71	220	0	78	196	0
Berkley	31	277	0	39	253	0	46	229	0	53	205	0	58	181	0	63	157	0
Patrick	11	96	0	14	89	0	16	82	0	19	74	0	22	67	0	24	60	0
REACH 6	**187**	**1,701**	**0**	**252**	**1,646**	**0**	**320**	**1,591**	**0**	**395**	**1,536**	**0**	**477**	**1,481**	**0**	**567**	**1,425**	**0**
Grant	8	73	0	10	63	0	11	53	0	11	43	0	11	33	0	9	23	0
Park	6	58	0	7	48	0	8	38	0	7	28	0	6	18	0	3	8	0
Ellwood	1	7	0	1	6	0	1	5	0	1	4	0	1	3	0	1	2	0
Norwood	1	7	0	1	6	0	1	5	0	1	4	0	1	3	0	1	2	0
Cassia	1	7	0	1	6	0	1	5	0	1	4	0	1	3	0	1	2	0
REACH 5	**17**	**152**	**0**	**20**	**129**	**0**	**21**	**106**	**0**	**21**	**83**	**0**	**19**	**60**	**0**	**15**	**37**	**0**
Pelican Beach Park	134	1,217	0	170	1,109	0	201	1,000	0	229	891	0	252	782	0	268	673	0
Desoto	12	106	0	15	98	0	18	90	0	21	82	0	24	74	0	26	66	0
Magellan	12	112	0	16	104	0	19	96	0	23	88	0	26	80	0	28	72	0
REACH 4b	**158**	**1,435**	**0**	**201**	**1,311**	**0**	**239**	**1,186**	**0**	**273**	**1,061**	**0**	**301**	**936**	**0**	**323**	**811**	**0**
Sunrise	11	103	0	15	95	0	18	87	0	20	79	0	23	71	0	25	63	0
Palmetto	50	452	0	63	412	0	75	372	0	85	332	0	94	292	0	100	252	0
Eau Gallie Ave	9	85	0	12	77	0	14	69	0	16	61	0	17	53	0	18	45	0
Bicentennial	31	279	0	37	239	0	40	199	0	41	159	0	38	119	0	31	79	0
REACH 4a	**101**	**919**	**0**	**126**	**823**	**0**	**147**	**727**	**0**	**162**	**631**	**0**	**172**	**535**	**0**	**175**	**439**	**0**
Pinetree	2	20	0	3	20	0	4	20	0	5	20	0	7	20	0	7	17	0
Palm Springs	2	19	0	3	18	0	3	16	0	4	14	0	4	13	0	4	11	0
REACH 3b	**4**	**39**	**0**	**6**	**38**	**0**	**7**	**36**	**0**	**9**	**35**	**0**	**11**	**33**	**0**	**11**	**28**	**0**
Atlantic	23	213	0	30	197	0	36	181	0	42	165	0	48	149	0	53	133	0
Millenium Park	9	80	0	11	72	0	13	64	0	14	56	0	15	48	0	16	40	0
Wallace	12	105	0	15	97	0	18	89	0	21	81	0	23	73	0	26	65	0
Eau Gallie Cswy	145	1,316	0	201	1,316	0	265	1,316	0	339	1,316	0	424	1,316	0	524	1,316	0
REACH 3a	**189**	**1,714**	**0**	**257**	**1,682**	**0**	**332**	**1,650**	**0**	**416**	**1,618**	**0**	**511**	**1,586**	**0**	**618**	**1,554**	**0**
Rasisson Suites	12	108	0	16	102	0	19	96	0	23	90	0	27	84	0	31	78	0
Coral Way East	11	104	0	15	98	0	18	92	0	22	86	0	26	80	0	29	74	0
REACH 2	**23**	**212**	**0**	**31**	**200**	**0**	**38**	**188**	**0**	**45**	**176**	**0**	**53**	**164**	**0**	**60**	**152**	**0**
Holiday Inn South	2	19	0	3	17	0	3	16	0	4	15	0	4	13	0	5	12	0
Harris	11	96	0	14	89	0	17	82	0	19	75	0	22	68	0	24	61	0
REACH 1c	**13**	**115**	**0**	**16**	**106**	**0**	**20**	**98**	**0**	**23**	**90**	**0**	**26**	**81**	**0**	**29**	**73**	**0**
Paradise Beach Park	2	20	0	3	20	0	4	20	0	5	20	0	7	20	0	8	20	0
Paradise Beach Park	293	2,660	0	378	2,471	0	460	2,282	0	539	2,093	0	613	1,904	0	682	1,715	0
Beach	1	9	0	1	9	0	2	8	0	2	8	0	2	7	0	3	7	0
Surf Walk	1	9	0	1	9	0	2	8	0	2	8	0	2	7	0	3	7	0
REACH 1b	**297**	**2,699**	**0**	**384**	**2,509**	**0**	**467**	**2,319**	**0**	**548**	**2,129**	**0**	**624**	**1,939**	**0**	**696**	**1,748**	**0**
Poinsetta	1	9	0	1	9	0	2	8	0	2	8	0	2	7	0	3	6	0
Coconut	2	16	0	2	15	0	3	14	0	3	13	0	4	12	0	5	11	0
Terrace Shores	13	121	0	19	121	0	24	121	0	30	117	0	35	110	0	41	103	0
Flug	2	20	0	3	20	0	4	20	0	5	20	0	7	20	0	8	20	0
Franklin	2	16	0	2	15	0	3	14	0	3	13	0	4	13	0	5	12	0
REACH 1a	**20.1**	**182.5**	**0**	**27.6**	**180.2**	**0**	**35.8**	**178.0**	**0**	**44.0**	**170.9**	**0**	**52.0**	**161.6**	**0**	**60.6**	**152.4**	**0**
TOTAL	1,010	9,170	**0**	1,320	8,624	**0**	1,627	8,079	**0**	1,937	7,529	**0**	2,246	6,976	**0**	2,555	6,421	**0**

With project: User Group 1, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
1	1.50	1	1.5

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	2,795	2,834	0	3,654	2,834	821	4,503	2,834	1,670	5,362	2,834	2,528	6,216	2,834	3,383	7,071	2,834	4,238
REACH 5	599	607	0	783	607	176	965	607	358	1,149	607	542	1,332	607	725	1,515	607	908
REACH 4b	3,852	3,906	0	5,038	3,906	1,132	6,208	3,906	2,302	7,391	3,906	3,485	8,570	3,906	4,663	9,748	3,906	5,842
REACH 4a	1,697	1,720	0	2,219	1,720	498	2,734	1,720	1,014	3,255	1,720	1,535	3,774	1,720	2,054	4,293	1,720	2,573
REACH 3b	60	61	0	78	61	18	97	61	36	115	61	54	133	61	72	152	61	91
REACH 3a	2,435	2,469	0	3,185	2,469	715	3,924	2,469	1,455	4,672	2,469	2,203	5,417	2,469	2,948	6,162	2,469	3,693
REACH 2	479	486	0	626	486	141	772	486	286	919	486	433	1,066	486	580	1,212	486	726
REACH 1c	140	142	0	183	142	41	225	142	83	268	142	126	311	142	169	354	142	212
REACH 1b	4,551	4,615	0	5,952	4,615	1,337	7,334	4,615	2,719	8,732	4,615	4,117	10,124	4,615	5,509	11,516	4,615	6,901
REACH 1a	200	202	0	261	202	59	322	202	119	383	202	181	444	202	242	505	202	303
TOTAL	**16,807**	**17,042**	**0**	**21,979**	**17,042**	**4,937**	**27,085**	**17,042**	**10,043**	**32,246**	**17,042**	**15,204**	**37,387**	**17,042**	**20,345**	**42,528**	**17,042**	**25,486**

With project: User Group 2, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
2	1.35	11	14.8

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	2,507	2,834	0	3,278	2,834	4,888	4,039	2,834	13,264	4,809	2,834	21,731	5,576	2,834	30,165	6,343	2,834	38,600
REACH 5	537	607	0	702	607	1,047	866	607	2,842	1,031	607	4,657	1,195	607	6,464	1,359	607	8,271
REACH 4b	3,456	3,906	0	4,519	3,906	6,738	5,569	3,906	18,285	6,630	3,906	29,958	7,687	3,906	41,585	8,744	3,906	53,213
REACH 4a	1,522	1,720	0	1,990	1,720	2,968	2,453	1,720	8,053	2,920	1,720	13,194	3,385	1,720	18,315	3,851	1,720	23,436
REACH 3b	54	61	0	70	61	105	87	61	284	103	61	466	119	61	646	136	61	827
REACH 3a	2,184	2,469	0	2,857	2,469	4,260	3,520	2,469	11,559	4,191	2,469	18,937	4,859	2,469	26,287	5,527	2,469	33,637
REACH 2	430	486	0	562	486	838	692	486	2,274	824	486	3,725	956	486	5,171	1,087	486	6,617
REACH 1c	125	142	0	164	142	244	202	142	663	240	142	1,087	279	142	1,508	317	142	1,930
REACH 1b	4,082	4,615	0	5,338	4,615	7,960	6,578	4,615	21,601	7,832	4,615	35,390	9,081	4,615	49,127	10,330	4,615	62,863
REACH 1a	179	202	0	234	202	349	289	202	947	344	202	1,552	398	202	2,155	453	202	2,757
TOTAL	**15,075**	**17,042**	**0**	**19,715**	**17,042**	**29,398**	**24,294**	**17,042**	**79,774**	**28,924**	**17,042**	**130,696**	**33,535**	**17,042**	**181,424**	**38,147**	**17,042**	**232,151**

With project: User Group 3, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
3	1.17	10	11.7

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	2,180	2,834	0	2,850	2,834	169	3,513	2,834	6,791	4,182	2,834	13,484	4,849	2,834	20,152	5,516	2,834	26,820
REACH 5	467	607	0	611	607	36	753	607	1,455	896	607	2,889	1,039	607	4,318	1,182	607	5,747
REACH 4b	3,005	3,906	0	3,930	3,906	233	4,842	3,906	9,361	5,765	3,906	18,589	6,684	3,906	27,781	7,604	3,906	36,973
REACH 4a	1,323	1,720	0	1,731	1,720	103	2,133	1,720	4,123	2,539	1,720	8,187	2,944	1,720	12,235	3,349	1,720	16,283
REACH 3b	47	61	0	61	61	4	75	61	146	90	61	289	104	61	432	118	61	575
REACH 3a	1,899	2,469	0	2,484	2,469	147	3,061	2,469	5,917	3,644	2,469	11,750	4,225	2,469	17,561	4,806	2,469	23,371
REACH 2	374	486	0	489	486	29	602	486	1,164	717	486	2,312	831	486	3,455	946	486	4,598
REACH 1c	109	142	0	143	142	8	176	142	340	209	142	674	242	142	1,008	276	142	1,341
REACH 1b	3,550	4,615	0	4,642	4,615	275	5,721	4,615	11,059	6,811	4,615	21,960	7,897	4,615	32,819	8,982	4,615	43,678
REACH 1a	156	202	0	204	202	12	251	202	485	299	202	963	346	202	1,439	394	202	1,916
TOTAL	13,109	**17,042**	**0**	17,144	**17,042**	**1,016**	21,126	**17,042**	**40,840**	25,152	**17,042**	**81,097**	29,162	**17,042**	**121,199**	33,172	**17,042**	**161,301**

With project: User Group 4, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
4	0.99	7	6.9

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	1,836	2,834	0	2,402	2,834	0	2,959	2,834	880	3,523	2,834	4,828	4,085	2,834	8,760	4,647	2,834	12,692
REACH 5	394	607	0	515	607	0	634	607	189	755	607	1,035	875	607	1,877	996	607	2,720
REACH 4b	2,532	3,906	0	3,311	3,906	0	4,080	3,906	1,214	4,857	3,906	6,656	5,632	3,906	12,077	6,406	3,906	17,498
REACH 4a	1,115	1,720	0	1,458	1,720	0	1,797	1,720	535	2,139	1,720	2,931	2,480	1,720	5,319	2,821	1,720	7,706
REACH 3b	39	61	0	51	61	0	63	61	19	75	61	103	88	61	188	100	61	272
REACH 3a	1,600	2,469	0	2,093	2,469	0	2,579	2,469	767	3,070	2,469	4,207	3,560	2,469	7,634	4,049	2,469	11,061
REACH 2	315	486	0	412	486	0	507	486	151	604	486	828	700	486	1,502	797	486	2,176
REACH 1c	92	142	0	120	142	0	148	142	44	176	142	241	204	142	438	232	142	635
REACH 1b	2,991	4,615	0	3,911	4,615	0	4,820	4,615	1,434	5,738	4,615	7,863	6,653	4,615	14,267	7,568	4,615	20,671
REACH 1a	131	202	0	172	202	0	211	202	63	252	202	345	292	202	626	332	202	907
TOTAL	11,045	**17,042**	**0**	14,443	**17,042**	**0**	17,799	**17,042**	**5,295**	21,190	**17,042**	**29,036**	24,569	**17,042**	**52,686**	27,947	**17,042**	**76,336**

With project: User Group 5, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
5	0.81	16	12.9

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	1,502	2,834	0	1,964	2,834	0	2,421	2,834	0	2,882	2,834	772	3,341	2,834	8,123	3,801	2,834	15,475
REACH 5	322	607	0	421	607	0	519	607	0	618	607	165	716	607	1,741	814	607	3,316
REACH 4b	2,071	3,906	0	2,708	3,906	0	3,337	3,906	0	3,973	3,906	1,064	4,606	3,906	11,199	5,240	3,906	21,333
REACH 4a	912	1,720	0	1,193	1,720	0	1,470	1,720	0	1,750	1,720	469	2,029	1,720	4,932	2,308	1,720	9,396
REACH 3b	32	61	0	42	61	0	52	61	0	62	61	17	72	61	174	81	61	332
REACH 3a	1,309	2,469	0	1,712	2,469	0	2,109	2,469	0	2,511	2,469	672	2,912	2,469	7,079	3,312	2,469	13,485
REACH 2	257	486	0	337	486	0	415	486	0	494	486	132	573	486	1,393	652	486	2,653
REACH 1c	75	142	0	98	142	0	121	142	0	144	142	39	167	142	406	190	142	774
REACH 1b	2,446	4,615	0	3,199	4,615	0	3,942	4,615	0	4,693	4,615	1,257	5,442	4,615	13,229	6,190	4,615	25,202
REACH 1a	107	202	0	140	202	0	173	202	0	206	202	55	239	202	580	271	202	1,105
TOTAL	9,034	**17,042**	**0**	11,814	**17,042**	**0**	14,558	**17,042**	**0**	17,332	**17,042**	**4,641**	20,096	**17,042**	**48,856**	22,859	**17,042**	**93,071**

With project: User Group 6, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
6	0.63	22	13.8

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	1,169	2,834	0	1,528	2,834	0	1,883	2,834	0	2,242	2,834	0	2,600	2,834	0	2,957	2,834	2,716
REACH 5	250	607	0	327	607	0	404	607	0	480	607	0	557	607	0	634	607	582
REACH 4b	1,611	3,906	0	2,107	3,906	0	2,596	3,906	0	3,091	3,906	0	3,584	3,906	0	4,077	3,906	3,744
REACH 4a	710	1,720	0	928	1,720	0	1,143	1,720	0	1,361	1,720	0	1,578	1,720	0	1,795	1,720	1,649
REACH 3b	25	61	0	33	61	0	40	61	0	48	61	0	56	61	0	63	61	58
REACH 3a	1,018	2,469	0	1,332	2,469	0	1,641	2,469	0	1,954	2,469	0	2,265	2,469	0	2,577	2,469	2,367
REACH 2	200	486	0	262	486	0	323	486	0	384	486	0	446	486	0	507	486	466
REACH 1c	58	142	0	76	142	0	94	142	0	112	142	0	130	142	0	148	142	136
REACH 1b	1,903	4,615	0	2,489	4,615	0	3,067	4,615	0	3,651	4,615	0	4,234	4,615	0	4,816	4,615	4,423
REACH 1a	83	202	0	109	202	0	135	202	0	160	202	0	186	202	0	211	202	194
TOTAL	7,028	**17,042**	**0**	9,191	**17,042**	**0**	11,326	**17,042**	**0**	13,485	**17,042**	**0**	15,635	**17,042**	**0**	17,785	**17,042**	**16,336**

With project: User Group 7, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
7	0.45	19	8.6

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	843	2,834	0	1,103	2,834	0	1,359	2,834	0	1,618	2,834	0	1,876	2,834	0	2,134	2,834	0
REACH 5	181	607	0	236	607	0	291	607	0	347	607	0	402	607	0	457	607	0
REACH 4b	1,162	3,906	0	1,520	3,906	0	1,873	3,906	0	2,230	3,906	0	2,586	3,906	0	2,942	3,906	0
REACH 4a	512	1,720	0	670	1,720	0	825	1,720	0	982	1,720	0	1,139	1,720	0	1,296	1,720	0
REACH 3b	18	61	0	24	61	0	29	61	0	35	61	0	40	61	0	46	61	0
REACH 3a	735	2,469	0	961	2,469	0	1,184	2,469	0	1,410	2,469	0	1,635	2,469	0	1,859	2,469	0
REACH 2	145	486	0	189	486	0	233	486	0	277	486	0	322	486	0	366	486	0
REACH 1c	42	142	0	55	142	0	68	142	0	81	142	0	94	142	0	107	142	0
REACH 1b	1,373	4,615	0	1,796	4,615	0	2,213	4,615	0	2,635	4,615	0	3,055	4,615	0	3,475	4,615	0
REACH 1a	60	202	0	79	202	0	97	202	0	116	202	0	134	202	0	152	202	0
TOTAL	5,072	**17,042**	**0**	6,632	**17,042**	**0**	8,173	**17,042**	**0**	9,730	**17,042**	**0**	11,282	**17,042**	**0**	12,833	**17,042**	**0**

With project: User Group 8, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
8	0.27	26	7

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	502	2,834	0	656	2,834	0	808	2,834	0	962	2,834	0	1,116	2,834	0	1,269	2,834	0
REACH 5	107	607	0	141	607	0	173	607	0	206	607	0	239	607	0	272	607	0
REACH 4b	691	3,906	0	904	3,906	0	1,114	3,906	0	1,327	3,906	0	1,538	3,906	0	1,750	3,906	0
REACH 4a	305	1,720	0	398	1,720	0	491	1,720	0	584	1,720	0	677	1,720	0	771	1,720	0
REACH 3b	11	61	0	14	61	0	17	61	0	21	61	0	24	61	0	27	61	0
REACH 3a	437	2,469	0	572	2,469	0	704	2,469	0	839	2,469	0	972	2,469	0	1,106	2,469	0
REACH 2	86	486	0	112	486	0	139	486	0	165	486	0	191	486	0	218	486	0
REACH 1c	25	142	0	33	142	0	40	142	0	48	142	0	56	142	0	63	142	0
REACH 1b	817	4,615	0	1,068	4,615	0	1,316	4,615	0	1,567	4,615	0	1,817	4,615	0	2,067	4,615	0
REACH 1a	36	202	0	47	202	0	58	202	0	69	202	0	80	202	0	91	202	0
TOTAL	3,017	**17,042**	**0**	3,945	**17,042**	**0**	4,861	**17,042**	**0**	5,788	**17,042**	**0**	6,711	**17,042**	**0**	7,633	**17,042**	**0**

With project: User Group 9, years 2010-2060:

User Group	Percent of Total	Number of Days	% Annual Total
9	0.09	253	22.8

YEAR	2010 With-Project			2020 With-Project			2030 With-Project			2040 With-Project			2050 With-Project			2060 With-Project		
Name	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)	Daily Demand	Capacity	Excess Demand (Annual)
REACH 6	168	2,834	0	220	2,834	0	271	2,834	0	322	2,834	0	373	2,834	0	425	2,834	0
REACH 5	36	607	0	47	607	0	58	607	0	69	607	0	80	607	0	91	607	0
REACH 4b	231	3,906	0	303	3,906	0	373	3,906	0	444	3,906	0	515	3,906	0	586	3,906	0
REACH 4a	102	1,720	0	133	1,720	0	164	1,720	0	196	1,720	0	227	1,720	0	258	1,720	0
REACH 3b	4	61	0	5	61	0	6	61	0	7	61	0	8	61	0	9	61	0
REACH 3a	146	2,469	0	191	2,469	0	236	2,469	0	281	2,469	0	325	2,469	0	370	2,469	0
REACH 2	29	486	0	38	486	0	46	486	0	55	486	0	64	486	0	73	486	0
REACH 1c	8	142	0	11	142	0	14	142	0	16	142	0	19	142	0	21	142	0
REACH 1b	273	4,615	0	358	4,615	0	441	4,615	0	525	4,615	0	608	4,615	0	692	4,615	0
REACH 1a	12	202	0	16	202	0	19	202	0	23	202	0	27	202	0	30	202	0
TOTAL	1,010	**17,042**	**0**	1,320	**17,042**	**0**	1,627	**17,042**	**0**	1,937	**17,042**	**0**	2,246	**17,042**	**0**	2,555	**17,042**	**0**

Attachment 3

Summary Table of Preliminary Alternative Cost Estimates

Preliminary Alternative Construction Cost Estimates (from MCACES)

Alternative	Reach	length in feet	Description	Quantity (c.y.) per LF	Quantity (c.y.	Unit Price	Unit of Measure	Mob/Demob	Fill Cost	Lands	PED	Engineering Monitoring	Subtotal
Dune Fill	1	9,599		5	48,000	$23.77	cubic yard	$434,012	$1,141,137	$10,000	$43,806	$26,753	$1,655,708
	2	3,406		5	17,000	$23.66	cubic yard	$0	$402,166	$0	$15,515	$9,493	$427,173
	3	6,239		5	32,000	$23.77	cubic yard	$0	$760,639	$0	$29,204	$17,388	$807,231
	4	5,603		5	28,000	$23.84	cubic yard	$0	$667,596	$0	$25,553	$15,616	$708,765
	5	9,029		5	45,000	$23.75	cubic yard	$0	$1,068,724	$0	$41,068	$25,164	$1,134,956
	6	7,207		5	36,000	$23.77	cubic yard	$0	$855,675	$0	$32,854	$20,086	$908,616
Subtotal		41,083			206,000			$434,012	$4,895,937	$10,000	$188,000	$114,500	$5,642,449
Beachface Fill	1	9,599	20 ft MHW ext.	14.4	138,000	$23.95	cubic yard	$434,012	$3,304,534	$5,000	$43,824	$26,753	$3,814,123
truck haul	2	3,406	20 ft MHW ext.	14.4	49,000	$23.64	cubic yard	$0	$1,158,367	$0	$15,561	$9,493	$1,183,420
	3	6,239	20 ft MHW ext.	14.4	90,000	$23.47	cubic yard	$0	$2,112,346	$0	$28,581	$17,388	$2,158,315
	4	5,603	20 ft MHW ext.	14.5	81,000	$23.73	cubic yard	$0	$1,921,902	$0	$25,723	$15,616	$1,963,241
	5	9,029	20 ft MHW ext.	14.4	130,000	$23.68	cubic yard	$0	$3,078,280	$0	$41,284	$25,164	$3,144,728
	6	7,207	20 ft MHW ext.	14.4	104,000	$23.62	cubic yard	$0	$2,456,364	$0	$33,027	$20,086	$2,509,477
Subtotal		41,083			592,000			$434,012	$14,031,793	$5,000	$188,000	$114,500	$14,773,305
Conventional Fill	1	9,599	20 ft MHW ext.	14.4	138,000	$19.16	cubic yard	$1,102,609	$2,643,935	$5,000	$43,824	$26,753	$3,822,121
hydraulic	2	3,406	20 ft MHW ext.	14.4	49,000	$21.98	cubic yard	$0	$1,077,250	$0	$15,561	$9,493	$1,102,303
	3	6,239	20 ft MHW ext.	14.4	90,000	$18.75	cubic yard	$0	$1,687,904	$0	$28,581	$17,388	$1,733,873
	4	5,603	20 ft MHW ext.	14.5	81,000	$18.22	cubic yard	$0	$1,475,734	$0	$25,723	$15,616	$1,517,073
	5	9,029	20 ft MHW ext.	14.4	130,000	$17.79	cubic yard	$0	$2,312,635	$0	$41,284	$25,164	$2,379,083
	6	7,207	20 ft MHW ext.	14.4	104,000	$17.48	cubic yard	$0	$1,817,696	$0	$33,027	$20,086	$1,870,809
Subtotal		41,083			592,000			$1,102,609	$11,015,154	$5,000	$188,000	$114,500	$12,425,263
Conventional Fill	1	9,599	40 ft MHW ext.	29.4	282,000	$18.57	cubic yard	$1,102,609	$5,236,998	$5,000	$52,857	$26,753	$6,424,217
	2	3,406	40 ft MHW ext.	24.4	83,000	$18.38	cubic yard	$0	$1,525,658	$0	$15,557	$9,493	$1,550,708
	3	6,239	40 ft MHW ext.	18.9	118,000	$18.10	cubic yard	$0	$2,135,759	$0	$22,118	$17,388	$2,175,265
	4	5,603	40 ft MHW ext.	22.7	127,000	$17.70	cubic yard	$0	$2,247,722	$0	$23,805	$15,616	$2,287,142
	5	9,029	40 ft MHW ext.	24.5	221,000	$17.34	cubic yard	$0	$3,831,469	$0	$41,424	$25,164	$3,898,057
	6	7,207	40 ft MHW ext.	23.9	172,000	$16.93	cubic yard	$0	$2,911,595	$0	$32,239	$20,086	$2,963,920
Subtotal		41,083			1,003,000			$1,102,609	$17,889,201	$5,000	$188,000	$114,500	$19,299,310

Alternative	Reach	length in feet	Description	Quantity (c.y.) per LF	Quantity (c.y.	Unit Price	Unit of Measure	Mob/Demob	Fill Cost	Lands	PED	Engineering Monitoring	Subtotal
Conventional Fill	1	9,599	100 ft MHW ext.	59.2	568,000	$18.12	cubic yard	$1,878,806	$10,292,710	$5,000	$43,782	$26,753	$12,247,051
	2	3,406	100 ft MHW ext.	66.6	227,000	$17.81	cubic yard	$0	$4,042,750	$0	$17,497	$9,493	$4,069,740
	3	6,239	100 ft MHW ext.	48.4	302,000	$17.57	cubic yard	$0	$5,307,268	$0	$23,278	$17,388	$5,347,935
	4	5,603	100 ft MHW ext.	56.0	314,000	$17.21	cubic yard	$0	$5,404,142	$0	$24,203	$15,616	$5,443,961
	5	9,029	100 ft MHW ext.	61.2	553,000	$16.88	cubic yard	$0	$9,335,437	$0	$42,626	$25,164	$9,403,227
	6	7,207	100 ft MHW ext.	65.9	475,000	$16.47	cubic yard	$0	$7,821,586	$0	$36,613	$20,086	$7,878,286
Subtotal		41,083			2,439,000			$1,878,806	$42,203,893	$5,000	$188,000	$114,500	$44,390,199
Conventional Fill	1	9,599	160 ft MHW ext.	104.0	998,000	$17.12	cubic yard	$1,878,806	$17,080,881	$5,000	$40,806	$26,753	$19,032,245
	2	3,406	160 ft MHW ext.	119.2	406,000	$17.81	cubic yard	$0	$7,229,577	$0	$16,600	$9,493	$7,255,670
	3	6,239	160 ft MHW ext.	100.2	625,000	$17.57	cubic yard	$0	$10,978,710	$0	$25,555	$17,388	$11,021,653
	4	5,603	160 ft MHW ext.	103.5	580,000	$17.19	cubic yard	$0	$9,970,249	$0	$23,715	$15,616	$10,009,579
	5	9,029	160 ft MHW ext.	115.4	1,042,000	$16.86	cubic yard	$0	$17,568,096	$0	$42,605	$25,164	$17,635,865
	6	7,207	160 ft MHW ext.	131.4	947,000	$16.43	cubic yard	$0	$15,558,854	$0	$38,720	$20,086	$15,617,661
Subtotal		41,083			4,598,000			$1,878,806	$78,386,367	$5,000	$188,000	$114,500	$80,572,673
Revetment	1	9,599				$1,982.23	linear foot	$0	$19,027,393	$20,000	$43,926	$26,753	$19,118,072
	2	3,406				$2,103.23	linear foot	$0	$7,163,587	$0	$15,586	$9,493	$7,188,666
	3	6,239				$1,935.87	linear foot	$0	$12,077,899	$0	$28,550	$17,388	$12,123,838
	4	5,603				$2,067.74	linear foot	$0	$11,585,556	$0	$25,640	$15,616	$11,626,812
	5	9,029				$1,992.13	linear foot	$0	$17,986,931	$0	$41,318	$25,164	$18,053,413
	6	7,207				$1,949.58	linear foot	$0	$14,050,652	$0	$32,980	$20,086	$14,103,718
Subtotal		41,083						$0	$81,892,018	$20,000	$188,000	$114,500	$82,214,518
Limestone			1 acre			$2,143,359.00	acre	$267,785	$1,573,074	$0	$188,000	$114,500	$2,143,359
Mitigation Reef			2 acre			$1,774,093.00	acre	$267,785	$2,977,901	$0	$188,000	$114,500	$3,548,186
			5 acre			$1,552,504.60	acre	$267,785	$7,192,238	$0	$188,000	$114,500	$7,762,523
			10 acre			$1,478,661.80	acre	$267,785	$14,216,333	$0	$188,000	$114,500	$14,786,618
			15 acre			$1,454,040.60	acre	$267,785	$21,240,324	$0	$188,000	$114,500	$21,810,609
Subtotal								$1,338,925	$47,199,870	$0	$940,000	$572,500	$50,051,295

Attachment 4

Final Array MCACES Cost Estimate

Attachment 5

Baseline MCACES Cost Estimate

APPENDIX C
TABLE OF CONTENTS
REAL ESTATE PLAN FOR BREVARD COUNTY, FLORIDA, MID REACH SEGMENT, SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT

5/4/2007 (lhz)
rev 8/25/2008
rev 11/5/2008

APPENDIX C

1. Statement of Purpose. This Real Estate Plan is for the General Reevaluation Report for the Brevard County, Florida, Mid Reach Segment Shore Protection Project. This Real Estate Plan is only for planning purposes and both the final real property acquisition lines and estimates of value are subject to change even after approval of this report.

2. Project Authorization.

The GRR Study was authorized under the Water Resources Development Act of 2000, Public Law 106-541, Section 418. Brevard County, Florida:

The Secretary shall prepare a general re-evaluation report on the project for shoreline protection, Brevard County, Florida, authorized by Section 101(b)(7) of the Water Resources Development Act of 1996 (110 Stat. 3667), to determine, if the project were modified to direct the Secretary to incorporate in the project any or all of the 7.1-mile reach of the project that was deleted from the south reach of the project, as described in paragraph (5) of the Report of the Chief of Engineers, dated December 23, 1996, whether the project as modified would be technically sound, environmentally acceptable, and economically justified.

3. Project Location and Description.

a. The Brevard County (Mid - Reach) Shore Protection Project is located on Florida's Atlantic coast. The Mid Reach consists of approximately 7.8 miles of the Brevard County shoreline, from the south end of Patrick Air Force Base to just north of Indialantic, Florida(R-75.4 – R-118.3).

b. The recommended plan consists of a dune fill and a 10-foot extension of the mean high water line plus advanced nourishment to maintain that design fill volume in Reach 1 (R-119 to R-109),a dune fill and a 20-foot extension of the mean high water line plus advanced nourishment to maintain that design fill volume in Reaches 2 and 3 (R-109 to R-99), a dune fill and a 10-foot extension of the mean high water line plus advanced nourishment to maintain that design fill volume in Reaches 4 and 5 (R-99 to R-83), and a dune fill with no added advanced

nourishment in Reach 6 (R-83 to R-75.4). Fill will be accomplished by rehabilitating the Poseidon dredged material management area (DMMA) at Port Canaveral, dredging material from Canaveral Shoals with placement into the Poseidon DMMA every 6 years, and hauling by dump truck to the Mid-Reach for placement on the beach at approximately 3 year intervals. The renourishment volume is approximately 164,000 cubic yards. The recommended plan offers erosion protection ranging from a 5-year storm level to a 75-year storm, varying along the length of the Mid-Reach. The plan includes 3.0 acres of environmental impact to the nearshore rock resources, following minimization of the impacts as much as possible while still offering maximum storm damage reduction. Mitigation for impacts due to direct and indirect cover of the nearshore rock is included in the 3.0 acre impact, however, 1.4 acres is expected to include some temporal variation as the advanced nourishment erodes. The recommended plan includes impacts in Reaches 1 to 5 and no impact in Reach 6. The area impacted is on the landward edge of the nearshore rock, resulting in the small width of rock impacted but over the whole length of Reach 1 to 5. The calculated impact acreage is 3.0 acres out of the total of 31.3 acres of nearshore rock in the Mid-Reach study area. The nearshore rock seaward of the fill area will not be impacted. The mitigation quantity is calculated from the UMAM ratio of 1.6 mitigation acres required for every acre of natural rock impacted, resulting in a required mitigation of 4.8 acres.

4. Locally Owned Land.

The local sponsors, Brevard County owns three parks within the project area and are known as Sea Gull Park, Pelican Beach Park and SPRA Park. The County also owns approximately 20 public beach access points within the area.

5. Government-Owned Land.

The proposed Poseidon Stockpile Site is owned by Patrick Air Force Base.

6. Navigational Servitude.

Although the Federal Government has the right to use navigational servitude, it was agreed that the local sponsor will obtain all permissions to use submerged lands from the State of Florida.

7. Real Estate Requirements.

a. Material placed upon public lands seaward of the proposed ECL will require a Consent of Use from the State of Florida. The Consent of Use basically grants the rights to place material on state-owned submerged lands in accordance with the beach nourishment plans submitted with the application for an erosion control line. Also included in this document is the use of any submerged borrow areas and/or pipeline corridors. Usually the State of Florida only gives a ten (10) year time limit for use of submerged lands.

b. Perpetual Storm Damage Reduction Easements will be required for approximately 95 acres and 198 parcels located landward of the proposed ECL. A list of parcels can be located within the Economics section of this report. The non-Federal sponsor must acquire perpetual storm damage reduction easement estate for all placement areas, dune/vegetation areas and all accesses to the beach. These properties need to be open to the public equally.

c. The borrow area, Canaveral Shoals II (CSII), is located approximately 20 miles north-northeast of the Mid Reach and 9.4 miles east of proposed Poseidon stockpile site. As the borrow area is located within the Federal Waters of the United States, the Corps of Engineers will enter into a Memorandum of Agreement (MOA) with the United States Mineral Management Service (MMS).

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

e. The nearshore upland values are used to determine economical benefits of the project and can be found in the economics section. In accordance to the project purpose, no land will be lost with this project.

f. Staging areas have not been identified at this time, but will require a temporary work area easement if not located within the perpetual storm damage reduction easement area.

g. Permits from the Department of the Air Force will be required for the stockpile area located on Cape Canaveral Air Station. The permit will be between U.S. Army Corps of Engineers

and U.S. Air Force, Patrick Air force Base. An automatic renewal of this permit will be requested, so that it can continue for project life.

8. Non-Federal Operation/Maintenance Responsibilities.

The non-Federal sponsors will operate and maintain the project for the project life. Future periodic nourishments are considered construction and will be performed as part of the Federal project.

9. Non-Federal Authority to Participate in the Project.

a. Brevard County, Florida, is the non-Federal sponsor of the project and is a political subdivision of the State of Florida as provided by Article 8, Section 1 of the Florida Constitution.

b. Counties of Florida are empowered by Florida Statutes 125.001 to "Establish and administer programs of ...flood and beach erosion control..." By Chapter 127, counties are empowered to exercise eminent domain powers for any county purpose except certain restrictions apply on recreational projects.

10. Minerals.

There are no known minerals of value in the project area.

11. Hazardous and Toxic Wastes (HTW).

There have been no hazardous or toxic wastes identified within the project area.

12. Relocation Assistance Payments (Public Law 91-646).

No persons or business will require relocation.

13. Structures and Facilities.

There are no structures and facilities to be damaged as part of the Federal project.

14. Summary of Real Estate Costs.

a. Lands:

Lands:	0
Improvements:	0
Severance Damages:	0

Minerals:		0
Total Lands and Damages	$	0
b. Acquisition/Administrative		
Federal		10,000
Non-Federal		60,000
c. Public Law 91-646		0
d. Contingencies (25%)		17,500
e. Total Real Estate Cost	$	87,500

(NOTE: We anticipate a temporary staging area will be needed, but has not been identified at this time. If this area is located outside the project footprint a gross appraisal will be required.)

15. Real Estate Acquisition Schedule.

The Project Partnership Agreement (PPA) will be fully executed on October 10, 2010 with advertisement on April 4, 2011. If the local sponsor acquires the land prior to the fully executed PPA, they may be at risk to receive crediting for administrative costs (scheduled dates as of October 2008).

At this time landowners have not been contacted in the area, however it is expected for this project to be supported by many and not supported by others. Patrick Air Force Base supports the project.

If the non-Federal sponsor cannot acquire LERRD required for the project in a timely fashion or has difficulty in acquiring the required estate, the non–Federal sponsor can request in writing that the Government acquire LERRD on its behalf. In such event, the decision to acquire LERRD on behalf of the non-Federal sponsor lies within the sole discretion of the Government.

NOTE: The above statement is added to the report to receive the approval authority to acquire such necessary LERRD’s by condemnation for the non-Federal sponsor if it requests the Federal Government to do so. The local sponsor was able to acquire parcels by condemnation for another reach, but State Court only allowed a 50 year easement. Due to Corps of Engineers requiring perpetual the County may request we condemn.

16. Standard Estates to be Acquired.

See Real Estate Requirements for what lands need what estate.

PERPETUAL BEACH STORM DAMAGE REDUCTION EASEMENT

A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts No. ___), for use by the Project Sponsor, its representatives, agents, contractors and assigns, to construct; preserve; patrol; operate; maintain; repair; rehabilitate; and replace; a public beach (a dune system) and other erosion control and storm damage reduction measures together with appurtenances thereto, including the right to deposit sand; to accomplish any alterations of contours on said land; to construct berms (and dunes); to nourish and renourish periodically; to move, store and remove equipment and supplies; to erect and remove temporary structures; and to perform any other work necessary and incident to the construction, periodic renourishment and maintenance of the Brevard County, Florida, Mid Reach Segment, together with the right of public use and access; (to plant vegetation on said dunes and berms; to erect, maintain and remove silt screens and snow fences; to facilitate preservation of dunes and vegetation through the limitation of access to dune areas;) to trim, cut, fell, and remove from said land all trees, underbrush, debris, obstructions, and any other vegetation, structures and obstacles within the limits of the easement (except _____); (reserving, however, to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns, the right to construct dune overwalk structures in accordance with any applicable Federal, State or local laws or regulations, provided that such structures shall not violate the integrity of the dune in shape, dimension or function, and that prior approval of the plans and specifications for such structures is obtained from the (designated representative of the Project Sponsor) and provided further that such structures are subordinate to the construction, operation, maintenance, repair, rehabilitation and replacement of the project; and further) reserving to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns all such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easements hereby acquired; subject however to existing easements for public roads and highways, public utilities, railroads and pipelines.

TEMPORARY WORK AREA EASEMENT

A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. ___ and ___), for a period not to exceed _____, beginning with date

possession of the land is granted to the Project Sponsor, for use by the United States, its representatives, agents, and contractors as a (borrow area) (work area), including the right to (borrow and/or deposit fill, spoil and waste material thereon) (move, store and remove equipment and supplies), and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the Brevard County, Florida, Project, Mid Reach Segment together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines

17. Map.

A real estate map and parcel list of the proposed project area is included with this appendix as Enclosures 1 & 2.

18. Chart of Accounts.

01	Lands and Damages	$ 0	
01B00	Acquisition/Administrative		
	Federal	$10,000	
	Non-Federal	$60,000	
Total Real Estate Total w/o cont.			$ 70,000
Total Real Estate Contingencies (25%)			$ 17,500
Total Real Estate Costs			$ 87,500

Enclosure 1

Site Name	Street Number	Parcel Number
REACH 6		
Pineda Phase I	101 Hwy A1A	26372300-00011
Pineda Phase II	155 Hwy A1A	26372300-00013
Pineda Phase III	175 Hwy A1A	26372300-00015
Oceanus I	199 Hwy A1A	26372300-00004
Oceanus III	199 Hwy A1A	26372300-00004
Sandpiper Towers I	205 Hwy A1A	26372300-00772
Flores de Playa	245 Hwy A1A	26372300-00751
Ocean Residence North	261 Ocean Residence Ct	26372379-00001
Opal Seas	275 Hwy A1A	26372300-00752
Park - State of FL	285 Hwy A1A	26372300-00753
Sea Gull Park - Brevard County		26372300-00754
Silver Sands I	295 Hwy A1A	26372300-00755
Silver Sands II	297 Hwy A1A	26372300-00756
Sea Breakers	307 Hwy A1A	26372300-00769
Horizon II	401 Hwy A1A	26372300-00781
Horizon I	403 Hwy A1A	26372300-00779
Horizon III	405 Hwy A1A	26372300-00783
Horizon IV	407 Hwy A1A	26372600-00004
SPRA Park - Brevard County	501 Hwy A1A	26372600-00005
Las Brisas I	537 Hwy A1A	26372600-00004
Las Brisas II	553 Hwy A1A	26372600-00008
Monaco Condo	571 Hwy A1A	26372602-00000
Monaco Condo		26372602-00000
Monaco Condo	579 Hwy A1A	26372603-00000
Monaco Condo		26372603-00000
TIITF - State of FL		26372600-00025
City of Satellite Beach		26372600-00010
Brevard County		26372600-00026
Brevard County	815 Hwy A1A	26372600-00751
City of Satellite Beach	North part of parcel	26372600-00750
REACH 5		
City of Satellite Beach	South Part of Parcel	26372600-00750
TIITF - State of FL		26372600-00763
New House	905 Hwy A1A	26372600-00762
Vacant		26372600-00760
Majesty Palm Condo	925 Hwy A1A	26372600-00761
Vacant	951 Hwy A1A	26372600-00759
Paradise Beach Club	975 Hwy A1A	26372600-00753
Oceana Beach Club	1035 Hwy A1A	26373500-00003
New House	1055 Hwy A1A	26373500-00012

Drug Store	1077 Hwy A1A	26373500-00007
The Oceans	1085 Hwy A1A	26373500-00004
The Buccaneer Club I	1125 Hwy A1A	26373501-00001
The Buccaneer Club II	1125 Hwy A1A	26373501-00001
The Buccaneer Condo Apts	1175 Hwy A1A	26373501-00006
Seamark	1195 Hwy A1A	26373501-00006
Las Olas	1215 Hwy A1A	26373500-00763
House	10 Park Ave	26373578-0000A0-0001
Park Avenue	Public R.O.W.	
House	5 Park Ave	26373578-0000B0-0001
Sand Castle Condo	1273 Hwy A1A	26373500-00801
Sand Castle - pool		26373500-00758
New Construction		26373500-00756
City of Satellite Beach	easement?	263735EA-00001
La Colonnade Condo	1303 Hwy A1A	263735EA-0000A-1
La Playa East - pool,		263735EA-0000A-4
La Playa East Condo	1343 Hwy A1A	263735EA-0000A-5
TIITF - State of FL		263735EA-0000A-7
Misty Shore	1369 Hwy A1A	263736EA-0000A-9
Summer Cove	1385 Hwy A1A	263736EB-0000C-1
Reflections	1395 Hwy A1A	263736EB-0000C.A-0
City of Satellite Beach	public access	263736EB-0000C.3-0
Emerald Shores	1405 Hwy A1A	2737011A-00201
Sea Villa	1425 Hwy A1A	27370100-00264A-0
East Wind II	1455 Hwy A1A	27370100-00335.6-0
East Wind I	1465 Hwy A1A	27370100-00333.0-0
Brevard County	1495 Hwy A1A	27370100-00258.1-0
Brevard County - Pelican Beach Park	1525 Hwy A1A	27370100-00258.0

REACH 4

Brevard County - Pelican Beach Park	1525 Hwy A1A	27370100-00258.0
Brevard County		27370100-00270
Brevard County		27370100-00268
City of Satellite Beach		27370100-00265
City of Satellite Beach		27370100-00272
Ocean Royale	1595 Hwy A1A	27370100-00275.A-0
Magnolia Ave	public R.O.W.	
House	610 Ocean Street	27370150-0000A-1
House	620 Ocean Street	27370150-0000A-3
House	626 Ocean Street	27370150-0000A-4
Townhouse	630 Ocean Street	27370150-0000A-5
Townhouse	632 Ocean Street	27370150-0000A-5.01
Townhouse	634 Ocean Street	27370150-0000A-6
House	638 Ocean Street	27370150-0000A-7
House	640 Ocean Street	27370150-0000A-9

House	648 Ocean Street	27370150-0000A-11
Magellan Ave	public R.O.W.	
House	1655 Hwy A1A	27370150-00001.0-1
House		27370150-00001.0-3.01
House	1683 Hwy A1A	27370150-00001.0-6
House	1687 Hwy A1A	27370150-00001.0-8
City of Satellite Beach		27370150-0000B.0-11
Sunrise Ave	public R.O.W.	
City of Satellite Beach		27370150-0000C-1
House	715 Beach Street	27370150-0000C-5
House	721 Beach Street	27370150-0000C-6
House	725 Beach Street	27370150-0000C-8
House	735 Beach Street	27370150-0000C-10
House	745 Beach Street	27370150-0000C-11
Palmetto Ave	public R.O.W.	
City of Satellite Beach		27370150-0000D-1
City of Satellite Beach		27370150-0000D-2
House	785 Shell Street	27370150-0000D-6
House	789 Shell Street	27370150-0000D-8
House	795 Shell Street	27370150-0000D-10
House	797 Shell Street	27370150-0000D-11
Volunteer Way	public R.O.W.	
Lantana Condo	1791 Hwy A1A	27371232-00000-1
Lantana Condo	1791 Hwy A1A	27371232-00000-1
Lantana Condo	1791 Hwy A1A	27371232-00000-1
Lantana Condo	1791 Hwy A1A	27371232-00000-1
City of Indian Harbour Beach	Bicentennial Park	27371200-00260
City of Indian Harbour Beach	Bicentennial Park	27371227-0000A-1

REACH 3

Ocean Dunes Drive	public R.O.W.	
Aloha Condo	1891 Hwy A1A	27371227-0000B-1
SatCom Direct	1901 Hwy A1A	27371227-0000B-6
The Christal II	1907 Hwy A1A	27371227-0000B-7
The Christal I	1919 Hwy A1A	27371227-0000B-11
Seashore Estates I	1923 Hwy A1A	27871227-0000B-15.01
Seashore Estates Access	1923 Hwy A1A	27871227-0000B-19.01
TIITF - State of FL		27371200-00585
Golden Palm	1941 Hwy A1A	27371200-00500.9-0201
Serena Shores II	2025 Hwy A1A	27371200-00586A
Serena Shores I	2035 Hwy A1A	27371200-00500A
Indian Harbour Bch Club	2055 Hwy A1A	27371200-00501.1
Somerset Condo	2065 Hwy A1A	2737121B-00000-1
Somerset Condo	2065 Hwy A1A	2737121B-00000-1
Somerset Condo	2065 Hwy A1A	2737121B-00000-1
Somerset Condo	2065 Hwy A1A	2737121B-00000-1
Oceanique Condo II	2105 Hwy A1A	27371200-00516.M

Oceanique Condo pool	2105 Hwy A1A	27371200-00516
Oceanique Condo I	2105 Hwy A1A	27371200-00516.A
City of Indian Harbour Beach	Millenium Park	27371200-00587
City of Indian Harbour Beach	Millenium Park	27371200-00584
Gardenia Condo	2195 Hwy A1A	27371300-00001.1-1
Ocean Walk Condo	2225 Hwy A1A	27371300-00006
Brevard County Community Center	2289 Hwy A1A	27371300-00003
Wallace Ave	public R.O.W.	
TIITF - State of FL	Canova Beach Park	27371301-00001
Eau Gallie Blvd	Canova Beach Park	
TIITF - State of FL	Canova Beach Park - 3299 Hwy A1A	27371302-00001-1

REACH 2

Melbourne Ocean Club Condo	3101 N. Hwy A1A	27371302-00001-12
Brevard County		27371375-00001-2.01
Vacant		27371375-0001-3
Hilton Hotel	3003 N. Hwy A1A	27371300-00753
Villa Riviera	2925 N. Hwy A1A	27371376-00000-1.01
Coral Palms	2875 N. Hwy A1A	27371376-0000-4.01
Club Residence	2855 N. Hwy A1A	27371300-00754.1
Sandy Kaye	2835 N. Hwy A1A	27371378-00001-2.01
Silver Palms	2805 N. Hwy A1A	2737131A-00201
Beach Access	easement	
Vacant		27371300-00755.1
Vacant		27371300-00755.0
Ocean Sands N	2727 N. Hwy A1A	27371300-00789
Ocean Sands S	2725 N. Hwy A1A	27371300-00792
Holiday Inn	2605 N. Hwy A1A	27371300-00759

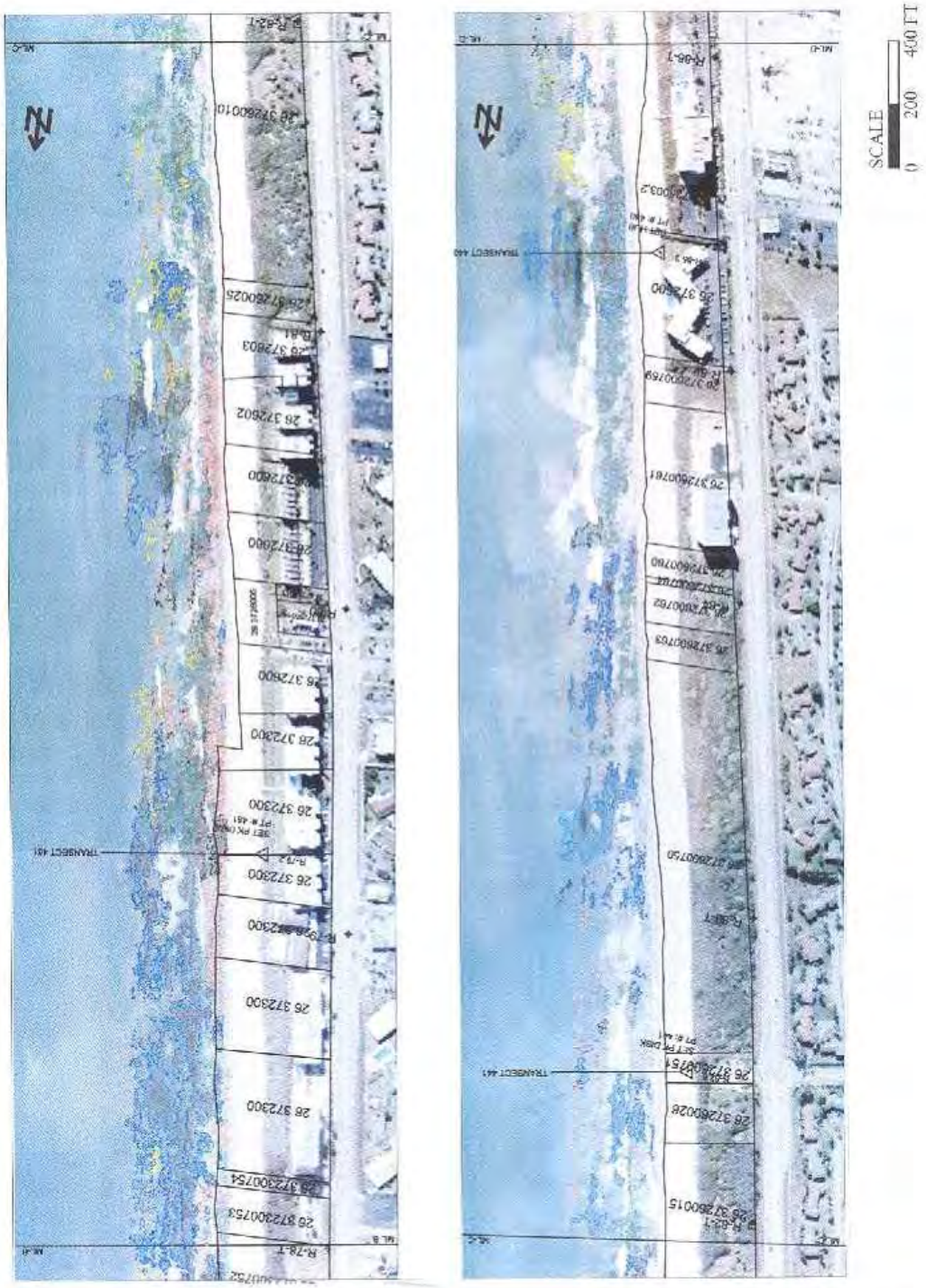
REACH 1

Brevard County	beach access	27372400-00056
TIITF - State of FL		27372400-00005
TIITF - State of FL		27372400-00037
Brevard County	Paradise Beach Park	27372400-00009
Brevard County	Paradise Beach Park	27372400-00010
Brevard County	2301 N. Hwy A1A - Paradise Beach Park	27372400-00011.1
House	2175 N. Hwy A1A	27372475-00001-1
House	2165 N. Hwy A1A	27372475-00001-2
House	2155 N. Hwy A1A	27372475-00001-3
House	2145 N. Hwy A1A	27372475-00001-4
House	2135 N. Hwy A1A	27372475-00001-5
House	2125 N. Hwy A1A	27372475-00001-6
House	2115 N. Hwy A1A	27372475-00001-7
House	2105 N. Hwy A1A	27372475-00001-8
House	2095 N. Hwy A1A	27372475-00001-9
House	2085 N. Hwy A1A	27372475-00001-10

House	2075 N. Hwy A1A	27372475-00001-11
House	2065 N. Hwy A1A	27372475-00001-12
House	2055 N. Hwy A1A	27372475-00001-13
House	2045 N. Hwy A1A	27372475-00001-14
beach access		
House	2035 N. Hwy A1A	27372475-00001-15
House	2025 N. Hwy A1A	27372475-00001-16
House	2015 N. Hwy A1A	27372475-00001-17
House	2005 N. Hwy A1A	27372484-0000A-1
Vacant		27372484-0000A-2
House	1965 N. Hwy A1A	27372484-0000A-3
House	1955 N. Hwy A1A	27372484-0000A-4
House	1945 N. Hwy A1A	27372484-0000A-5
beach access		
House	1935 N. Hwy A1A	27372484-0000A-6
House	1925 N. Hwy A1A	27372484-0000A-7
House	1915 N. Hwy A1A	27372484-0000A-8
House	1905 N. Hwy A1A	27372484-0000A-9
House	1885 N. Hwy A1A	27372484-0000A-10
House	1875 N. Hwy A1A	27372484-0000A-11
The Barringer Condo I	1835 N. Hwy A1A	27372490-00000-1
The Barringer II	1845 N. Hwy A1A	27372491-00000-1
Casa Blanca Inn	1805 N. Hwy A1A	273725EV-00000-1
Bella Vista	1755 N. Hwy A1A	27372513-00000-1
Apartments	1745 N. Hwy A1A	273725EV-00000-4
Blue Seas Apts.	1725 N. Hwy A1A	273830EV-00000-5
Ocean Park Condo	1665 N. Hwy A1A	273830EN-00000-16.01
Brevard County	access	273830EN-00000-16.02
Vacant		273830EN-00000-15
Sea Pearl Condo	1575 N. Hwy A1A	27383027-00000-1
Brevard County	access	273830EN-00000-12.01
Outrigger	1555 N. Hwy A1A	273830EN-00000-11.01
Majestic Shores	1525 N. Hwy A1A	27383026-00000-1
Brevard County	access	
Claridge Condo	1515 N. Hwy A1A	273830EN-00000-7
Royal Palms	1505 N. Hwy A1A	2738301A-00201
Vacant		273830EN-00000-4
Brevard County	access	
The Dunes	1415 N. Hwy A1A	273830EN-00000-1
Jade Palm	1345 N. Hwy A1A	27383052-00000-1
Brevard County	access	
House	1315 N. Hwy A1A	27383050-00000-28
House	1245 N. Hwy A1A	27383050-00000-29
House	1235 N. Hwy A1A	27383050-00000-31
Brevard County	access	
House	1225 N. Hwy A1A	27383050-00000-32

House	1215 N. Hwy A1A	27383050-00000-33
Coral Reef Condo	1177 N. Hwy A1A	27383050-00000-34
House	1163 N. Hwy A1A	27383050-00000-36
TIITF - State of FL	1137 N. Hwy A1A	273830EW-000A-15
Brevard County	access	
House	1135 N. Hwy A1A	273830EW-000A-14

Enclosure 2



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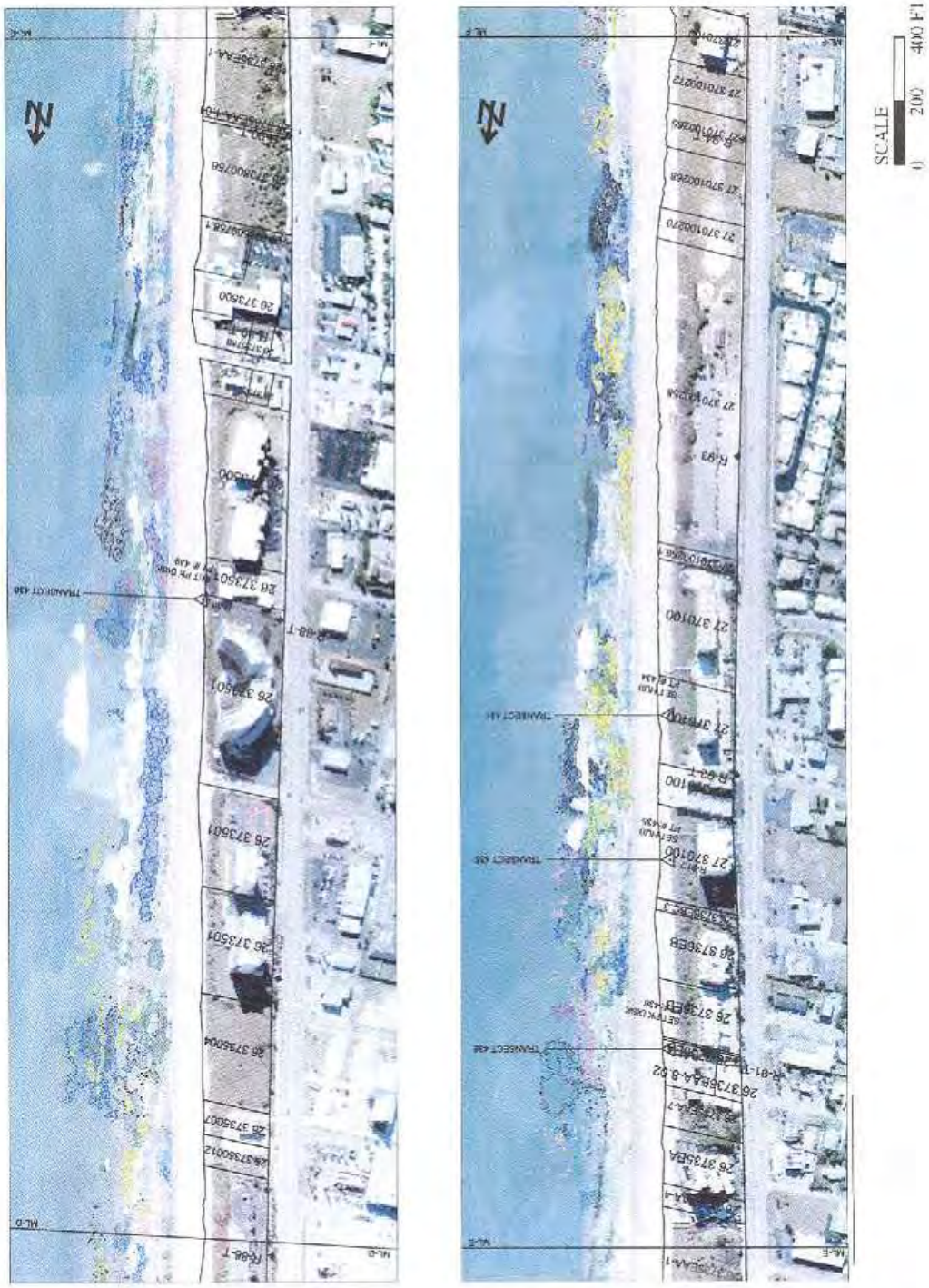

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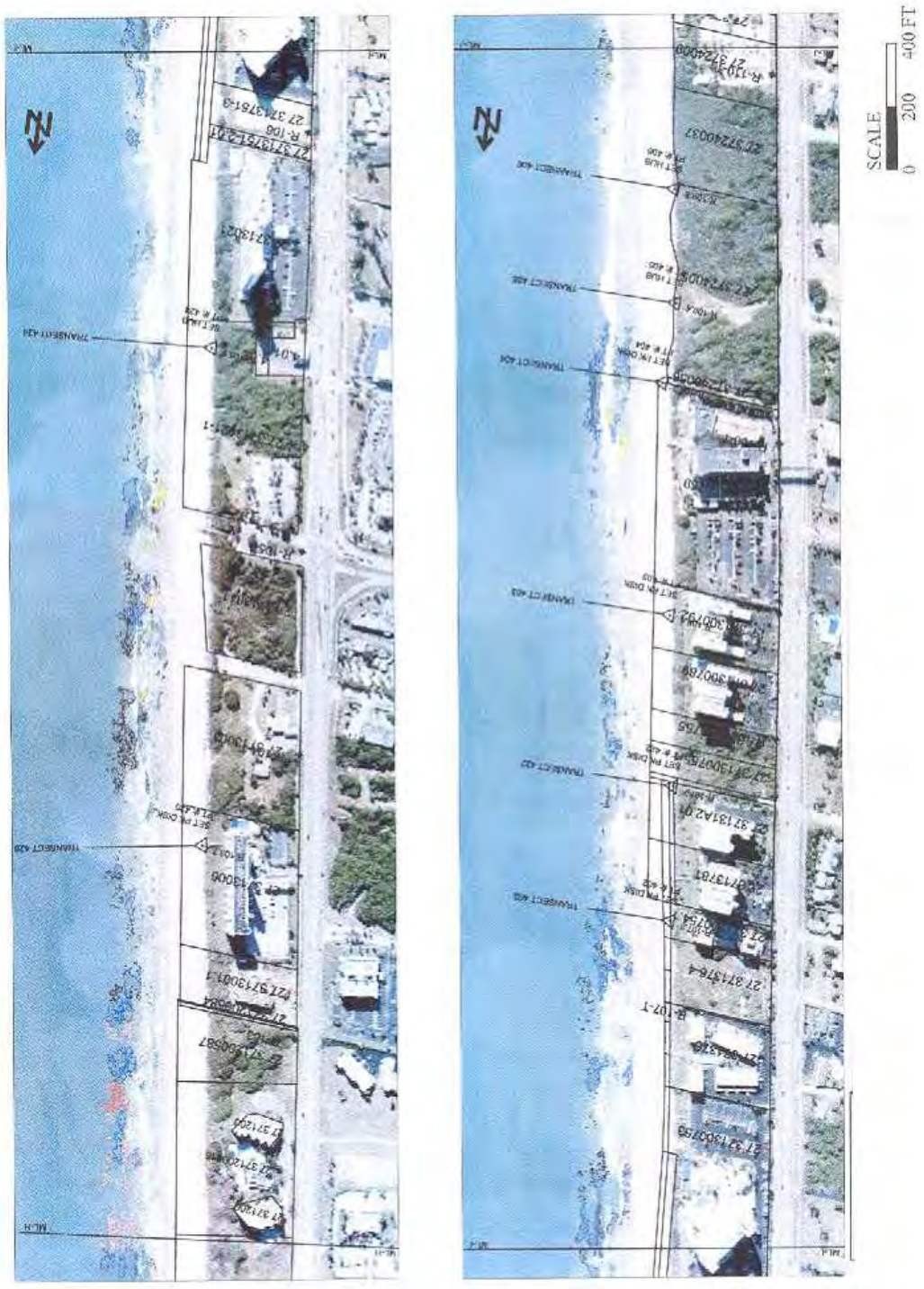
SCALE
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Appendix D

Public Use Determination and Cost Allocation
Brevard County, Florida Shore Protection Project
Mid-Reach Segment

INTRODUCTION

1. Federal participation in shore protection projects is limited to shorelines open to public use. Guidance is provided in ER 1105-2-100 wherein user fees, parking, access, beach use by private organizations, and public shores with limitations are addressed (E-24.d). Federal participation is further defined by project purpose, either hurricane and storm damage reduction or recreation, and by shoreline ownership. Shoreline ownership is separated into lands that are Federally owned, publicly and privately owned, and privately owned with limited use, as shown in **Table 1**. More specific guidance is provided in ER 1165-2-130 on what constitutes sufficient parking.

Table 1: Shore Ownership and Levels of Federal Participation

Shore Ownership and Project Purpose or Benefits	Maximum Level of Federal Participation in Initial Construction	Maximum Level of Federal Participation in OMRR&R
I. Federally Owned		
HSDR on Developed Lands	100%	100%
HSDR on Undeveloped Lands	100%	100%
Recreation (Separable costs)	100%	100%
II. Publicly and Privately Owned (public benefits)		
HSDR on Developed Lands	65%	0%
HSDR on Undeveloped Lands		
Public Lands	50%	0%
Private Lands	0%	0%
Recreation (Separable costs)	50%	0%
III. Privately Owned (limited use)		
HSDR on Developed Lands	0%	0%
HSDR on Undeveloped Lands	0%	0%
Recreation (Separable costs)	0%	0%

THE BASIC METHODOLOGY OF THE STUDY

2. In order to evaluate the Brevard County Mid-Reach study area, available information was gathered from existing reports, aerial photography, Brevard County sources and field reconnaissance. The public use of the shoreline was addressed first to determine the level of Federal participation, then secondly the shoreline ownership. Each of the major areas of study is discussed in the following paragraphs.

USER FEES

3. Reasonable user fees are acceptable for beach recreation use when used to offset the local share of project costs. Field reconnaissance of the study area did not find any user fees in order to access the study area.

PARKING

4. Lack of sufficient parking facilities for the general public (including nonresident users) located reasonably near and accessible to the project beaches may constitute a restriction on public access and use. Parking on a free or reasonable basis must be within a reasonable walking distance of a pedestrian access to the beach. Public transportation may also be used to augment parking facilities provided there is supporting evidence that the public transportation system is adequate for the needs of beach users. Specific guidance from ER 1165-2-130 states that “parking should be sufficient to accommodate the lesser of the peak hour demand or the beach capacity” (par. h(2)).

5. Parking was verified by field visit on October 19, 2005. Aerial photos were consulted for possible access points and field verified. The number of parking spaces were estimated as closely as possible. The parking areas noted during the field visit are listed in **Table 2** for a total of 830 spaces.

6. Public transportation routes were noted during the field visit. Discussion with Brevard County yielded publicly available information on bus routes adjacent to the project area. The parking analysis includes a reduction in users to account for users that arrive via public transportation or other means.

7. The amount of parking was analyzed compared to user demand and beach capacity. Information for this analysis was found in the report completed by Olsen Associates, Inc. titled “Brevard County, Florida, Federal Shore Protection Project, Mid-Reach, Economic Analysis of Incidental Project Benefits, June 22, 2006” (Economics Appendix). The analysis provided estimates of beach user demand in the Mid-Reach at the projected end of construction in 2010 at 15,075 visits per day for the use category that includes peak weekend days that account for 88.3% of

peak demand. To compute the number of parking spaces required to bring that number of people to the beach, some additional factors come into play. Notional visitors are those that access the beach on foot, on bike, or are dropped off by cars or city buses. Following the analysis used in the incidental benefit calculations, a notional factor is used, equating to 60.5% of beach users that do not use parking and 39.5% of users that depend on parking. The number of people traveling by car is further reduced by assuming four people ride in each car and each space can be used twice per pay, thus each parking space provides daily capacity for eight users per day. This results in the need for 744 spaces in 2010 in order to meet demand, as shown in **Table 3**.

Table 2: Parking Spaces of Brevard County Mid-Reach

Park Name	Nearest Cross Street	Nearest DEP Monument	Number of Spaces
Patrick AFB	State Hwy 404	R-75	50
Sea Gull Park	1st	R-78	20
SPRA Park	Berkeley Rd	R-80	50
	Patrick Road	R-82	20
	Grant Ave	halfway R-87 to R-88	23
	Park	R-89	4
Pelican Beach Park	Royal Palm	R-93	170
	Desoto - Magnolia	R-95	11
	Magellan	R-95	12
	Sunrise	R-96	12
	Palmetto	R-97	25
	Volunteer Way	R-97	6
Bicentennial Park	Ocean Dunes	R-99	42
	Palm Springs	R-101	2
	Atlantic	R-102	12
Millenium Park	Golden Beach	R-103	25
	Wallace	R-104	20
Canova Beach Park	Eau Gallie	R-105	65
	Oceanside	R-106	18
	Coral Way East	R-108	6
	Harris	R-109	6
Paradise Beach Park	Paradise	R-111	225
	Terrace Shores	R-116	6
Sum			830

Table 3: User Demand Parking Spaces

Year	User Demand (persons)	39.5% that Park (persons)	Number of parking spaces (8 users per space)
2010	15,075	5,955	744

8. Although the user demand is calculated independent of construction of a shore protection project, the parameter of beach capacity is dependent on the shore protection alternative recommended for construction. The incidental benefit analysis included the suite of alternatives under consideration. For this verification of public use, only the NED plan is described. For the NED plan of beachface fill with a 10-foot mean high water extension in Reaches 1 and 5, a 20-foot mean high water extension in Reach 2, a 30-foot mean high water extension in Reach 3, and a dune fill in Reaches 4 and 6, the calculated beach area is 4,083,290 square feet. This value accounts for the dry beach area between the vegetation line and the mean high water line for the length of the Mid-Reach, unconstrained by beach access. Beach capacity is then calculated assuming each person needs 100 square feet of space, resulting in a total number of possible persons at 40,833, as shown in **Table 4**. To compute the number of parking spaces required to bring that number of people to the beach, the notional visitor percentage and number of persons per space are applied. Notional visitors are those that access the beach on foot, on bike, or are dropped off by cars or city buses. Following the analysis used in the incidental benefit calculations, a notional factor is used, equating to 60.5% of beach users that do not use parking and 39.5% of users that depend on parking. Using the same percentages, 39.5% of the total beach users of 40,833 equals 16,129 people traveling by car. The number of people traveling by car is further reduced by assuming four people ride in each car and each space can be used twice per pay, thus each parking space provides daily capacity for eight users per day. Dividing 16,129 people by 8 equals 2,016 parking spaces that must be provided.

Table 4: Beach Capacity

Reach	Average Beach Width (feet)	Reach Length (feet)	With Project Beach Area (sqft)	Beach Capacity (persons)
1	115	9,599	1,103,885	11,039
2	126	3,406	429,156	4,292
3	122	6,239	761,158	7,612
4	92	5,603	515,476	5,155
5	78	9,029	704,262	7,043
6	79	7,207	569,353	5,694
Sum		41,083	4,083,290	40,833

9. The total number of required parking spaces is the lesser of that required to meet peak hour demand or beach capacity per current policy guidance. At the time of construction in 2010, the lesser of peak hour demand and beach capacity is 744 spaces. The current number of parking spaces of 830 meets the current demand.

ACCESS

10. Reasonable public access rights of way must be provided approximately every one-half mile or less along the beach. For purposes of this study, such accesses will be considered pedestrian accesses with either parking or a bus stop. Parking and access points are shown on the drawings in **Figures 1 to 11**. The majority of the Mid-Reach included in the recommended plan is open and accessible to the public with only 3,985 feet in four segments out of 41,083 feet that are not open. This length is incidental to the whole project and cannot be avoided without jeopardizing the integrity of the recommended plan or incurring extra costs. An adjustment is included in the cost allocation to remove that portion from Federal participation.

11. Public transportation is provided by the Space Coast Area Transit (SCAT), a department under the Brevard County Board of County Commissioners. In addition to fixed route buses, SCAT offers services tailored to elderly and special needs riders. All buses are equipped with wheelchair lifts and allow bicycles, surfboards, and other beach equipment. Reservations on special buses are available for curb to curb service for special needs individuals. Public outreach is a regular part of service, through the use of television, radio and newspaper advertising. The normal fare per ride throughout the system is $1.25, with reduced rates for senior citizens, disabled, veterans, and students. The beach trolley route is shown in **Figure 12**. The beach trolley stops at transfer points to other buses whereby riders from farther away would be able to access the beach.

BEACH USE BY PRIVATE ORGANIZATIONS

12. Federal aid to private shores owned by beach clubs and hotels which limit beach use to members or guests is contrary to the intent of Public Law 84-826. The State of Florida Coastal Zone Management Program establishes State ownership of lands seaward of the mean high water line. For new construction of beach nourishment projects, the existing mean high water line is renamed the erosion control line (ECL) at the time of initial construction. Any new lands created by the project seaward of the ECL are state owned lands. Public use of state owned lands is assured by the maintenance of regular pedestrian access points to the beach. Public use of the lands between the dune or seawall and the ECL is included as a provision of the easements required from private landowners prior to construction.

PUBLIC SHORES WITH LIMITATIONS

13. Publicly owned beaches, which limit use to residents of the community or a group of communities, are not considered to be open to the general public and are treated as private beaches. The ability of the public to use the beach is inherent to the other portions of this study such as user fees, pedestrian access, parking and beach ownership. No restrictions to use by the general public were found in addition to the other portions of this study.

PROJECT PURPOSE

14. Shore protection projects are formulated to provide hurricane and storm damage reduction. Incidental recreation benefits may be included in the benefit calculations, but may be not more than fifty percent of the total benefits required for justification. Any separable costs for recreation features are paid at 100% non-Federal cost.

SHORE OWNERSHIP

15. The amount of Federal participation in the costs of construction and OMRR&R of the shore protection project are determined by the shoreline ownership. The oceanfront parcels are divided between Federally owned, privately owned, and publicly owned. Whether the parcel has been developed or not is also needed information. The Brevard County tax appraisers database was reviewed for each parcel of oceanfront property within the study area. The most recent information available was dated 2005. Undeveloped property was verified by field reconnaissance.

COST SHARING

16. The public use determination, project purpose and shore ownership are combined in **Table 5** according to the parameters shown in **Table 1**. A detailed parcel by parcel account is included in the attachment. The length of shoreline corresponds with that of the recommended plan which includes Reaches 1, 2, 3, 4, 5 and 6. From this determination, the Federal share of construction costs for the Brevard County Mid-Reach project recommended plan is 54.0%.

Table 5: Brevard County Mid-Reach Cost Sharing Percentage

Shore Ownership and Project Purpose (as defined in ER 1105-2-100, Table E-22)	Maximum Level of Federal Participation in Construction Costs	Shoreline Length (feet)	Federal Participation (feet)
I. Federally Owned	100%	0	0
II. Publically and Privately Owned, Protection Results in Public Benefits			
A. Hurricane and Storm Damage Reduction on Developed Lands	65%	26,834	17,469
B. Hurricane and Storm Damage Reduction on Undeveloped Lands			
(1) Public Lands	50%	4,415	2,208
(2) Private Lands	0%	815	0
C. Separable Recreation	50%	5,034	2,521
III. Privately Owned, Use Limited to Private Interests			
A. Hurricane and Storm Damage Reduction on Developed Lands	0%	3,695	0
B. Hurricane and Storm Damage Reduction on Undeveloped Lands	0%	85	0
C. Separable Recreation	0%	205	0
	Total Distance	41,083	22,198
	Federal share = 22,198 divided by 41,083 =		54.0%

Attachments

Figure 1: Brevard Mid-Reach Parking and Access, R75-78

Figure 2: Brevard Mid-Reach Parking and Access, R78-82

Figure 3: Brevard Mid-Reach Parking and Access, R82-86

Figure 4: Brevard Mid-Reach Parking and Access, R86-91

Figure 5: Brevard Mid-Reach Parking and Access, R91-95

Figure 6: Brevard Mid-Reach Parking and Access, R95-99

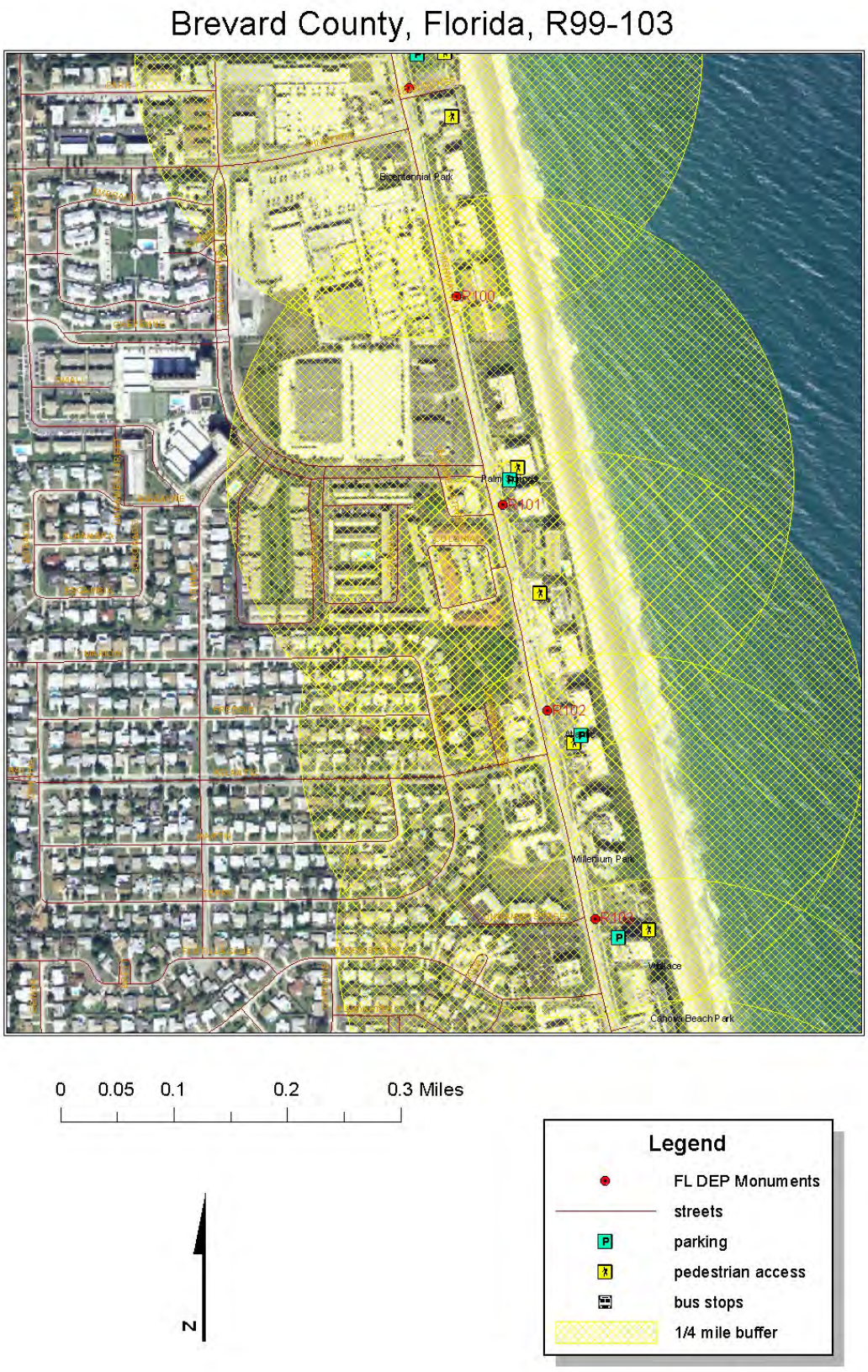


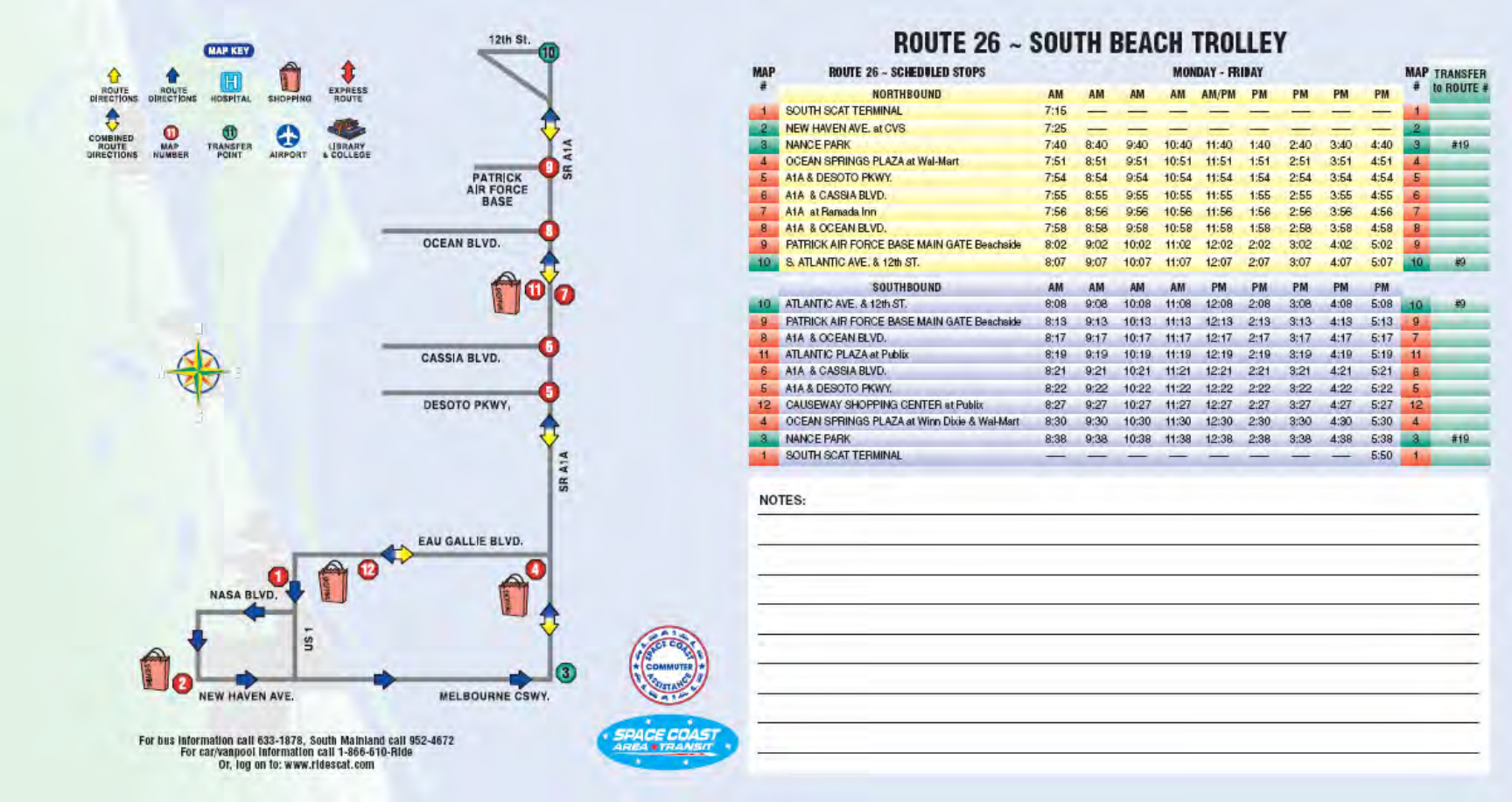
Figure 7: Brevard Mid-Reach Parking and Access, R99-103

Figure 8: Brevard Mid-Reach Parking and Access, R103-107

Figure 9: Brevard Mid-Reach Parking and Access, R107-111

Figure 10: Brevard Mid-Reach Parking and Access, R111-115

Figure 11: Brevard Mid-Reach Parking and Access, R115-119



ROUTE 26 ~ SOUTH BEACH TROLLEY

MAP #	ROUTE 26 ~ SCHEDULED STOPS	MONDAY - FRIDAY									MAP #	TRANSFER to ROUTE #
	NORTHBOUND	AM	AM	AM	AM	AM/PM	PM	PM	PM	PM		
1	SOUTH SCAT TERMINAL	7:15	—	—	—	—	—	—	—	—	1	
2	NEW HAVEN AVE. at CVS	7:25	—	—	—	—	—	—	—	—	2	
3	NANCE PARK	7:40	8:40	9:40	10:40	11:40	1:40	2:40	3:40	4:40	3	#19
4	OCEAN SPRINGS PLAZA at Wal-Mart	7:51	8:51	9:51	10:51	11:51	1:51	2:51	3:51	4:51	4	
5	A1A & DESOTO PKWY.	7:54	8:54	9:54	10:54	11:54	1:54	2:54	3:54	4:54	5	
6	A1A & CASSIA BLVD.	7:55	8:55	9:55	10:55	11:55	1:55	2:55	3:55	4:55	6	
7	A1A at Ramada Inn	7:56	8:56	9:56	10:56	11:56	1:56	2:56	3:56	4:56	7	
8	A1A & OCEAN BLVD.	7:58	8:58	9:58	10:58	11:58	1:58	2:58	3:58	4:58	8	
9	PATRICK AIR FORCE BASE MAIN GATE Beachside	8:02	9:02	10:02	11:02	12:02	2:02	3:02	4:02	5:02	9	
10	S. ATLANTIC AVE. & 12th ST.	8:07	9:07	10:07	11:07	12:07	2:07	3:07	4:07	5:07	10	#9
	SOUTHBOUND	AM	AM	AM	AM	PM	PM	PM	PM	PM		
10	ATLANTIC AVE. & 12th ST.	8:08	9:08	10:08	11:08	12:08	2:08	3:08	4:08	5:08	10	#9
9	PATRICK AIR FORCE BASE MAIN GATE Beachside	8:13	9:13	10:13	11:13	12:13	2:13	3:13	4:13	5:13	9	
8	A1A & OCEAN BLVD.	8:17	9:17	10:17	11:17	12:17	2:17	3:17	4:17	5:17	7	
11	ATLANTIC PLAZA at Publix	8:19	9:19	10:19	11:19	12:19	2:19	3:19	4:19	5:19	11	
6	A1A & CASSIA BLVD.	8:21	9:21	10:21	11:21	12:21	2:21	3:21	4:21	5:21	6	
5	A1A & DESOTO PKWY.	8:22	9:22	10:22	11:22	12:22	2:22	3:22	4:22	5:22	5	
12	CAUSEWAY SHOPPING CENTER at Publix	8:27	9:27	10:27	11:27	12:27	2:27	3:27	4:27	5:27	12	
4	OCEAN SPRINGS PLAZA at Winn Dixie & Wal-Mart	8:30	9:30	10:30	11:30	12:30	2:30	3:30	4:30	5:30	4	
3	NANCE PARK	8:38	9:38	10:38	11:38	12:38	2:38	3:38	4:38	5:38	3	#19
1	SOUTH SCAT TERMINAL	—	—	—	—	—	—	—	—	5:50	1	

NOTES:

Figure 12: Space Coast Area Transit Bus Route

Table 6: Brevard Mid-Reach Public Access and Ownership

Parcel Number (A)	Lot Width (Feet) (B)	Shoreline Description (C)		Within Project Limits (D)	Within 1/4 Mile of Access (E)	Shore Ownership and Project Purpose (F)	Level of Federal Participation (G)	Federal Participation Times Lot Width (H)	Number of Parking Spaces (I)	DEP Monument (J)
REACH 6										
26372300-00011	400	Condo	Pineda I, 101 Hwy A1A	Y	Y	II.A.	65%	260		R-75.4
26372300-00013	220	Condo	Pineda II, 155 Hwy A1A	Y	Y	II.A.	65%	143		
26372300-00013	110	Condo	Pineda II, 155 Hwy A1A	Y	N	III.A.	0%	0		
26372300-00015	270	Condo	Pineda III, 175 Hwy A1A	Y	N	III.A.	0%	0		R-76
26372300-00004	240	Condo	Oceanus I, 199 Hwy A1A	Y	N	III.A.	0%	0		
26372300-00004	60	Condo	Oceanus III, 199 Hwy A1A	Y	N	III.A.	0%	0	bus stop w/ no walkover	
26372300-00004	180	Condo	Oceanus III, 199 Hwy A1A	Y	Y	II.A.	65%	117		
26372300-00772	250	Condo	Sandpiper I, 205 Hwy A1A	Y	Y	II.A.	65%	163		
26372300-00751	250	Condo	Flores de Playa, 245 Hwy A1A	Y	Y	II.A.	65%	163		
26372379-00001	230	Condo	Ocean Res N, 261 Ocean Res Ct	Y	Y	II.A.	65%	150		
26372300-00752	260	Condo	Opal Seas, 275 Hwy A1A	Y	Y	II.A.	65%	169		R-78
26372300-00753	150	Public Park	State of FL, 285 Hwy A1A	Y	Y	II.C.	50%	75		
26372300-00754	50	Public Park	Sea Gull Park - Brevard County	Y	Y	II.C.	50%	25	20	
26372300-00755	350	Condo	Silver Sands I, 295 Hwy A1A	Y	Y	II.A.	65%	228		
26372300-00756	300	Condo	Silver Sands II, 297 Hwy A1A	Y	Y	II.A.	65%	195		
26372300-00769	200	Condo	Sea Breakers, 307 Hwy A1A	Y	Y	II.A.	65%	130		R-79
26372300-00781	150	Condo	Horizon II, 401 Hwy A1A	Y	Y	II.A.	65%	98		
26372300-00779	220	Condo	Horizon I, 403 Hwy A1A	Y	Y	II.A.	65%	143		
26372300-00783	150	Condo	Horizon III, 405 Hwy A1A	Y	Y	II.A.	65%	98		
26372600-00004	220	Condo	Horizon IV, 407 Hwy A1A	Y	Y	II.A.	65%	143		
26372600-00005	200	Public Park	SPRA Park - Brevard County, 501 I	Y	Y	II.C.	50%	100	50	R-80
26372600-00004	230	Condo	Las Brisas I, 537 Hwy A1A	Y	Y	II.A.	65%	150		
26372600-00008	190	Condo	Las Brisas II, 553 Hwy A1A	Y	Y	II.A.	65%	124		
26372602-00000	90	Condo	Monaco Condo, 571 Hwy A1A	Y	Y	II.A.	65%	59		
26372602-00000	150	Condo	Monaco Condo	Y	Y	II.A.	65%	98		
26372603-00000	86	Condo	Monaco Condo, 579 Hwy A1A	Y	Y	II.A.	65%	56		
26372603-00000	110	Condo	Monaco Condo	Y	Y	II.A.	65%	72		R-81
26372600-00025	100	Public Park	TIITF - State of FL	Y	Y	II.B.(1)	50%	50		
26372600-00010	1100	Public Park	City of Satellite Beach	Y	Y	II.B.(1)	50%	550		R-82
26372600-00026	135	Public Park	Brevard County	Y	Y	II.B.(1)	50%	68		
26372600-00751	115	Public Park	Brevard County, 815 Hwy A1A	Y	Y	II.C.	50%	58	20	
26372600-00750	440	Public Park	City of Satellite Beach, North part o	Y	Y	II.B.(1)	50%	220		R-83
REACH 5										
26372600-00750	790	Public Park	City of Satellite Beach, South Part	Y	Y	II.B.(1)	50%	395		R-83
26372600-00763	90	Public Park	TIITF - State of FL	Y	Y	II.B.(1)	50%	45		
26372600-00763	30	Public Park	TIITF - State of FL	Y	N	III.C.	0%	0		
26372600-00762	80	House	905 Hwy A1A	Y	N	III.A.	0%	0		
26372600-00762	50	House	905 Hwy A1A	Y	Y	II.A.	65%	33		R-84
26372600-00760	110	Undeveloped	Vacant	Y	Y	II.B.(2)	0%	0		
26372600-00761	445	Condo	Majesty Palm, 925 Hwy A1A	Y	Y	II.A.	65%	289		
26372600-00759	125	Undeveloped	Vacant, 951 Hwy A1A	Y	Y	II.B.(2)	0%	0		R-85
26372600-00753	430	Condo	Paradise Bch Club, 975 Hwy A1A	Y	Y	II.A.	65%	280		
26373500-00003	160	Condo	Oceana Bch Club, 1035 Hwy A1A	Y	Y	II.A.	65%	104	bus stop w/ walkover	
26373500-00003	655	Condo	Oceana Bch Club, 1035 Hwy A1A	Y	Y	II.A.	65%	426		R-86
26373500-00012	115	House	1055 Hwy A1A	Y	Y	II.A.	65%	75		
26373500-00007	100	Commercial	Drug Store, 1077 Hwy A1A	Y	Y	II.A.	65%	65		
26373500-00004	320	Condo	The Oceans, 1085 Hwy A1A	Y	Y	II.A.	65%	208		R-87
26373501-00001	310	Condo	The Buccaneer Club I, 1125 Hwy A	Y	Y	II.A.	65%	202		
26373501-00001	350	Condo	The Buccaneer Club II, 1125 Hwy A	Y	Y	II.A.	65%	228		
	45	Public R.O.W.	Grant Ave	Y	Y	II.A.	65%	29	23	
26373501-00006	550	Condo	The Buccaneer Condo Apts, 1175 I	Y	Y	II.A.	65%	358		R-88
26373501-00006	125	Condo	Seamark, 1195 Hwy A1A	Y	Y	II.A.	65%	81		
26373500-00763	510	Condo	Las Olas, 1215 Hwy A1A	Y	Y	II.A.	65%	332		
26373578-0000A0-0001	110	House	10 Park Ave	Y	Y	II.A.	65%	72		
	25	Public R.O.W.	Park Avenue, Public R.O.W.	Y	Y	II.A.	65%	16	4	
26373578-0000B0-0001	115	House	5 Park Ave	Y	Y	II.A.	65%	75		R-89
26373500-00801	125	Condo	Sand Castle Condo, 1273 Hwy A1A	Y	Y	II.A.	65%	81		
26373500-00758	175	Condo	Sand Castle - pool	Y	Y	II.A.	65%	114		
26373500-00756	300	Condo	New Construction	Y	Y	II.A.	65%	195		
263735EA-00001	20	Public Park	City of Satellite Beach, easement	Y	Y	II.C.	50%	10		R-90
263735EA-0000A-1	330	Condo	La Colonnade, 1303 Hwy A1A	Y	Y	II.A.	65%	215		
263735EA-0000A-4	105	Condo	La Playa East - pool, parking and to	Y	Y	II.A.	65%	68		
263735EA-0000A-5	175	Condo	La Playa East, 1343 Hwy A1A	Y	Y	II.A.	65%	114		
263735EA-0000A-7	130	Public Park	TIITF - State of FL	Y	Y	II.B.(1)	50%	65		R-91
263736EA-0000A-9	150	Condo	Misty Shore, 1369 Hwy A1A	Y	Y	II.A.	65%	98		
263736EB-0000C-1	215	Condo	Summer Cove, 1385 Hwy A1A	Y	Y	II.A.	65%	140		
263736EB-0000C.A-0	220	Condo	Reflections, 1395 Hwy A1A	Y	Y	II.A.	65%	143		
263736EB-0000C.3-0	35	Public Park	City of Satellite Beach, public acces	Y	Y	II.C.	50%	18	bus stop w/ walkover	

Table 6: Brevard Mid-Reach Public Access and Ownership (cont.)

Parcel Number (A)	Lot Width (Feet) (B)	Shoreline Description (C)		Within Project Limits (D)	Within 1/4 Mile of Access (E)	Shore Ownership and Project Purpose (F)	Level of Federal Participation (G)	Federal Participation Times Lot Width (H)	Number of Parking Spaces (I)	DEP Monument (J)
2737011A-00201	305	Condo	Emerald Shores, 1405 Hwy A1A	Y	Y	II.A.	65%	198		
27370100-00264A-0	130	Condo	Sea Villa, 1425 Hwy A1A	Y	Y	II.A.	65%	85		R-92
27370100-00335.6-0	265	Condo	East Wind II, 1455 Hwy A1A	Y	Y	II.A.	65%	172		
27370100-00333.0-0	360	Condo	East Wind I, 1465 Hwy A1A	Y	Y	II.A.	65%	234		
27370100-00258.1-0	50	Public Park	Brevard County, 1495 Hwy A1A	Y	Y	II.C.	50%	25	20	
27370100-00258.0	300	Public Park	Brevard County - Pelican Beach Pa	Y	Y	II.C.	50%	150	75	R-93
REACH 4										
27370100-00258.0	635	Public Park	Brevard County - Pelican Beach Pa	Y	Y	II.C.	50%	318	75	R-93
27370100-00270	100	Public Park	Brevard County	Y	Y	II.B.(1)	50%	50		
27370100-00268	200	Public Park	Brevard County	Y	Y	II.B.(1)	50%	100		
27370100-00265	150	Public Park	City of Satellite Beach	Y	Y	II.B.(1)	50%	75		R-94
27370100-00272	150	Public Park	City of Satellite Beach	Y	Y	II.B.(1)	50%	75		
27370100-00275.A-0	190	Condo	Ocean Royale, 1595 Hwy A1A	Y	Y	II.A.	65%	124		
	50	Public R.O.W.	Magnolia Ave	Y	Y	II.A.	65%	33	11	
27370150-0000A-1	115	House	610 Ocean Street	Y	Y	II.A.	65%	75		
27370150-0000A-3	50	House	620 Ocean Street	Y	Y	II.A.	65%	33		
27370150-0000A-4	60	House	626 Ocean Street	Y	Y	II.A.	65%	39		
27370150-0000A-5	30	Townhouse	630 Ocean Street	Y	Y	II.A.	65%	20		
27370150-0000A-5.01	30	Townhouse	632 Ocean Street	Y	Y	II.A.	65%	20		
27370150-0000A-6	30	Townhouse	634 Ocean Street	Y	Y	II.A.	65%	20		R-95
27370150-0000A-7	110	House	638 Ocean Street	Y	Y	II.A.	65%	72		
27370150-0000A-9	108	House	640 Ocean Street	Y	Y	II.A.	65%	70		
27370150-0000A-11	110	House	648 Ocean Street	Y	Y	II.A.	65%	72		
	50	Public R.O.W.	Magellan Ave	Y	Y	II.A.	65%	33	12	
27370150-00001.0-1	120	House	1655 Hwy A1A	Y	Y	II.A.	65%	78		
27370150-00001.0-3.01	130	House		Y	Y	II.A.	65%	85		
27370150-00001.0-6	105	House	1683 Hwy A1A	Y	Y	II.A.	65%	68		
27370150-00001.0-8	105	House	1687 Hwy A1A	Y	Y	II.A.	65%	68		
27370150-0000B.0-11	145	Public Park	City of Satellite Beach	Y	Y	II.C.	50%	73		R-96
	40	Public R.O.W.	Sunrise Ave	Y	Y	II.A.	65%	26	12	
27370150-0000C-1	205	Public Park	City of Satellite Beach	Y	Y	II.C.	50%	103		
27370150-0000C-5	80	House	715 Beach Street	Y	Y	II.A.	65%	52		
27370150-0000C-6	80	House	721 Beach Street	Y	Y	II.A.	65%	52		
27370150-0000C-8	80	House	725 Beach Street	Y	Y	II.A.	65%	52		
27370150-0000C-10	90	House	735 Beach Street	Y	Y	II.A.	65%	59		
27370150-0000C-11	70	House	745 Beach Street	Y	Y	II.A.	65%	46		
	55	Public R.O.W.	Palmetto Ave	Y	Y	II.A.	65%	36	25	
27370150-0000D-1	35	Public Park	City of Satellite Beach	Y	Y	II.C.	50%	18		
27370150-0000D-2	235	Public Park	City of Satellite Beach	Y	Y	II.C.	50%	118		R-97
27370150-0000D-6	80	House	785 Shell Street	Y	Y	II.A.	65%	52		
27370150-0000D-8	105	House	789 Shell Street	Y	Y	II.A.	65%	68		
27370150-0000D-10	50	House	795 Shell Street	Y	Y	II.A.	65%	33		
27370150-0000D-11	105	House	797 Shell Street	Y	Y	II.A.	65%	68		
	25	Public R.O.W.	Volunteer Way	Y	Y	II.A.	65%	16	6	
27371232-00000-1	310	Condo	Lantana, 1791 Hwy A1A	Y	Y	II.A.	65%	202		
27371232-00000-1	310	Condo	Lantana, 1791 Hwy A1A	Y	Y	II.A.	65%	202		R-98
27371232-00000-1	300	Condo	Lantana, 1791 Hwy A1A	Y	Y	II.A.	65%	195		
27371232-00000-1	365	Condo	Lantana, 1791 Hwy A1A	Y	Y	II.A.	65%	237		
27371200-00260	100	Public Park	City of Indian Harbour Bch, Bicente	Y	Y	II.C.	50%	50	20	
27371227-0000A-1	110	Public Park	City of Indian Harbour Bch, Bicente	Y	Y	II.C.	50%	55	22	R-99
REACH 3										
	40	Public R.O.W.	Ocean Dunes Drive	Y	Y	II.A.	65%	26		R-99
27371227-0000B-1	130	Condo	Aloha Condo, 1891 Hwy A1A	Y	Y	II.A.	65%	85		
27371227-0000B-6	80	Commercial	SatCom Direct, 1901 Hwy A1A	Y	Y	II.A.	65%	52		
27371227-0000B-7	305	Condo	The Christal II, 1907 Hwy A1A	Y	Y	II.A.	65%	198		
27371227-0000B-11	285	Condo	The Christal I, 1919 Hwy A1A	Y	Y	II.A.	65%	185		
27871227-0000B-15.01	410	Condo	Seashore Estates I, 1923 Hwy A1A	Y	Y	II.A.	65%	267		R-100
27871227-0000B-19.01	15	Condo	Seashore Estates Access, 1923 H	Y	Y	II.A.	65%	10		
27371200-00585	90	Public Park	TIITF - State of FL	Y	Y	II.B.(1)	50%	45		
27371200-00500.9-0201	350	Condo	Golden Palm, 1941 Hwy A1A	Y	Y	II.A.	65%	228		
27371200-00586A	200	Condo	Serena Shores II, 2025 Hwy A1A	Y	Y	II.A.	65%	130		
	10	Public Park	Palm Springs access	Y	Y	II.C.	50%	5	2	
27371200-00500A	195	Condo	Serena Shores I, 2035 Hwy A1A	Y	Y	II.A.	65%	127		R-101
27371200-00501.1	260	Condo	Indian Harbour Bch Club, 2055 Hw	Y	Y	II.A.	65%	169		
2737121B-00000-1	210	Condo	Somerset Condo, 2065 Hwy A1A	Y	Y	II.A.	65%	137		
2737121B-00000-1	260	Condo	Somerset Condo, 2065 Hwy A1A	Y	Y	II.A.	65%	169		
2737121B-00000-1	240	Condo	Somerset Condo, 2065 Hwy A1A	Y	Y	II.A.	65%	156		R-102
	10	Public Park	Atlantic Rd access	Y	Y	II.C.	50%	5	12	
2737121B-00000-1	240	Condo	Somerset Condo, 2065 Hwy A1A	Y	Y	II.A.	65%	156		
27371200-00516.M	150	Condo	Oceanique II, 2105 Hwy A1A	Y	Y	II.A.	65%	98		

Table 6: Brevard Mid-Reach Public Access and Ownership (cont.)

Parcel Number (A)	Lot Width (Feet) (B)	Shoreline Description (C)		Within Project Limits (D)	Within 1/4 Mile of Access (E)	Shore Ownership and Project Purpose (F)	Level of Federal Participation (G)	Federal Participation Times Lot Width (H)	Number of Parking Spaces (I)	DEP Monument (J)
27371200-00516	160	Condo	Oceanique pool, 2105 Hwy A1A	Y	Y	II.A.	65%	104		
27371200-00516.A	170	Condo	Oceanique I, 2105 Hwy A1A	Y	Y	II.A.	65%	111		
27371200-00587	240	Public Park	City of Indian Harbour Bch, Millenii	Y	Y	II.C.	50%	120	25	R-103
27371200-00584	10	Public Park	City of Indian Harbour Bch, Millenii	Y	Y	II.C.	50%	5		
27371300-00001.1-1	200	Condo	Gardenia, 2195 Hwy A1A	Y	Y	II.A.	65%	130		
27371300-00006	415	Condo	Ocean Walk, 2225 Hwy A1A	Y	Y	II.A.	65%	270		
27371300-00003	465	Brevard County Community Center, 2289 Hwy A1A		Y	Y	II.A.	65%	302		R-104
	60	Public R.O.W.	Wallace Ave	Y	Y	II.A.	65%	39	20	
27371301-00001	320	Public Park	TIITF - State of FL, Canova Beach	Y	Y	II.B.(1)	50%	160		
	100	Public R.O.W.	Eau Gallie Blvd, Canova Beach Pa	Y	Y	II.A.	65%	65	65	
27371302-00001-1	620	Public Park	TIITF - State of FL, Canova Beach	Y	Y	II.B.(1)	50%	310		
REACH 2										
27371302-00001-12	575	Condo	Melbourne Ocean Club, 3101 N. H	Y	Y	II.A.	65%	374		R-105.5
27371375-00001-2.01	50	Public Park	Brevard County	Y	Y	II.C.	50%	25	18	R-106
27371375-0001-3	130	Undeveloped	Vacant	Y	Y	II.B.(2)	0%	0		
27371300-00753	600	Commercial	Hilton Hotel, 3003 N. Hwy A1A	Y	Y	II.A.	65%	390		
27371376-00000-1.01	275	Condo	Villa Riviera, 2925 N. Hwy A1A	Y	Y	II.A.	65%	179		R-107
27371376-0000-4.01	190	Condo	Coral Palms, 2875 N. Hwy A1A	Y	Y	II.A.	65%	124		
27371300-00754.1	125	Condo	Club Residence, 2855 N. Hwy A1A	Y	Y	II.A.	65%	81		
27371378-00001-2.01	180	Condo	Sandy Kaye, 2835 N. Hwy A1A	Y	Y	II.A.	65%	117		
2737131A-00201	190	Condo	Silver Palms, 2805 N. Hwy A1A	Y	Y	II.A.	65%	124		
	20	Public Park	Coral Way Beach Access	Y	Y	II.C.	50%	10	6	
27371300-00755.1	100	Undeveloped	Vacant	Y	Y	II.B.(2)	0%	0		
27371300-00755.0	100	Undeveloped	Vacant	Y	Y	II.B.(2)	0%	0		R-108
27371300-00789	210	Condo	Ocean Sands N, 2727 N. Hwy A1A	Y	Y	II.A.	65%	137		
27371300-00792	210	Condo	Ocean Sands S, 2725 N. Hwy A1A	Y	Y	II.A.	65%	137		
27371300-00759	450	Commercial	Holiday Inn, 2605 N. Hwy A1A	Y	Y	II.A.	65%	293		
REACH 1										
27371300-00759	175	Commercial	Holiday Inn cont., 2605 N. Hwy A1	Y	Y	II.A.	65%	114		R-109
27372400-00056	20	Public Park	Brevard County	Y	Y	II.C.	50%	10		
27372400-00005	610	Public Park	TIITF - State of FL	Y	Y	II.C.	50%	305	6	
27372400-00037	325	Public Park	TIITF - State of FL	Y	Y	II.C.	50%	163		
27372400-00009	200	Public Park	Brevard County, Paradise Beach P	Y	Y	II.C.	50%	100		R-110
27372400-00010	100	Public Park	Brevard County, Paradise Beach P	Y	Y	II.C.	50%	50		
27372400-00011.1	1004	Public Park	Brevard County, Paradise Beach P	Y	Y	II.C.	50%	502	225	R-111
27372475-00001-1	25	House	2175 N. Hwy A1A	Y	Y	II.A.	65%	16		
27372475-00001-2	75	House	2165 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-3	75	House	2155 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-4	75	House	2145 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-5	80	House	2135 N. Hwy A1A	Y	Y	II.A.	65%	52		
27372475-00001-6	80	House	2125 N. Hwy A1A	Y	Y	II.A.	65%	52		
27372475-00001-7	75	House	2115 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-8	75	House	2105 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-9	75	House	2095 N. Hwy A1A	Y	Y	II.A.	65%	49		R-112
27372475-00001-10	80	House	2085 N. Hwy A1A	Y	Y	II.A.	65%	52		
27372475-00001-11	75	House	2075 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-12	75	House	2065 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-13	75	House	2055 N. Hwy A1A	Y	Y	II.A.	65%	49		
27372475-00001-14	80	House	2045 N. Hwy A1A	Y	Y	II.A.	65%	52		
	10	Public Park	beach access	Y	Y	II.C.	50%	5		
27372475-00001-15	100	House	2035 N. Hwy A1A	Y	Y	II.A.	65%	65		
27372475-00001-16	100	House	2025 N. Hwy A1A	Y	Y	II.A.	65%	65		
27372475-00001-17	90	House	2015 N. Hwy A1A	Y	Y	II.A.	65%	59		
27372475-00001-17	10	House	2015 N. Hwy A1A	Y	N	III.A.	0%	0		
27372475-00001-17	35	House	2015 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-1	30	House	2005 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-2	85	Undeveloped	Vacant	Y	N	III.B.	0%	0		R-113
27372484-0000A-3	75	House	1965 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-4	110	House	1955 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-5	95	House	1945 N. Hwy A1A	Y	N	III.A.	0%	0		
	10	Public Park	beach access	Y	N	III.C.	0%	0		
27372484-0000A-6	100	House	1935 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-7	100	House	1925 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-8	100	House	1915 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-9	100	House	1905 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-10	100	House	1885 N. Hwy A1A	Y	N	III.A.	0%	0		
27372484-0000A-11	80	House	1875 N. Hwy A1A	Y	N	III.A.	0%	0		R-114
27372490-00000-1	150	Condo	The Barringer Condo I, 1835 N. Hw	Y	N	III.A.	0%	0		
27372491-00000-1	105	Condo	The Barringer II, 1845 N. Hwy A1A	Y	N	III.A.	0%	0		
27372491-00000-1	50	Condo	The Barringer II, 1845 N. Hwy A1A	Y	Y	II.A.	65%	33		
273725EV-00000-1	175	Condo	Casa Blanca Inn, 1805 N. Hwy A1A	Y	Y	II.A.	65%	114		
27372513-00000-1	145	Condo	Bella Vista, 1755 N. Hwy A1A	Y	Y	II.A.	65%	94		

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273830EN-00000-16.01	750	Condo	Ocean Park Condo, 1665 N. Hwy A	Y	Y	II.A.	65%	488		R-115
273830EN-00000-16.02	10	Public Park	Brevard County, access	Y	Y	II.C.	50%	5	6	
273830EN-00000-15	140	Undeveloped	Vacant	Y	Y	II.B.(2)	0%	0		
27383027-00000-1	200	Condo	Sea Pearl Condo, 1575 N. Hwy A1	Y	Y	II.A.	65%	130		R-116
273830EN-00000-12.01	10	Public Park	Brevard County, access	Y	Y	II.C.	50%	5		
273830EN-00000-11.01	190	Condo	Outrigger, 1555 N. Hwy A1A	Y	Y	II.A.	65%	124		
27383026-00000-1	305	Condo	Majestic Shores, 1525 N. Hwy A1A	Y	Y	II.A.	65%	198		
	10	Public Park	Brevard County, access	Y	Y	II.C.	50%	5		
273830EN-00000-7	100	Condo	Claridge Condo, 1515 N. Hwy A1A	Y	Y	II.A.	65%	65		
2738301A-00201	190	Condo	Royal Palms, 1505 N. Hwy A1A	Y	Y	II.A.	65%	124		
273830EN-00000-4	110	Undeveloped	Vacant	Y	Y	II.B.(2)	0%	0		R-117
	10	Public Park	Brevard County, access	Y	Y	II.C.	50%	5		
273830EN-00000-1	55	Condo	The Dunes, 1415 N. Hwy A1A	Y	Y	II.A.	65%	36		
273830EN-00000-1	285	Condo	The Dunes, 1415 N. Hwy A1A	Y	N	III.A.	0%	0		
27383052-00000-1	370	Condo	Jade Palm, 1345 N. Hwy A1A	Y	N	III.A.	0%	0		
	10	Public Park	Brevard County, access	Y	N	III.C.	0%	0		
27383050-00000-28	105	House	1315 N. Hwy A1A	Y	N	III.A.	0%	0		
27383050-00000-29	190	House	1245 N. Hwy A1A	Y	N	III.A.	0%	0		R-118
27383050-00000-31	120	House	1235 N. Hwy A1A	Y	N	III.A.	0%	0		
	10	Public Park	Brevard County, access	Y	N	III.C.	0%	0		
27383050-00000-32	95	House	1225 N. Hwy A1A	Y	N	III.A.	0%	0		
27383050-00000-33	95	House	1215 N. Hwy A1A	Y	N	III.A.	0%	0		
27383050-00000-34	200	Condo	Coral Reef Condo, 1177 N. Hwy A1	Y	N	III.A.	0%	0		
27383050-00000-36	105	House	1163 N. Hwy A1A	Y	N	III.A.	0%	0		
273830EW-000A-15	135	Public Park	TIITF - State of FL, 1137 N. Hwy A1	Y	N	III.C.	0%	0		
	10	Public Park	Brevard County, access	Y	N	III.C.	0%	0		
273830EW-000A-14	180	House	1135 N. Hwy A1A	Y	N	III.A.	0%	0		R-119
Sum of Length	41,083							22,198		