

**Captiva Island, Florida Beach  
Comprehensive Management and Emergency Response Plan**

**Prepared for:  
Captiva Erosion Prevention District**

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**Captiva Island, Florida Beach  
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**PART I - THE CAPTIVA EROSION PREVENTION DISTRICT**

**Introduction**

The Comprehensive Plan to maintain Captiva's beaches was first adopted by the Captiva Erosion Prevention District (CEPD) in 1990 to preserve the benefits of the 1988-89 beach restoration project. The plan defines a shore protection project consisting of planned periodic beach nourishments to maintain a design shoreline, and to provide storm protection to upland properties and recreational areas for residents and visitors.

To address restoration of the beach after major storms, the CEPD adopted the Captiva Island Emergency Maintenance Plan in 1998. The plan describes the actions needed to prepare for and recover from serious storm damage and identifies procedures and methods to implement emergency beach maintenance.

This document combines and updates these plans into a comprehensive Captiva Island Beach Comprehensive Management and Emergency Response Plan to be administered by the CEPD.

**Establishment History**

The CEPD was created in 1959 by an act of the Florida Legislature. During the period between 1959 and 1981, the Board was active in helping residents construct structural solutions to erosion, and installing experimental structures to prevent erosion damage. Since 1988 the CEPD has engaged in the practice of beach renourishment as the most environmentally sound and economical solution to Captiva's erosion problems.

The CEPD, as we know it today, was reestablished by the Florida Legislature in 1981 as a beach and shore preservation authority. This legislation was last updated in 2000 as Chapter 2000-399 House Bill No. 927.

**Authority and Responsibility**

The CEPD is an independent special district with taxing authority. The boundaries of the District include all of Captiva Island, from the centerline of Blind Pass to the centerline of Redfish Pass, and extends 300 feet into the Gulf of Mexico and Pine Island Sound. CEPD has funding authority as a result of a 2011 referendum to construct a shore protection project to renourish the gulfside beach; however, CEPD has the statutory authority to construct projects on all beaches within the district if other funding sources are obtained.

The District has all the powers and duties of a beach and shore preservation authority under the provisions of Chapter 161.32, Florida Statutes. These include:

- Developing and executing a logical and suitable program for comprehensive beach and shore preservation.
- Constructing and maintaining erosion prevention projects.
- Exercising jurisdiction, control and supervision over erosion prevention projects within the District. This includes making and enforcing rules and regulations.
- Establishing rules for its government and proceedings.
- Purchasing, holding, leasing and disposing of real estate and personal property, such as offices and equipment.
- Borrowing funds.
- Exercising the power of eminent domain.
- Entering into contracts and agreements with other governments.
- Contracting for the services of consultants such as engineers, attorneys, economists, and accountants. Hiring employees and agents.
- Exercising other legal powers and duties of a government, including the ability to sue and be sued, enforce its rules and regulations, receive and accept grants, and pay its debts.

### **Structure**

The CEPD is governed by an elected board of five Commissioners, each of whom is a qualified elector residing within the District. Commissioners are elected to four year terms and receive no compensation. The Board sets the policies of the District, and employs a District Administrator to carry out day to day operations.

### **Governing Documents**

- Enabling Legislation Chapter 2000-399 HB 927
- Rules of Procedure
- 1996 General Design Memorandum (GDM) as described in Section 312 of the Water Resources Development Act of 1999
- 1987 and 1988 Corps Studies
- Historic
  - Captiva Island Emergency Maintenance Plan 1998
  - Comprehensive Plan December 2000

## **PART II – THE SHORE PROTECTION PROGRAM AND PROJECT AREA FEATURES**

### **Overview**

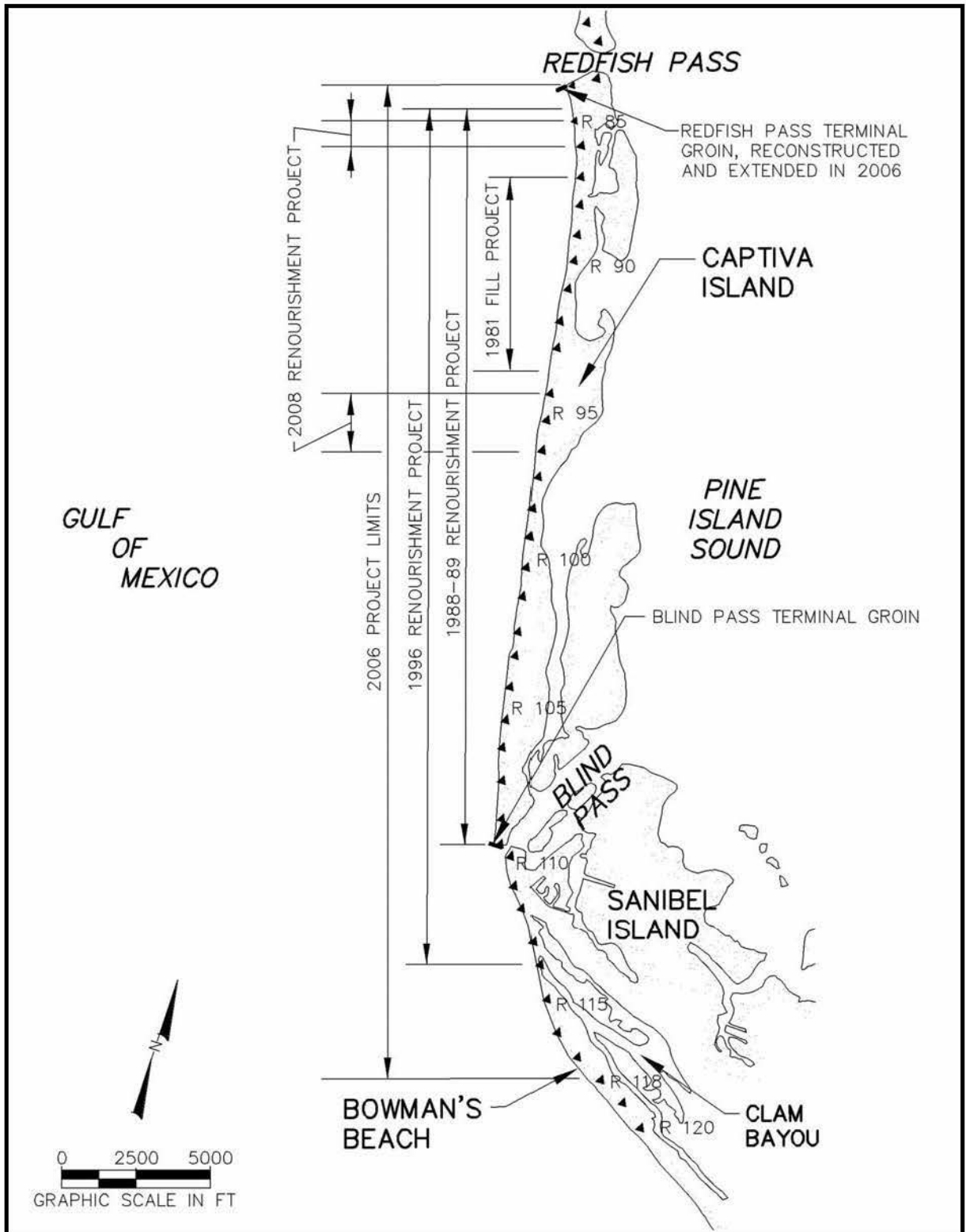
The Captiva Shore Protection Program includes an on-going beach nourishment program that mitigates erosion of the island by periodically placing sand dredged from offshore sources onto the beach. Performance of the beach is monitored and assessed periodically. Maintenance nourishment projects are constructed to replace sand lost to erosion over the nourishment cycle - the interval between scheduled beach nourishment projects. Based on experience to date, the nourishment cycle for each maintenance nourishment project is approximately eight years. Other aspects of the Shore Protection Program include the Emergency Maintenance Plan and the District's participation in hurricane evacuation route protection, natural resource protection and the support for management of Blind Pass and Redfish Pass.

### **Project History**

#### Shore Protection Projects

Five beach nourishment/erosion control projects have been constructed on Captiva Island (Figure 1) (CPE, 2010):

1. Between 1961 and 1981, a number of structures and a small fill project were constructed by a combination of owners and the District in response to erosion. A beach fill, in conjunction with construction of a groin field, placed 107,000 cubic yards of material from the bay side of the island onto the beach in 1961. Structures built in the 1960's and 1970's included over 100 groins and several sandbag breakwaters. In 1972, Lee County constructed a rock groin at Blind Pass to protect the bridge and the evacuation route. A terminal rock groin at Redfish Pass was built by South Seas Plantation in 1977 as part of an erosion control project that later placed sand on South Seas Plantation.
2. The second project, known as the South Seas Plantation fill project, placed 655,000 cubic yards of beach fill along 1.9 miles of beach (Figure 1) at the north end of the island and was completed in October 1981. The 1981 project area extended from R-87 to R-93.4. Redfish Pass ebb shoal was the sand source. The 1981 nourishment slowed the threat from erosion in the project area. The Redfish Pass terminal groin was completed during the same year. The funding for this private initiative was provided by a municipal services taxing unit (MSTU) of property owners within South Seas Plantation.
3. The District's 1989 beach restoration project placed 1,600,000 cubic yards of sand from the Redfish ebb shoal borrow area in the project area (R-85 to R-109). The design of this project was developed by Coastal Planning & Engineering, Inc. (CPE) for the CEPD and is the basis of the Shore Protection Project that is the focus of the current beach management program. The project was constructed by Norfolk Dredging Company.



**Figure 1. Beach Nourishment and Erosion Control Projects on Captiva Island**

As part of the project, the Blind Pass terminal groin was extended 100 feet and dunes were constructed from R-96.5 (Jensen's) to R-108 (Turner Beach Park). The beach consisted of a flat berm at elevation +6 feet NGVD (+4.8 feet NAVD) and a sloping section of sand that extended from the berm into the water. On average the total beach width (at equilibrium) was 150 ft. The 1988-1989 project was federally reimbursable under Section 215, and the federal government, the State of Florida and Lee County, as well as Captiva taxpayers contributed funding to the project. Post-construction, the average shoreline retreat rate was 3.1 feet per year. Large hot spots occurred in the center (R-96) and along the south reach (R-107), accounting for 68% of the gross erosion. The post-construction erosion rate (46,000 cubic yards per year) was nearly half of the pre-construction erosion rate (85,500 cubic yards per year).

4. The fourth project was a renourishment that helped to re-establish a portion of the Gulf beaches of Captiva Island and the north end of Sanibel Island between February and May 1996. The CEPD began preparing for the 1996 project in 1991, with the initiation of a sand search. The final design of the project was completed in late 1995. The design was based on the 1996 Design Memorandum, the Redfish Inlet Management Plan, the Blind Pass Inlet Management Plan and an interlocal agreement with the County. The latter ultimately included Sanibel Island. The project was constructed by Great Lakes Dredge & Dock Company based on design and permits developed by CPE. Approximately 5.5 miles of shoreline was nourished during the 1996 maintenance nourishment project with approximately 1,061,000 cubic yards of sand. The interlocal agreement called for placement of at least 200,000 cubic yards to address groin impacts. From May 1996 (post-construction) to March 2004, the Captiva shoreline retreated approximately -5.4 feet per year. Higher erosion occurred near Redfish Pass (R-84 to R-86), along the north-central section of the project area (Jensen's, R-94 to R-98) and near Blind Pass (R-106 to R-109), accounting for 88% of the net erosion. From May 1996 to June 2005, the net volumetric losses were approximately 68,375 cubic yards per year. As in 1988, the federal government, the State of Florida, Lee County and Captiva taxpayers contributed funding to the project.
5. The 2005-2006 renourishment project was constructed by Great Lakes Dredge & Dock Company based on design and permits developed by CPE for the CEPD and included storm recovery. The design volumes for Captiva Island, northern Sanibel, and Bowman's Beach were 1,020,000 cubic yards, 225,000 cubic yards and 80,000 cubic yards, respectively. An as-built volume of 1,352,931 cubic yards was placed along 6.4 miles of shoreline between Redfish Pass (R-84) at the northern end of Captiva Island and Bowman's Beach (R-118) on Sanibel Island. Captiva Island received 1,017,387 cubic yards along the 4.9 miles of shoreline between Redfish Pass (R-84) and Blind Pass (R-109). Northern Sanibel Island (R-110.5 to R-116) received 244,630 cubic yards, and Bowman's Beach received 90,914 cubic yards. The Captiva Island portion of the project was supported by a combination of Federal, State, County and Captiva taxpayer funds. The District



managed the project for the Sanibel portion but paid only sand mitigation costs on Northern Sanibel. Construction began in September 2005 and was completed at the end of January 2006. In addition, the Redfish terminal groin was rehabilitated and extended. The average post construction shoreline retreat was approximately -8.0 feet per year (between February 2006 and September 2009). The greatest erosion occurred at R-109 after the opening of Blind Pass. Since 2006, the Captiva Island project area has lost approximately 65,895 cubic yards per year. Sanibel Island accreted approximately 24,647 cubic yards between February 2006 and September 2009, including sand dredged from opening Blind Pass.

6. Due to a series of hurricanes and storms that impacted the area before and during construction of the 2005-2006 project, a supplemental renourishment project took place in April 2008 in order to restore two locations on Captiva Island that were in need of post-storm repair. The project was funded and managed by the U.S. Army Corps of Engineers. The project started pumping on April 17, 2008 and was completed on April 26, 2008. Over the ten day period, approximately 99,000 cubic yards of sand were placed on a north and central fill section on Captiva Island by Weeks Marine, Inc. The northern fill section (R-85 to R-86) received approximately 54,866 cubic yards of fill, while the south fill section (R-94 to R-96) received 44,554 cubic yards of sand. Since 2006, the average shoreline retreat rate has been -4.7 feet per year and the shoreline adjacent to Redfish Pass (R-84 to R-88) has a lower volumetric loss rate since the groin was rehabilitated. The volumetric changes were -54,300 cubic yards per year through 2011; the adjusted volumetric change is 74,100 cubic yards per year.

### **Inlet Management Projects**

In addition to shore protection projects, several inlet related projects have been constructed for Captiva Island at Blind Pass and Redfish Pass.

#### Blind Pass

Blind Pass is a natural tidal inlet that has existed for over 1,000 years, although it has migrated and closed at various times. A detailed account of early history can be found in the Blind Pass Inlet Management Plan (CPE, 1993).

Prior to the opening of Redfish Pass in 1921, Blind Pass was a more substantial inlet with a larger tidal prism. The Blind Pass ebb shoal associated with the larger tidal prism (pre-Redfish Pass) most likely helped maintain the seaward position of the south end of Captiva Island and the north end of Sanibel Island.

When Redfish Pass opened, it captured a significant portion of the tidal prism of Blind Pass, making Blind Pass a smaller, more unstable inlet. The ebb shoal of Blind Pass migrated to shore and no longer provided protection for southern Captiva and northern Sanibel. The inlet cross section decreased due to shoaling to a point of complete closure of the channel. A cycle ensued in which Blind Pass was opened by storms and closed by

shoaling. By 1964, the spit once again migrated to the south and closed the pass. The pass was not re-opened again until 1972 following Hurricane Agnes.

In 1972, Lee County installed a terminal groin on the north side of the pass to protect the road and bridge by stabilizing the beach to the north at Turner Beach Park. The pass was closed again between 1975 and 1980. The pass was reopened in its present position by a subtropical storm in June of 1982. In October and November of 1988, the District extended the terminal groin on the north side of Blind Pass by 100 feet to stabilize the beach nourishment material which was placed along Captiva Island.

Between August 1998 and October 1999, Blind Pass closed due to natural processes. To open the inlet in 2001, 20,400 cubic yards were removed by the [District] from the channel seaward of the bridge and trucked to a disposal site located between R-115 and R-115.5 on Sanibel. The dredging was paid for by Lee County and the District. The project had a short expected life span, since the controlling cross-section landward of the bridge was not dredged. The project took place between January 29 and March 31, 2001. During construction, sand filled in the channel and was removed two additional times. In the years after the project, the inlet closed, reopened, and closed several times.



**Figure 2. Aerial photograph of Blind Pass after opening (August 2009)**

Recently, on December 3, 2008, Lee County began dredging to re-open Blind Pass. The dredging to open the pass took 241 days, with nature opening the pass on July 31, 2008 (Figure 2). The goal of opening the pass was to provide a stable pass opening with a 5 year maintenance schedule, increase water circulation in Clam and Dinkins Bayous, improve habitat, and to enhance recreational opportunities. The new channel alignment extends from the -10 foot NAVD contour in the Gulf of Mexico with a maximum channel width of 330 feet and narrows to 160 feet as it enters into interior waters. The

dimensions reduce further as the alignment traverses into Wulfert Channel. The dimensions of the channel on the interior of the pass maintain an approximated 100 foot width and 8 foot depth. Dredged material was placed downdrift. The project was accomplished pursuant to an inlet management plan and interlocal agreement joined by the District, Lee County and Sanibel. The State provided financial support.

### Redfish Pass

Redfish Pass was cut through the barrier island by a hurricane in 1921, forming the islands of North Captiva and Captiva. During the early stages of Redfish Pass, tidal currents transferred large amounts of sand from adjacent shorelines to rapidly developing flood shoals inside the pass and ebb shoals offshore of the pass. Since its initial opening in 1921, the beaches adjacent to Redfish Pass have been impacted by a large number of storms. There is evidence that the opening of Redfish Pass in 1921 captured a significant portion of the tidal prism of Blind Pass, which has affected the beach processes in the area of both passes. Beaches, both to the north and south of Redfish Pass, exhibited significant erosion through the mid-1950s. There was a general accretion trend within a few thousand feet to the north and south of the inlet through the 1970s.

The Southwest Gulf Coast Region Strategic Management Plan (SMP; FDEP, 2008) states that Redfish Pass is a naturally formed inlet (1921) that provides recreational boating access through a relatively deep channel that has not required maintenance dredging. In 1977, construction began on a terminal groin at the north end of Captiva Island adjacent to Redfish Pass, which was completed in 1981. In 1981 and 1988-89, the ebb shoal was used as a sand source for beach nourishment of Captiva Island. In 1993, an inlet management study was prepared by CPE for the CEPD. In 1998, T-head groins were constructed by private interests on the south end of North Captiva Island, as recommended in the study.

During the summer of 2006, the terminal groin on Captiva Island adjacent to Redfish Pass was extended by the District 100 feet seaward and refurbished in conjunction with the 2005-2006 nourishment project (Figure 3). This project was partially funded by FEMA to repair impacts from Hurricane Charley.

The Florida Department of Environmental Protection (FDEP), in partnership with Lee County and the District, sponsored an inlet management study of Redfish Pass in the early 1990's. This study, to evaluate the erosion impact of the pass on adjacent beaches and recommend corrective measures to mitigate identified impacts, resulted in the Redfish Pass Inlet Management Plan [Study] (1995).

At the encouragement of the State, a technical review committee was established which included Lee County, the West Coast Inland Navigation District, the North Captiva property owners, the Florida Department of Environmental Protection, and the District. The technical advisory committee adopted a summary of findings report and recommended implementation of the plan in 2000. The report identified the area of

influence for Redfish Pass and a recommended implementation plan. The plan has been incorporated into the State Strategic Beach Management Plan.



**Figure 3. Captiva Island Adjacent to Redfish Pass after the 2006 rehabilitation and extension of the terminal groin**

#### Clam Bayou

Water quality monitoring and reopening as needed were historic permit conditions for Clam Bayou. The latest District permit only requires leaving the mouth of the bayou free of fill. With the establishment of an eastern opening to the bayous for circulation, the need for an open Clam Bayou has been eliminated.

### **PART III. PROJECT AUTHORIZATION, PLANS AND LOCAL AGREEMENTS**

#### **Comprehensive Plan to Maintain Captiva's Beaches**

CEPD adopted a Comprehensive Plan to maintain Captiva's Beaches in July 1990, and it was amended in December 2000 and is updated in this document. The 1990 plan states that a renourishment project would be expected when 57% (900,000 cubic yards) of the 1988-1989 fill remained in the project area or when the berm has eroded to the 40 foot design level. The 1990 plan addressed the design objectives, borrow area resources, monitoring program, the inlet management plans, permitting, funding for the Captiva Shore Protection Project, and other issues related to maintenance of the Shore Protection Project. Since future renourishments are periodic maintenance, a long-term permit approach was suggested. The plan suggested that multiple nourishments and borrow area resources be permitted for a period of approximately 10-25 years. The renourishments are expected to be cost-shared by Federal, State, County, and local agencies. A 10-year

multi use permit was secured in 2005, the maximum allowable time period by FDEP. This Plan also anticipates that the next multi-year permit will be scheduled to go into effect with the expiration of the existing permit. The requested permit duration should be the maximum time allotted by the state, which may increase to 15 years.

This Plan also includes the implementation of the Emergency Maintenance Plan, and the integration of the erosion control plan with other coastal features at Blind Pass and Redfish Pass. A portion of the hurricane evacuation route directly abuts the beach between R-95 to R-102 and R-108 to R-110. Historically, this section was periodically closed due to undermining of the road by erosion. Protection of the evacuation route is an important goal of the Shore Protection Project. The Emergency Maintenance Plan, summarized later in this document, enables the CEPD to expeditiously respond to major storm damage.

This Plan specifies the goals and objectives that govern the implementation of the current CEPD Comprehensive Plan (see Appendix A). Mitigation efforts for Blind Pass are included in the renourishment designs for future projects.

These goals and objectives allow the CEPD to manage the current Shore Protection Program, provide protection to upland structures and public safety, preserve recreational value and natural resources, and allocate the costs of beach maintenance.

This CEPD Comprehensive Plan is based on the authorized Federal project (described below), but customized for local preferences. These elements include dune and vegetation maintenance and improvements, additional width for hot spots, sand placeman continuously along the beach, maintenance of the two terminal groins and construction to achieve conditions defined in the interlocal agreements with the County and Sanibel and the State Strategic Beach Management Plan.

### **U.S. Army Corps of Engineers Authorized Plan**

The Federal beach erosion control project for Lee County, Florida was authorized under the provisions of Section 201 of the Flood Control Act of 1965 by Senate Resolution dated December 17, 1970 and House Resolution dated December 15, 1970. The authorized Federal project, as described in House Document (HD) No. 91-305, provides for Federal participation in beach erosion control measures on Gasparilla, northern Estero, and Captiva Islands. The design beach has a level berm 50 feet wide at an elevation of 4 feet above mean low water (+2.7 feet NGVD) and a natural slope (shaped by wave action). The project also provides for island segments of the project to be constructed together or independently of each other, and for cost sharing percentages to be adjusted based on conditions of actual ownership at the time of construction. As related to Captiva Island, the beach would extend over the entire length of the island, except for the northernmost 0.2 miles of the island.

Federal interests in the Captiva Island segment was confirmed by the U.S. Army Corps of Engineers Summary Report (USACE, 1987) dated October 1, 1987. The Office of the



Secretary of the U.S. Army provided authority to construct the project under the provisions of Section 215 of Public Law 90-403 in the finalization of the local assurance agreement dated September 1, 1988. The project approved and constructed for Captiva Island was developed in the 1989 General and Detailed Design Memorandum (G&DDM) and is described in the Operation and Maintenance Manual (USACE, 1993). A Design Memorandum (DM) for the first renourishment project was approved in 1996.

Based on Section 312 of the Water Resources Development Act of 1999 and the 1996 DM, Federal cost-sharing for the subsequent renourishment was approved on June 22, 2000 for a full 50-year project life. A Project Cooperation Agreement for the Corps of Engineers construction of the 2006 project is still valid, but local construction authority of future projects will require a new agreement with the Corps of Engineers.

The pertinent project parameters are summarized in the 1996 DM. Beach slopes are 1 vertical on 12 horizontal from the berm crest to 0 ft NGVD (-1.24 feet NAVD) and 1 on 25 below 0 ft NGVD (-1.24 feet NAVD) or a translation of the natural profile below the water. The 40 foot added berm width was specified for the reach between profiles R-94 to R-109 at an elevation of +6 ft NGVD (4.76 ft NAVD). The reach between R-84 and R-94 on Captiva Island (South Seas Plantation) was recommended for advance nourishment only, which implies maintaining the shoreline specified by the 1987 6 ft NGVD contour line. The design width was established for Southeast Plantation with the 1981 project. The goal is to maintain the design width for the duration of the project life by using sufficient advanced nourishment fill. Recent projects are designed for a life of 8 years.

### **FDEP Strategic Beach Management Plan**

The FDEP has developed a multiyear repair and maintenance strategy to carry out the proper state responsibilities of a comprehensive long-range, state-wide program of beach erosion control, restoration and nourishment, and storm and hurricane protection. The Strategic Beach Management Plan (SBMP) is intended to be updated periodically as specific strategies are implemented, new resources and opportunities are identified, and proposed strategies are developed by FDEP, federal or local government sponsors. Included within the SBMP is a list of areas which are critically eroded, and therefore, eligible for State funding assistance for beach management activities. These areas include the Captiva beaches and Sanibel beaches, among others. To accomplish strategies of the SBMP, the document includes the following recommendations for Captiva and Sanibel:

- Methods of construction must be designed to avoid and minimize adverse impacts to wildlife and habitat.
- Regionalization: To reduce dredge mobilization fees, a single contract for beach nourishment of both Captiva and Sanibel Islands should be considered.
- Implement a comprehensive beach, inlet, and offshore monitoring program for Redfish Pass (R-82 to R-83) to validate or redefine the sediment budget developed in the inlet management study.

- Maintain the Captiva (R-83 to R-109) project through monitoring and nourishment using sand from offshore sources.
- Bypass 37,250 cubic yards of beach compatible sand to the downdrift shoreline south of the Blind Pass (R-109) inlet on an annual basis; implement a comprehensive beach, inlet, and offshore monitoring program to validate or redefine the sediment budget.
- Maintain the Northern Sanibel (R-109 to R-118) project through monitoring and nourishment using sand from offshore and bypassing sources per the 1995, 2000 and 2004 interlocal agreements.

A sediment budget was developed as part of the CPE 2010 engineering report for the District. It confirms that over 37,500 cubic yards is bypassed annually to Sanibel Island. The strategic beach management plan does not require a separate nourishment of 25,000 cubic yards annually on northern Sanibel Island nor does it mandate nourishment of northern Sanibel Island other than to show State support for such a project. The state considers these goals when permitting a project. These strategies may need to be changed to incorporate new goals desired by the CEPD.

### **Emergency Maintenance Plan**

The Captiva Island Emergency Maintenance Plan was adopted in 1998 to address the planning and actions needed to respond to major storm damage within 90 days of an event. A more deliberate and slower response may be warranted if emergency funding is essential to fund storm losses. The plan outlines the criteria for implementation of a recovery plan, and the steps to be taken to prepare the plan and specifications, secure permits and notices to proceed, and secure funding. The Emergency Response Plan is updated later in this document.

### **Interlocal Agreement between CEPD and Lee County**

Financial support from Lee County is based on an interlocal agreement between CEPD and the County. On August 16, 1995, the CEPD and the County entered into an interlocal agreement which provided for Lee County Tourist Development Council (TDC) funding for the 1996 Captiva Island project and states that the District may be required to place a certain amount of sand on northern Sanibel to mitigate losses due to the CEPD's 1988-1989 beach restoration and groin extension project. This agreement was the basis for placement of sand on Sanibel Island during the 1996 construction project. A similar agreement was implemented for the 2005-06 project. It is anticipated that the County will calculate future cost sharing using formulae based on public access, recreation and protection of public property. The formula is based on both FDEP cost sharing values and Dr. William Stronge's economic study.

### **Blind Pass Interlocal Agreement**

CEPD, Lee County, and the City of Sanibel entered into an interlocal agreement in April, 2000 for Blind Pass. The purpose of the 2000 Interlocal Agreement is to provide for a

method for allocation of future costs and responsibilities associated with the 1988 and 1996 CEPD projects and as defined in the 1995 interlocal agreement. Including the 1996 project, approximately 641,468 cubic yards of sand has been disposed on northern Sanibel between R-110 and R-116, which should satisfy the County's and CEPD's commitment under the Agreement for 25.6 years.

The Agreement requires the CEPD and the County to restore the construction template between R-110 and R-116 during each renourishment of Captiva and to coordinate the fill design between R-116 and R-120 with the City of Sanibel. CEPD and the County are responsible for a maximum volume of 25,000 cubic yards per year for each year from the previous renourishment project. Should Sanibel wish to place more than this volume or to fill outside the template, the City of Sanibel would be responsible for the cost. This supersedes the design standard established between R-110.5 to R-112.5 in the 1996 Design Memorandum. The Agreement requires the City of Sanibel to waive any claim for liability for any erosion that may occur within the project template area above and beyond the agreed upon mitigation.

The Agreement also forbids modifications or alterations to the existing groin at Blind Pass, excluding maintenance, without the mutual agreement of the District, County, and Sanibel, with the exception of emergency measures to protect the bridge and/or evacuation routes.

In 1998, the CEPD applied for an emergency permit to dredge Blind Pass and prevent its natural closure. Regulatory agencies denied permits for the full project based on potential environmental risks associated with new dredging in protected waters. The Corps of Engineers did agree, however, to permit dredging the channel seaward of the Blind Pass bridge. The minor dredging was not sufficient to keep the inlet open. In response, local governments partnered to develop a comprehensive plan to restore Blind Pass.

On June 22, 2004, Lee County, the CEPD and the City of Sanibel entered into an interlocal agreement to cooperate in the permitting, financing and construction of the Blind Pass Ecozone Restoration Project, which was an update to the 2000 Interlocal Agreement. Lee County is the sponsor for the permit application process and project management. The 2004 agreement led to the 2008-2009 dredging of Blind Pass. The agreement is valid through April 2015. Approximately 641,468 cubic yards of sand was placed on northern Sanibel Island in 1996, 2001, 2006 and 2008 between R-110 and R-116. This sand volume should be creditable based on the 1995, 2000 and 2004 interlocal agreements.

#### **PART IV. RESTORATION PLANNING & IMPLEMENTATION**

Restoration planning includes the preparatory actions that will prepare the CEPD for a maintenance renourishment project, or in order to immediately respond to serious storm damage. These preparatory actions include securing necessary permits and modifications, identifying and reserving sufficient sand resources, preparing plans and



specifications, identifying funding sources, securing approvals necessary to acquire local funding, and selecting a dredging contractor. The overall plan recognizes that normal nourishment planning and emergency planning should be conducted simultaneously. Planning should accommodate both local construction and Corps managed construction. Most of the planning and design will be locally funded and executed. The Corps can conduct planning, design and permitting, but only when Federal funding is available for the project. Recently, this occurs only during the construction year. Planning for routine nourishment is the best emergency project preparation.

The basis for permitting, design and apportionment planning is the project engineering and benefits study. These documents provide the information for State and County funding requests and the benefits based apportionment plan, and facilitate coordination with the Corps of Engineers and likely dredging contractors.

## **Design**

Project design includes an evaluation of previous designs and beach performance based on the results of annual monitoring and borrows area investigations for each nourishment project. A design report is developed to determine the required beach cross section needed for storm protection and the amount of additional fill (advance fill) needed to allow for erosion between nourishments. Since the CEPD intends to pursue long-term permits, the next report necessary for a new permit will address multiple maintenance projects. Final design includes the development of plans and specifications for bidding each beach nourishment project.

The project design area includes all of Captiva Island (Shore Protection Project), and approximately the northern 6,000 feet of Sanibel Island. The latter is based on obligations from the interlocal agreement with the County and City of Sanibel, which may change with future agreements. Sand is dredged from offshore borrow areas and placed on the beach in a specific cross section. The equilibration of this cross section provides storm protection and recreation beach.

Beach nourishment projects are designed to maintain the integrity of the design beach section by the placement of a sufficient volume of sand, known as advance fill, seaward of the design section. The design section is defined as the cross section needed to provide protection against upland damage. The advance fill volume is consistent with the projected erosion during the time interval between the periodic renourishment projects, known as the nourishment cycle. As a result, the established level of storm protection is designed to be maintained over the nourishment cycle. The CEPD design goal for its Shore Protection Project is based on the Corps of Engineers authorized project (CPE 1989 and 1996) with accommodation for local preferences to address hot spots, dune and groin repairs, and stabilizing fill and the desired beach width.

## **Borrow Area Resources**

Borrow areas are offshore sand sources consisting of deposits of material with a grain size similar to the existing beach, and a low proportion of silts and clays. Borrow areas are developed through geotechnical investigations that identify and map sand deposits meeting the criteria for beach nourishment. Beach nourishment fill is dredged from these borrow areas and brought to the beach using hydraulic or hopper dredge techniques. In line with policies to utilize a long-term permit approach, the CEPD must identify borrow areas with a sufficient volume of sand to construct two scheduled maintenance nourishment projects and one emergency maintenance project. Therefore, borrow area resources will be updated comprehensively after every other beach nourishment, or approximately every sixteen years.

## **Monitoring**

Monitoring studies are performed to track the performance of the beach nourishment project, and to identify erosion and accretion patterns within the project limits and along adjacent shorelines. The CEPD has implemented a monitoring program to analyze the performance of the most recent shore protection project. The required monitoring is described in the conditions of each permit and the appropriate physical monitoring plan. The District's monitoring program also maintains an updated baseline from which to assess the actual storm damage from major storms, in order to qualify for FEMA funding. Monitoring studies are used as planning tools, estimating the timing of the next periodic maintenance project and refining the project design needs and advance fill. Monitoring data shall be compared to the thresholds of implementation from the Emergency Maintenance Plan to determine if emergency response is necessary. The monitoring surveys can be used for preliminary and final design, if the physical monitoring plan is timed well. The monitoring program currently consists of the following:

- Beach and hydrographic surveys of DEP profiles R-83 to R-109 on Captiva Island, and DEP profiles R-110 to R-123 on the northern 11,000 feet of Sanibel Island, but modified to the nourishment limits.
- Color aerial photographs of the Captiva and northern Sanibel shorelines at an approximate scale of 1" = 1,000 feet (use County or State aerials where practical).
- A comprehensive coastal analysis and monitoring report, detailing results of monitoring performed.
- Bathymetric surveys of the Blind Pass and Redfish Pass ebb tidal shoals are performed as needed.

## **Economic Planning**

An economic plan is developed for each maintenance nourishment project to assess the project costs and benefits. The special assessment that finances Captiva's portion of the funding is based upon an economic analysis of the appraised value of properties, their benefit category, and storm damage prevention and recreation benefits.

## **Permitting**

Permits are required from both State and Federal agencies for construction of the beach nourishment project. The permit review process addresses both the engineering and environmental protection issues related to the project. Permits grant CEPD the authority to place a specific volume of sand, taken from a specific borrow area, in a defined project area. Since future beach nourishment projects will consist of periodic maintenance, the District has determined that a long-term multi-use permit approach will be the most cost effective option for obtaining necessary permits. Therefore, the permit application will identify multiple nourishment projects over a period of approximately 10 - 25 years, and will include sufficient borrow area resources for several projects. The allowable permit duration was recently extended to 15 years by the Florida legislature.

## **Major Renourishment**

CEPD adopted its initial Comprehensive Plan to maintain Captiva's beaches in July 1990 and amended the plan in December 2000. The plan states that a renourishment project would be expected when 57% of the placed fill remained in the project area or when the berm has eroded to the 40 feet design level. A 40 foot design berm relative to the design baseline was formally adopted in the 1996 and 2010 engineering reports. This Comprehensive Plan for the next major renourishment is broken up into the following phases:

### **Preliminary Plans and Specifications**

Construction documents, including plans and specifications (P&S), will be prepared in anticipation of the next routine maintenance renourishment project. The preliminary plans and specifications will include all required information to construct the beach restoration, with the exception of final fill volumes and locations. These P&S provide the basis for the modified documents needed to bid an emergency project.

### **Offshore Borrow Areas and Sand Search**

Potential offshore borrow areas will be identified through a review of existing studies and surveys. These areas include existing borrow sites utilized in the previous beach renourishment projects, and other borrow areas with sufficient sand to provide for an emergency restoration as well as the next two scheduled nourishments. Verification of borrow area options may require additional field investigation and analysis.

### **Final Plans and Specifications**

In anticipation of construction, pre-construction surveys and analyses will be performed to determine the fill volumes and placement locations needed to restore

the beach. Final plans and specifications will be completed based on pre-construction information, and be used for bidding.

#### Construction Contract Award

In order to obtain a dredge contractor, a request for proposal (bid) will be advertised, based on plans and specifications. Following the advertisement, a certain amount of time will be given in order to allow the contractor to respond with bids. The contract may then be awarded by the Board after all bids have been received.

### **PART V. FUNDING**

The next Shore Protection Project is eligible for funding by Federal, State and County sources, based upon the level of accessibility by the general public and the project's protection of upland resources.

#### **Federal Funding**

Federal participation in the project area was authorized as part of the Lee County erosion control project in 1970. Federal interest in the Captiva Island segment was confirmed by the U.S. Army Corps of Engineers through a Summary Report in 1987. Authority for the local sponsor to construct the project was provided by the Secretary of the Army through a local cooperation agreement with the CEPD in 1988.

In 1999, the authority for Federal participation was extended to 50 years from the date of initial construction authority. This means that the Federal government may appropriate funds to share in the project related costs through 2039. The Federal interest in all future maintenance nourishment projects is justified through the 1996 Design Memorandum (DM) as described in Section 312 of the Water Resources Development Act of 1999. The DM establishes the technical, economic, and environmental parameters of the project, and the Federal share of costs. The Federal share of project cost is a function of the amount of eligible shoreline in the project area. Storm protection and recreation benefits provided by the project design must be greater than the projected cost. Eligibility is a function of public accessibility and the protection of public resources. The Federal share of project costs is appropriated by Congress through the Energy and Water Resources Appropriations Act, as part of the Federal budget process. The Federal share of project costs is reimbursed by the U.S. Army Corps of Engineers through a Project Cooperation Agreement (PCA). This agreement summarizes the authorities and project parameters established in law and in the DM, as well as defining the method and schedule of payments of Federal funds.

Federal funding for beach erosion control project is initiated at the district level in Jacksonville, and should work its way into the President's budget, where Congress can approve it. In the recent past, the local sponsor could place an add-on through its Congressman to include project funding in the Congressional budget, if the President left

it out of his budget. Politics has recently changed the budget process, eliminating add-ons and pushing funding into a work plan process initiated at the Corps District level. This year, the work plan process worked for states other than Florida, suggesting Federal funding may require a new form of add-on to secure approval of Federal funding. It appears that the lobby process in Washington and within the Corps may be required to secure funding for Federal nourishment projects in Florida.

A Project Cooperation Agreement (PCA) is a written agreement between the sponsor and the Department of the Army that describes the financial and other responsibilities for construction, operation and maintenance of a project. These agreements have and will be known under different names as Federal policy evolves. Special provisions in the PCA or a separate cooperation agreement (CA) may be required for the Corps to construct features outside the approved vertical and horizontal project limits.

### **State Funding**

The District project area has been designated as a critical erosion area by the State, which allows the State to participate in project funding. The State shares in project costs for the eligible portions of the project. Eligibility is a function of public accessibility, public parking and tourist accommodations like hotels.

Recent changes in the State beach preservation statute resulted in the establishment of a dedicated source of funds for beach projects and the establishment of a long term approach to project budgeting. The State share of project cost is appropriated either by the Florida Legislature as a part of the State budget process or taken from the dedicated beach funding source, the real estate transfer tax. The State share of project cost is reimbursed by the Florida Department of Environmental Protection through a funding contract with CEPD. State funding is initiated with the annual submittal of a Local Government Funding Request by CEPD.

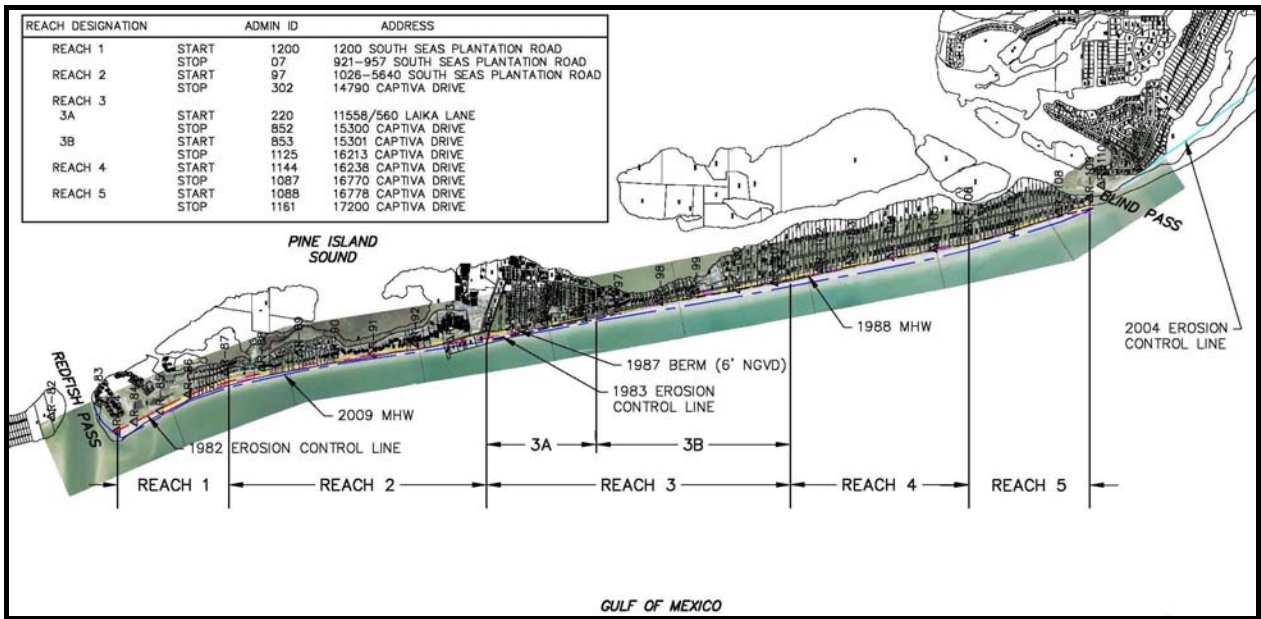
### **County Funding**

The local share of funds for the project currently include a contribution by Lee County as a property owner, and to support County recreation, which has historically been funded by bed taxes. County funding is addressed through an interlocal agreement and currently is calculated using a formula based on public access, recreation, public property protection and the state's funding calculation.

### **Captiva Funding**

The District's operating costs are funded by the island property owners through ad valorem taxes. Ad valorem taxes are assessed and levied for the CEPD by the Lee County Tax Assessor, and pays for the maintenance, operation and other corporate purposes of the District.

The local share of funds for the major beach project is provided by the property owners of Captiva through special assessments. The major beach project area is located on the Gulf of Mexico between the Blind and Redfish Passes' terminal groins. The levy of such special assessments requires approval of a referendum of the Captiva electors. General obligation bonds may be issued or a bank loan may be secured to pay project costs. Bond costs are then retired through the payment of special assessments and reimbursements by State, Federal and County agencies. Based on an economic analysis of the project, the nature and extent of benefits expected to accrue from the project are allocated to property owners by benefit categories or zones of comparable benefits. Areas of equal benefit are placed in the same zone, as illustrated below for the 2010 analysis.



**Figure 4. 2010 Benefit Reaches, Captiva Island**

The special assessment applies to a specific major beach project approved by referendum. Outside this project area, required mitigation is the only construction cost covered by this special assessment.

Local financing for the 1996 nourishment project was available from special assessments levied against properties within the District, based on an apportionment plan developed by Dr. William Stronge, and has been recalculated for each project since. This plan created a benefit based tax structure for inland and beachfront property owners. Beachfront properties were assigned a portion of project costs related to the storm protection and recreation benefits gained by nourishing the beach adjacent to the properties. Inland properties were assessed for their recreation benefit. Any funds not needed after State and Federal sources committed funds to the project were re-allocated to the property owners on a proportionate basis to reduce the finally adopted special assessment.

## **Blind Pass Financing**

The conditions at Blind Pass have changed in the last decade since it has been dredged twice to reopen the pass and periodic maintenance of the inlet by Lee County may be required. The CEPD should support the County efforts in long term planning for the Pass, and support the search for other funding sources to supplement the maintenance when CEPD cannot provide financial support.

## **PART VI. SMALL COASTAL PROJECT AUTHORITY OF CEPD**

The CEPD area of responsibility covers the entire Captiva Island, between the middle of Redfish Pass and Blind Pass, but only the Gulf shoreline between the terminal groins at Redfish Pass and Blind Pass is funded by a special assessment. There are no funds specifically earmarked or assessed for a project on the rest of the island. The CEPD has the authority to plan, permit, construct and maintain beach and shore preservation projects for these other areas, subject to referendum approval of special assessments or receipt of other funding. This funding can be provided by private and public entities on the island who have control of the property landward of the MHW in the proposed project area.

The CEPD may offer planning, permitting design and construction management services to homeowner's associations, neighborhoods and private entities in need of small coastal construction projects. Property owners may present their plan to the CEPD for approval and assistance. The CEPD can either assist in providing sand if qualified under its existing or modified permit, or help the owner apply for an FDEP Coastal Construction Control Line (CCCL) or field permit. The property owners would be liable for all project related costs, unless the project qualifies as part of the project described in the latest referendum and is supported by the CEPD board. The CEPD does not intend to address small washouts for individual property owners, but reserves the right to decide on a case by case basis. The CEPD can also facilitate FEMA emergency funding for public projects, such as FEMA Category B funding on qualifying beaches.

## **PART VII. EMERGENCY RESPONSE PLAN**

Storm damage to the shore protection project can range from isolated washouts to major damage to the entire project. Serious storm damage can trigger the need to perform an unscheduled maintenance nourishment project. Response to storms should be commensurate with the level of damage suffered.

The scope of the project to be implemented by this Emergency Maintenance Plan generally consists of restoration of the volume of fill lost to a major storm, together with sufficient fill to provide efficiency of construction, improved stability, and economic viability. The focus is on storm damage impacts and recovery on Captiva Island. The Emergency Response Plan assumes the implementation of a beach renourishment project using material dredged from offshore sand sources. However, it is recognized that, as part of the immediate response to storm damage, structures may need to be stabilized

temporarily to prevent further damage. These interim repairs will be made using beach compatible fill trucked from inland sources, scraped from undamaged beach segments if permitted, or dredged from Redfish Pass. The Emergency Response Plan consists of two parts: a major renourishment project (implemented earlier than planned) and hot spot repair. The major renourishment or hot spot repair shall be implemented to respond to major storm damage within 90 days of an event. Consideration should be given to timing of funding from Corps, FEMA and State Department of Emergency Management, which may require a delayed response subject to approval and funding of the emergency project by Federal and State agencies.

### **Thresholds for Implementation of Emergency Response**

The Emergency Response Plan will be implemented whenever storm damage exceeds one or more of the following thresholds for implementation:

- Erosion of more than 400,000 cubic yards of the total fill volume placed during the last periodic maintenance project has occurred.
- More than 20% of the total project length has eroded back to the 40 foot design berm.
- At any point along the evacuation route, erosion of the beach reaches a point that, in the opinion of the Engineer, threatens the stability of the evacuation route. If the volume of the fill needed to protect these segments does not warrant a dredge project, the design berm may be restored using material from other sources, or scraped from undamaged sections of the beach if permitted.
- Erosion of short segments of shoreline into the design intent to an extent that, in the opinion of the Engineer, continued erosion of the damaged areas would threaten the stability of structures. If the volume of the fill needed to protect these segments does not warrant a dredge project, the design berm may be restored using material from other sources, or scraped from undamaged sections of the beach if permitted.
- Federal Declared Disaster or State/Local Declared Emergency

After a major storm strikes, a visual survey of the beach is taken to assess the storm's impact. The volume of sand lost or percent of groin damaged is estimated along with the dollar value, and these losses are reported to the appropriate agencies through the County Emergency Operations Center. If the board decides major losses have occurred and an emergency project is probably warranted, then a topographic and bathymetric survey of the beach should be directed. If the CEPD elects to implement the Emergency Response Plan, the surveys are used to prepare plans and specifications, put the project to bid and provide the basis for qualifying for emergency funding. During and upon completion of the project, funding reimbursements are assessed and pursued.



The Emergency Response Plan after a major storm event is broken into the following phases:

### Post-Storm Activities

Once a damaging storm has occurred, there are a number of activities required to immediately implement the Emergency Response Plan. Pursuant to the Board's resolution adopting this Plan, these activities will be implemented automatically when the criteria for emergency response are met or exceeded, and will allow for construction to begin within 90 days.

- Conduct a visual survey of the beach and provide an estimate of losses to FEMA, the Corps of Engineers, FDEP, FDEM and the County Emergency Operations Center (EOC). The decision to declare a Federal disaster is based on the cumulative impact of all reporting communities.
- If a disaster is likely to be declared or the threshold is exceeded, perform post-storm topographic and bathymetric surveys and analysis to determine the fill volumes and placement locations. These surveys can take place as soon as the area is accessible and be completed within weeks. The information from the surveys and analysis will be used to finalize the permits, plans and specifications for a dredging contract and make definitive loss reports to the State FEMA and the Corps of Engineers.
- Based on the District Engineer's recommendation and information provided by emergency agencies, the CEPD board should decide on one of the following courses of action:
  - Take no action and wait for natural recovery or routine nourishment to restore the beach.
  - Decide on immediate nourishment to begin within 90 days.
  - Plan for a deliberate emergency nourishment, subject to eligibility and funding approval to restore storm losses.
  - Approve a hot spot nourishment project using an upland sand source.
- Finalize plans and specifications (P&S) with the information from the post storm surveys. These will provide instructions to the dredging contractor on the specific project needs. Plans and specifications can be completed within a month following the storm event and are needed to secure a notice to proceed from FDEP. The P&S will be based on updating the latest used for construction or those prepared for the next project.
- Activate permits with the final information from the post-storm surveys. Activation will consist of the notice to proceed from the State and Federal agencies, and should be completed within a month following the storm event.

This assumes a long term permit is active. Proof of an active permit must be provide before bid opening and is essential to a successfully bidding process.

- Activate the bid procedure by issuing a bid announcement that establishes a bid date and availability of plans and specifications. This activity can be completed within two months from the storm event. This is a multi-step process: including providing a project description to contractors, bid announcement, provide P&S, provide proof of permit, and bid opening after a shortened bid period.
- Activate financing plan with the final project costs. This will include a short term loan, based on the established line of credit, or the sale of bonds. The bond validation process and sale can be completed within three months. Reserve funds may be needed to start the process prior to loan or bond activation.
- Implement restoration operations. Based on notice to proceed, the dredging contractor could be on site within three months of the storm event, if bidding is initiated early and contractors (dredgers) are not superseded by Federal emergency directives.
- Request reimbursement of funds from appropriate sources. Sources may include the Federal government, the State of Florida, Lee County, and the City of Sanibel.
- For a deliberate planning and construction process, the steps are the same but timing may extent for up to a couple of years.

### Preliminary Plans and Specifications

Construction documents, including plans and specifications, will be prepared in anticipation of the need to award contracts quickly to allow for immediate response to storm damage. The preliminary plans and specifications will include all required information to construct the beach restoration, with the exception of final fill volumes and locations. The plans and specifications will also anticipate the loss of the vegetated dune system and provide for its restoration along with beach fill placement. Plans and specifications will be based on previous prepared documents to expedite process. The latest set of P&S shall be kept on hand for use in emergencies.

### Offshore Borrow Areas and Sand Search

Potential offshore borrow areas will be identified through a review of existing studies and surveys. These areas include existing borrow sites utilized in the previous beach renourishment projects, and other borrow areas with sufficient sand to provide for an emergency restoration as well as the next two scheduled nourishments. Verification of borrow area options may require additional field investigation and analysis. Sufficient sand sources should already be approved in the multi-use permits for use in emergencies.

## Final Plans and Specifications

After the storm, post-storm surveys and analyses will be performed to determine the fill volumes and placement locations needed for recovery. Final plans and specifications will be completed based on post-storm information.

## Construction Contract Award

For the District to respond to storm damage in a timely manner, a dredge contractor should be brought to the project within 90 days of the storm event. The following bidding procedure has been selected to meet this time frame:

A request for proposal will be advertised, based on preliminary plans and specifications (or plans and specifications from the last project), with no bid opening date. After the post-storm survey, an addendum will be issued, updating the plans and specifications based on the post-storm survey and giving short response time to bid opening. The contract may then be awarded by the Board.

## Permits

### Short Term

Federal and State permits will be required to perform any beach nourishment project. The existing permits issued for the 2005-2006 periodic maintenance nourishment projects are valid until November 2014. An emergency beach maintenance project to repair storm damage until that time can be constructed under these permits with some modifications, including the volume of sand to be placed, and the location of placement. At the simplest level, updated P&S will be all that is needed for project approval under an existing multi-use permit. The notice to proceed (NTP) will still require contractor related items, which must wait until a contractor is selected. This information would be based on a post-storm condition survey. Borrow areas will include those permitted for the last periodic maintenance project, Redfish Pass, and Immokalee Mines (upland source).

### Long Term

The ability to utilize the existing permit in the short term allows the District to plan for implementation of a long term approach to permitting as a cost-effective alternative to acquiring new permit for each maintenance project. Long term permits should be for at least 10 years, based on the maximum State permit duration. The State may extend the permit duration to 15 years; the Corps of Engineers can match but not exceed the permit duration approved by the State. This will allow for an updated sand search and borrow area definition, up to two periodic maintenance nourishments, and a response to major storm damage if needed. The permit process will be subject to any rule changes since the 2004 permit and results of on-going monitoring. Application for new permits should be initiated prior to the expiration of the existing permit to enable continuous authority to construct emergency projects without regulatory delay. Additionally, all borrow area and

construction schedule (phased construction) options should be included in future permits to reduce the need for permit modifications.

### **Funding Emergency**

This Plan considers all potential funding for a project to maintain or repair storm damage to the Captiva shoreline. The Board recognizes, however, that local interests, including Lee County as a property owner, may share the burden of a restoration. The emphasis will be, therefore, to depend on the CEPD sources of funding, but to seek to develop and expand County, State, and Federal funding sources.

Since projects may be funded by the federal government, reimbursed under Section 206 or solely by local government, the Plan provides flexibility to accommodate the funding available at the time of construction.

### **Captiva Financing Method**

A referendum is required to approve the levy of special assessments to provide funds to implement an emergency repair to major storm damage. The amount of the levy cannot exceed a total District debt of \$27.5 million (HB 927, 2000), including any outstanding bonds. A referendum that authorizes an emergency project was approved on March 30, 1999 for \$15 million. Special assessments of island property owners will use the millage rates for individual properties established in the most recent periodic maintenance nourishment project, subject to changes including appraised value and classification.

Based on the approved referendum, the Board will secure a line of credit backed up by the future sale of bonds to finance the cost of constructing an emergency restoration project. If an emergency project becomes necessary, the loan and bonds will be repaid through the special assessments and reimbursements from federal, state and other government participation.

### **County**

The funds for the most recent beach renourishment project include funds from the Lee County as a property owner and from the County Tourist Development Council (TDC) to support public recreational benefits of the beach. Additional funds for beach projects to repair or maintain the beaches could be available from Lee County through other fund sources. At present, there is no County fund for emergency beach restoration, although acceleration or future payment of TDC funding may be possible. If such a fund is established, interlocal agreements could be negotiated to address the method and scope of reimbursement.

### **State**

State funds are available for scheduled beach restoration through the provisions of Chapter 161, Florida Statutes. Recent changes in the statute resulted in the establishment

of a dedicated state source of funds for beach projects and the establishment of a long term approach to project budgeting. State project funding has been tight the last few years. In addition, the statute provides for setting aside some of the available funds from document stamps each year for the emergency repair of storm damage statewide. In 2004-05, the State appropriated special emergency funding to pay for projects above normal funding levels.

## Federal

Federal funds for emergency beach restoration may be available from FEMA and the U.S. Army Corps of Engineers, Flood Control & Coastal Emergencies (FCCE). Historically, federal funding for periodic maintenance nourishment has come through the Corps and has accounted for up to 27.7% of the periodic maintenance project costs from Energy and Water appropriations. The State can supplement this funding through the state Department of Emergency Management.

It appears that the Captiva project is eligible for at least some funding from FEMA, under the Stafford Act, to restore storm damage. The work funded by the Stafford Act is restricted to that volume required to replace fill lost during the storm and outside the Federal project area. This included the dunes and the terminal groins. It is expected that FEMA would reimburse 75% of the cost of restoring storm damage to the beach segments not previously funded by Corps funds.

In addition to the Stafford Act, Public Law 84-99 defines a role for the Army Corps of Engineers in the repair of unexpected storm damage to beach projects. This law allows the Federal Government to pay 100% of the cost to repair the damage. However, repair work is constructed and controlled by the Corps; and there is no reimbursement provision. In practice, the Corps has handled requests for assistance under Public Law 84-99 slowly, and with inconsistent results, except in response to the major hurricanes of 2004-2005, where local political action lead to funding the PL 84-99 program. The CEPD will continue to coordinate with the Corps in an effort to establish a reimbursable option for funding under Public Law 84-99. The Corps of Engineers and FEMA rely heavily on the survey and storm reports prepared by CEPD's Engineer.

In addition to storm damage repair, federal funding for the fill volume eroded since the last periodic nourishment should be pursued for any emergency project, through the extension of the federal authorization to participate in the beach project. This would return the project to the as-nourished condition.

## **PART VIII. SAND SOURCES**

Previously permitted Borrow Areas III-B and VI will be used as sand sources for the 2013-2014 renourishment project (Figure 5). Borrow Areas IV and III-A were substantially depleted in the 2005-2006 renourishment project. Borrow Area VI is approximately 8.3 nautical miles offshore of the center of Captiva Island and was used in the 2006 and 2008 projects.

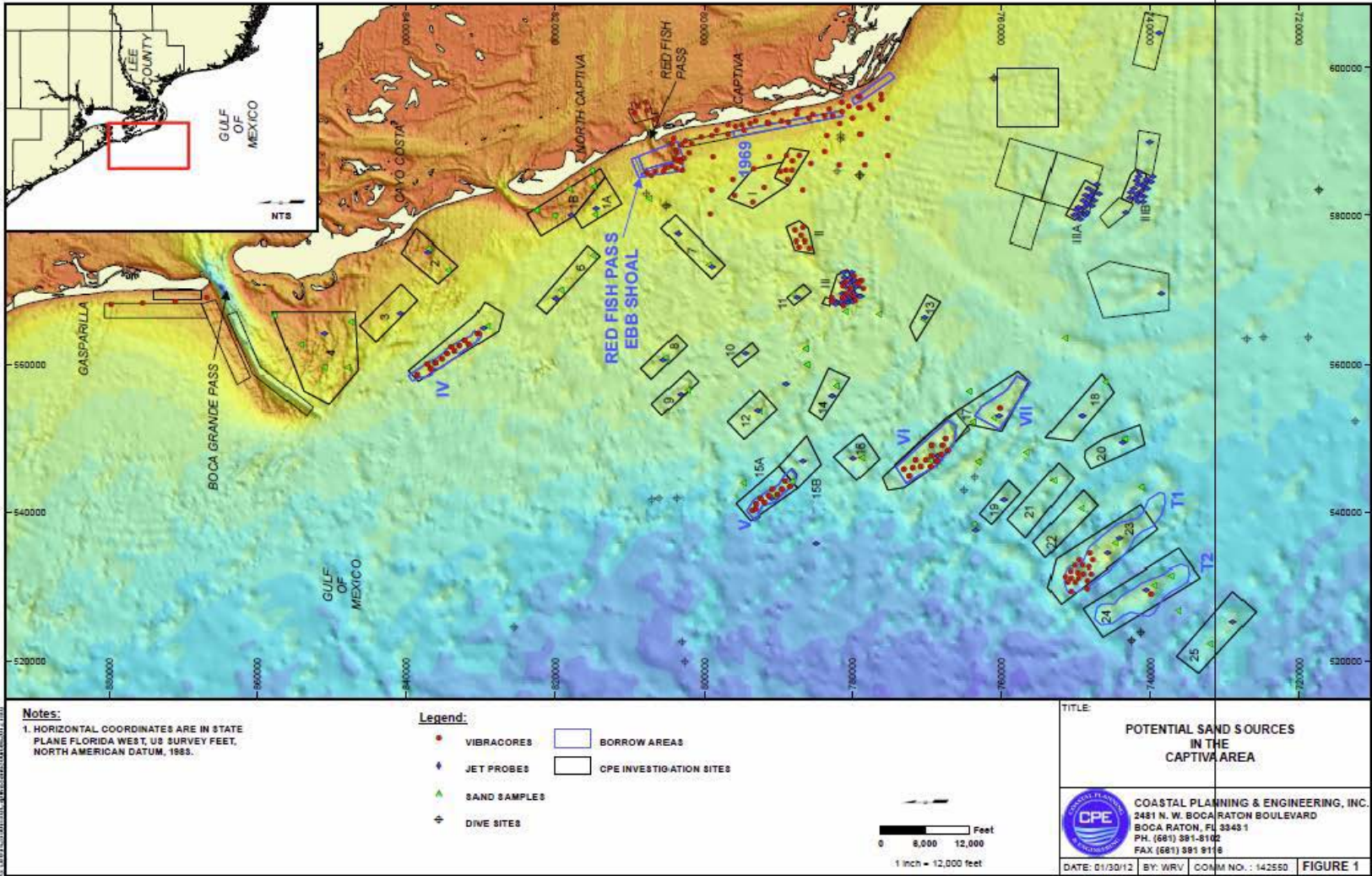


Figure 5. Borrow Area Location Map

This borrow area is characterized by medium to fine grained gray sand, which contains relatively low silt and high shell hash concentrations. The silt content is below 5%. The average grain size of the sediment in Borrow Area VI, based on computer composite distribution of 66 sub-samples, is 0.40 mm. Borrow area silt content and sorting was calculated to be 1.69% and 1.26 $\Phi$ , respectively. Areas of possible hardbottom, rubble, or shell were excluded from the borrow area. At least 2,450,000 cubic yards of beach quality material is estimated to remain in this borrow area based on the 2008 post-dredge survey. This borrow area was developed as a larger borrow area initially, and CEPD requested an expansion from the FDEP to 4.5 million cubic yards in 2011. A description of all borrow area characteristics can be found in Table 1.

**TABLE 1  
OFFSHORE BORROW AREA CHARACTERISTICS  
CAPTIVA AND SANIBEL RENOURISHMENT PROJECT**

| Borrow Area   | Volume CY | Mean Grain Size | Mean Grain phi | Sorting phi | Silt % |
|---------------|-----------|-----------------|----------------|-------------|--------|
| III-B         | 723,000   | 0.38            | 1.38           | 1.08        | 4.04   |
| V (Reserve)   | 2,380,000 | 0.37            | 1.43           | 1.32        | 2.44   |
| VI-E          | 4,541,000 | 0.4             | 1.34           | 1.12        | 0.80   |
| VII (Reserve) | 6,040,000 | 0.36            | 1.48           | 1.17        | 1.64   |

Borrow Area III-B has been previously permitted for the 1996 and 2005/2006 renourishment projects, but has remained unused. The borrow area is proposed for use for the Sanibel segment of the project area. Borrow Area III-B is approximately 8.7 nautical miles offshore from the center of Captiva Island. It contains gray to light gray, fine grained sand with varying amounts of shell hash, shells, and silt. In general, silt content increases with depth. The average grain size within the borrow area is 0.38 mm. This area contains 4.04% silt and has a sorting value of 1.08 $\Phi$ . A predominantly flush/buried platform with numerous scattered sponges and soft corals is located approximately 600 feet from the borrow area. Approximately 723,000 cubic yards of sand is available for use in renourishment projects from Borrow Area III-B.

In addition to the permitted borrow areas discussed above, The District Engineer has identified two additional reserve borrow areas. Borrow Area V is approximately 8.4 nautical miles offshore of the center of Captiva shoreline (Figure 5). This borrow area is characterized by medium to fine grained gray to light gray sand, containing various amounts of silt and shell hash, overlying a carbonate clast layer. Silt content generally increases with depth, while shell hash content decreases with depth. The average grain size of the sediment in Borrow Area V, based on computed composite distribution of 25 sub-samples, is 0.37 mm. Borrow area silt and sorting was calculated to be 2.44% and 1.32 $\Phi$ , respectively. Areas of possible hardbottom, rubble or shell found in or around this borrow area were avoided by using a 200 foot buffer. Approximately 2,380,000 cubic yards of beach quality material is estimated to be in this borrow area. A cultural

resources investigation must be completed before this borrow area can be permitted for use; therefore, it is considered a reserve area.

Borrow Area VII is approximately 8.5 nautical miles offshore of the center of Captiva Island. This borrow area was delineated based on limited vibrocore information. Additional fieldwork (including a cultural resources investigation) and analysis will be required to finalize this borrow area. Borrow Area VII is therefore considered a reserve borrow area. Borrow Area VII contains fine grained gray sand with trace silt and some shell hash at the surface decreasing to trace shell hash with depth. The average grain size of the sediment in Borrow Area VII, based on computed composite distribution of 4 subsamples, is 0.36 mm. Borrow area silt content and sorting was calculated to be 1.64% and 1.17 $\Phi$ . Areas of possible hardbottom, rubble or shell were excluded from the borrow area. Approximately 6,040,000 cubic yards of beach quality material is estimated to be in this borrow area.

Potential sand sources also exist in the ebb shoals of Redfish and Captiva Passes. Redfish Pass was last dredged in 1988 and should have naturally recovered most of the dredged volume since then. It is a moderate sand source and at least 300,000 cubic yards may be feasible to use. There are existing sand ridges offshore of Borrow Area VI, which are potential future sources. Sand source Toms Hill 2 (#24 or T2 on Figure 5) has beach quality sand, but needs further investigation. The highest quality material may be on the seaward edge of this ridge.

There is a high quality upland sand source near Captiva Island. The Immokalee Mine produces beach quality quartz sand with low silt and carbonate content, similar to Ortona Mine. The mine can process a wide range of sand products, including sand with a mean grain size above 0.50 mm. The mine dredges and sorts its sand using the latest technology, producing a light colored beach compatible sand. It can produce sand quality capable of matching almost any beach. The mine is located 56 miles from Captiva Island in the northeast corner of Collier County, Florida. Other sand pits may exist that will qualify for FDEP new Quality Assurance/Quality Control (QA/QC) plan template for upland sand sources. An approved QA/QC plan is a pre-requisite for permitting and use of a sand source in Florida. These plans are project specific.

## **PART IX. PROGRAM RESOURCES**

### **Public Beach Access and Parking**

Public access to the beach is available at a number of locations throughout the project area. Specific types of accessibility make the Shore Protection Project eligible for State and Federal funding. Generally these include public parking, pedestrian access points, and hotels. The value of each parking space in State funding contributions relative to project costs is estimated at \$28,000. Public parking areas include:



## Turner Beach Park

Located on both sides of Blind Pass, Turner Beach Park provides a total of 59 metered parking spaces (32 spaces on Captiva, 27 spaces on Sanibel). This park also includes restroom facilities.

## Alison Hagerup Beach Park

Located at the end of Captiva Road adjacent to South Seas Plantation, this area provides 45 metered parking spaces. In addition to public parking areas, there are a number of areas that provide pedestrian access. These include street ends at Laika Lane, Wightman Lane, Andy Rosse Lane, and the Captiva Road parking area; a pedestrian access near the cemetery at the end of Captiva Lane; and the area where Sanibel-Captiva Road (SR 867) abuts the beach. Area resorts, hotels and other short term accommodations also provide beach access and parking for their guests, which help to qualify a Shore Protection Project for State funding.

## **Hurricane Evacuation Route Protection**

Captiva Drive (SR 867), is the designated evacuation route for Captiva Island, and is the only road access to and from the island. Throughout much of the length of the island, this road parallels and directly abuts the beach. Historically, parts of Captiva Drive have been threatened by erosion, and have been closed due to undermining from beach erosion. Protection of the evacuation route is an important goal of the shore protection project. Maintenance of the design section provides a buffer that protects Captiva Drive from undermining.

## **Natural Resource Protection**

The Captiva Erosion Prevention District is involved in and endorses a number of programs to protect natural resources on Captiva and in the region. Sea Turtle monitoring is performed annually by the Sanibel Captiva Conservation Foundation, a non-profit organization. Nesting patterns are monitored for both Sanibel and Captiva Islands by volunteers. The nesting data is utilized by the District in its planning for the Shore Protection Program. The District has included dune revegetation in its beach nourishment project plans to reestablish or enhance dune areas damaged by erosion. In addition, the District encourages property owners to plant native vegetation on the dune and in adjacent areas and to remove exotic plant species. As part of its regulatory function, the District reviews coastal planting plans on private property and requires appropriate plant diversity.

## **PART X: FUTURE PROJECTS AND PLANNING**

### **Projects**

#### Captiva Island Project

The proposed 2013-2014 Shore Protection Project was designed by CPE for the CEPD. The Captiva Island segment has a design fill of 820,000 cubic yards over 25,100 feet. Previously permitted Borrow Areas III-B and VI will be used as sand sources for the 2013-2014 renourishment project. The minimum constructed beach width proposed is 30 feet (20 cubic yards per linear foot) with a maximum beach width of approximately 140 feet. The proposed fill for the north Sanibel area is 50,000 cubic yards over a distance of 6,335 feet. CEPD's interest in northern Sanibel is limited to its commitment for mitigation in the 1996, 2000 and 2004 interlocal agreements or the State Strategic Beach Management Plan.

Other Gulf Coast communities including Collier County and the Town of Longboat Key have nourishment projects planned for 2013/2014. An opportunity exists for the issuance of a joint bid for the projects, potentially resulting in mobilization and economy of scale cost savings. This also applies to other reaches in Lee County which may utilize a hopper dredge, leading to potential for shared common cost and economy of scale.

#### Blind Pass Maintenance

The CEPD should continue to support the maintenance of Blind Pass to its maximum allowed by the CEPD enabling legislation. Funding should be sought from other traditional sources including FDEP, Lee County, ad valorem taxes, and the West Coast Inlet Navigation District (WCIND). A special taxing district may be an appropriate funding source in the future.

#### Small Scale Emergency Maintenance Projects

For emergency maintenance projects with limited funding and/or of small size (less than 300,000 cubic yards), alternative borrow area resources should be considered. Beach compatible fill may be truck hauled from Immokalee Mines in Collier County or similar upland sources. Including truck hauled material in the current or future permit application is very feasible. Alternatively, Redfish Pass may be a potential borrow area. Dredging Redfish Pass may be an expensive alternative to permit; however, it may provide benefits related to expedient construction and lower construction costs for small emergency projects. Some North Captiva Island residents expressed concerns about its use in the past, but they may be interested in a joint project in the future.

## Design Refinement

The intent of the Captiva Island Project has been to maintain a 40 foot berm relative to the design baseline. Three hot spot areas continue to erode faster than the adjacent shorelines and account for the majority of erosion in the project area: Redfish Pass (R-84 to R-85), Blind Pass (R-106 to R-109), and central hot spot (R-96). These hot spots have been improved with each project using additional fill and the rehabilitation of the Redfish Pass groin. The hot spots are caused by combinations of inlet effects, island protrusions and changes in shoreline orientation. Refinement of the design to optimize berm widths within hot spot areas and to avoid unnecessary protrusions in the island may reduce erosional losses in these areas and increase project duration. Additional refinement of the design may be required to incorporate the effects of rising sea level.

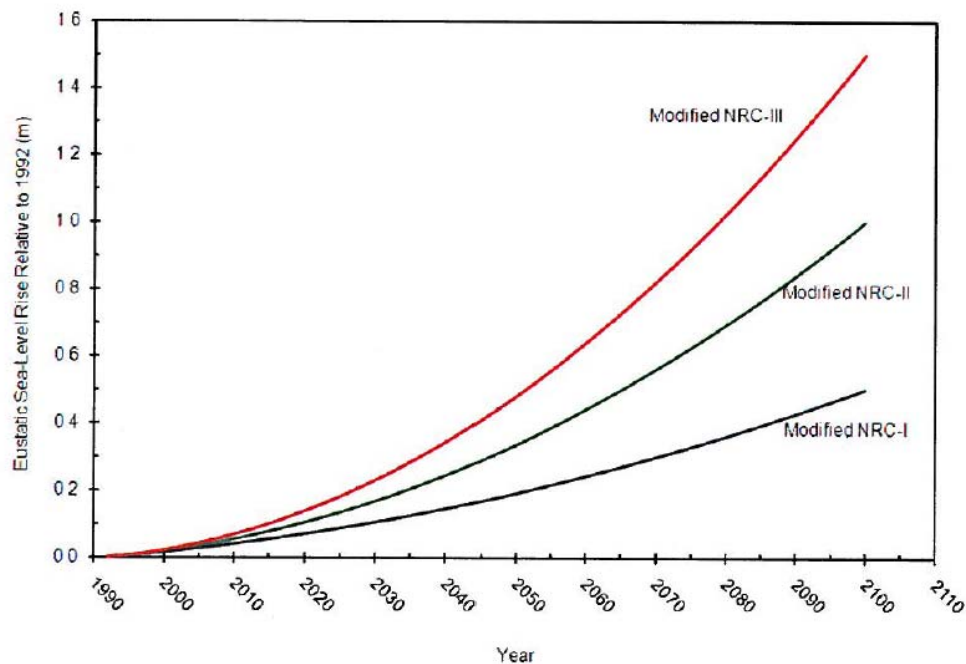
Advanced 3D modeling can be used to refine the design of the Captiva Island project and accomplish the following objectives:

- Investigate methods to control hot spot erosion
- Review the effectiveness of optimizing the nourishment volume
- Investigate the effectiveness of structures within the project area
- Investigate redefining beach width standard.

## Sea Level Rise

The U.S. Army Corps of Engineers) has required federal projects to account for the rise of global mean sea level (GMSL) in project design (USACE, 2011). The Corps has provided guidance to evaluate designs over the project life cycle based on three scenarios which consider low, intermediate and high sea- level changes (Figure 6), which should be incorporated into future Captiva designs. The nearest tide gauges with at least 40 years of records will be used to calculate the local historic water level trends, the regional trends, and predict future values for sea level change for low, intermediate (modified NRC Curve I) and high (modified NRC Curve II) sea level changes (USACE, 2011).

After evaluating the risk associated with each scenario, the project design will be reevaluated to determine if additional berm height is necessary. The natural berm elevation should rise with sea level, but should be incorporated into the design at the proper time.



**Figure 6. Scenarios for GMSL Rise based on 1987 NRC equation (USACE, 2011).**

### Dune Improvements

Dunes are an essential component of storm protection that must be maintained. Maintenance includes promoting the growth of vegetation on the dunes and replacing any lost fill. The evaluation of effects of sea level rise may suggest dunes be constructed to a higher elevation in order to provide an equal level of protection in the future. Additionally, the feasibility of filling in low elevation areas within the dune system during a future nourishment should be assessed to improve storm protection. Low points can be identified using LIDAR data properly filtered for the coastal environment. Filling in low points should be planned carefully, since it will cause the loss of existing vegetation, which will take a few years to regrow. The advantages to a higher continuous dune to mitigate sea level rise may require this type of action if natural dune vegetation is insufficient to spur sufficient vegetative growth.

### Blind Pass Maintenance

Blind Pass was dredged in 2001 (20,400 cubic yards) and 2008 (136,800 cubic yards) (CPE, 2011). Maintaining the inlet serves the purpose of bypassing sand lost to the inlet from the adjacent beaches and maintaining a stable tidal connection between Pine Island Sound and the Gulf of Mexico (CPE, 1993; 2003). The inlet was intended to be dredged approximately every 5 years based on County plans. The CEPD should support inlet maintenance, although a CEPD monetary contribution should be reviewed against whether it qualifies as an eligible District expense.

## Interlocal Agreement between CEPD, Lee County, and City of Sanibel (Blind Pass)

The existing Interlocal Agreement expires in 2015, and any new agreement should consider mitigation for the groin and inlet maintenance separately.

The Blind Pass Interlocal Agreement should be reviewed for potential amendment. Opening Blind Pass fundamentally changed the existing conditions. Sanibel Island should be responsible for a financial share of maintaining an open inlet and for erosion natural to Sanibel Island. Analyses of historic coastal processes suggest Sanibel Island should be responsible for at least 10% for natural erosion and a proportionate share for keeping the inlet open. A project solely to keep Blind Pass open may not be a qualifying expense for CEPD. In addition, the agreement should be synchronized with the State Strategic Beach Management Plan, which mitigates inlet impacts by establishing an inlet passing rate rather than a Sanibel nourishment rate. The State Strategic Beach Management Plan goal for bypassing 37,500 cubic yards per year is now duplicative of the nourishment rate for northern Sanibel of 25,000 cubic yards per year. The duplication should be eliminated.

## Permanent Partnerships and Regionalization

The CEPD should pursue Interlocal Agreements with adjacent governments to coordinate larger projects, save money and qualify for higher levels of State funding.

To reduce dredge mobilization fees and reap economy of scale benefits, the CEPD should seek local partners to issue a joint bid for multiple projects along the Gulf Coast. Potential partners may be the Town of Longboat Key and Collier County, both of which have similar project dredging requirements using hoppers and long pipelines. Additionally, a single contract for beach nourishment of Captiva and adjacent islands should be pursued when feasible.

## Encourage Better Procedures for Construction of Local Projects with Federal Funding

CEPD should continue to pursue all potential sources of funding including federal cost sharing under the authority of Section 206 of the Water Resources Development Act of 1996 or direct construction by the Corps of Engineers under its civil works program. The Section 206 authority allows the USACE to participate in projects built by local authorities. Under this authority, the studies and initial reports are conducted by the local sponsor and their consultants without waiting for Federal appropriations, which largely occurs even with Corps constructed projects. The local sponsor is responsible for initial study and design costs; however, these costs may be eligible for Federal cost sharing and reimbursement later. Reimbursements are dependent on the successful negotiation and execution of a Project Cooperation Agreement (PCA) and the availability of congressional appropriations to fund the reimbursements, which will pay the Federal share, 27.72% of eligible cost.

Section 206 is a tool that can be used to reduce delays in a federal erosion control project and reimburse costs associated with interim emergency projects. CEPD should work with representatives and associations to address the limitations of Section 206.

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## **APPENDIX A**

### **Project Goals and Objectives**



The Captiva Erosion Prevention District (CEPD) has adopted the following policies in relation to Beach Maintenance:

1. CEPD Responsibility:

The CEPD will assume management responsibility for the Beach Maintenance Program including the decision of when to undertake maintenance projects, which maintenance projects to undertake and their design and permitting.

2. Beach Monitoring:

a. Physical Monitoring: The CEPD will undertake periodic beach monitoring in order to evaluate the performance of the Restoration Project and to determine the need for maintenance projects.

b. Excessive Erosion Areas: The CEPD will monitor large areas of excessive erosion (hot spots) and investigate the causes and solutions for such excessive erosion.

c. Public Safety: Special attention will be paid to problems that arise in the Tween Waters and Turner Beach public road areas in order to maintain the viability of the hurricane evacuation route.

d. Economic Monitoring: The CEPD will undertake economic studies at least once prior to each nourishment in order to assess the economic impact of the beach and to determine beach use and benefits.

3. Washouts and Hot Spots:

a. The CEPD will avoid emergency repair to isolated washouts. This is considered to be the responsibility of the property owner, and the repairs must be consistent with the Beach Management Plan and all governmental permitting regulations. CEPD can, at property owners expense, provide assistance to smaller projects.

b. The CEPD will monitor washouts and investigate their causes.

c. Hot spots that have not responded to extra fill may be controlled by alternative solutions.

4. Beach Design:

a. Designs for beach renourishments will attempt to provide for a minimum level of protection to all gulf-front properties at the anticipated time of the next renourishment.

5. Structures:

- a. Existing Terminal structures will be maintained and, if necessary, modified to reduce erosion losses from the island.
- b. Terminal structures are designed to be "leaky", with some sand bypassing to Sanibel Island or to the interior shorelines of Redfish Pass. Adjustment to the amount of sand bypassing the groins may be called for.

6. Funding:

- a. There will be sufficient local contribution to the cost of the maintenance program in order to ensure local management responsibility.
- b. The CEPD will maintain the Beach Maintenance Revolving (Reserve) Account to help meet the anticipated design and permitting costs to be reimbursed from special assessments and reimbursements from government grants.
- c. The Captiva share of the cost of re-nourishment will be paid for in arrears by special assessment.
- d. County, State and Federal regulations governing funding of beach projects will be monitored. The CEPD will work to ensure that Captiva's goals are understood and its needs recognized.
- e. The CEPD will enter into agreements with other units of government, such as Lee County, the State of Florida and the Federal Government that provide for appropriate financial support for beach maintenance.

7. Schedule: The CEPD will initiate beach nourishment projects when any of the following conditions are met:

a. Planned Maintenance:

- (i) Volumetric Loss: renourishment will occur when there are 900,000 cubic yards left from the beach restoration, or about 57% of the original 1988-89 placement.
- (ii) Loss of beach: beach renourishment will occur when the advanced fill (of berm) has eroded away to the Federal design of 40 feet.

b. Emergency Maintenance:

- (i) Threat to property: if a serious threat arises to stretches of properties on Captiva, the Board will initiate an appropriate maintenance project.

(ii) Threat to the Hurricane Evacuation Route: if a serious threat arises to the hurricane evacuation route on Captiva, the Board will initiate an appropriate maintenance project.

(iii) Erosion of more than 400,000 cubic yards of the total fill volume placed during the last periodic maintenance project has occurred.

(iv) More than 20% of the total project length has eroded back to the 40 foot design berm.

(v) Federal disaster is declared.

c. Property owners have requested assistance and have a CEPD approved plan for nourishment

d. When anyone of the conditions described under planned or emergency maintenance above is met, the Board will resolve to undertake a Beach Maintenance Project. This resolution will be known as a Beach Maintenance resolution

#### 8. Scheduling:

a. The District Engineer will provide the Board with an assessment of the anticipated dates of the next maintenance project and its cost each time the beach is monitored. The results of the assessment will be forwarded to local, State, and Federal government agencies.

b. After the results of each physical monitoring are presented, the Board will review, update, and adjust the objectives of the Beach Maintenance Program.

#### 9. Consistency with the Lee County Comprehensive Plan:

The Beach Maintenance Program will be coordinated with the Lee County Comprehensive Plan.

**APPENDIX B**

**Maintenance Checklist**

## **Emergency Response**

*Within two weeks following a damaging storm:*

- Post-storm visual inspection
- Provide an estimate of losses to FEMA, the Corps of Engineers, FDEP, FDEM and the County Emergency Operations Center (EOC)
- Decide on quick or deliberate storm response track based on availability and the need of Federal and state emergency funding.
- If determined to be cost-effective or disaster declaration is likely, perform post-storm surveys and analysis to determine the fill volumes lost and estimated cost of replacement. Provide report to state and federal agencies to support their decision process.

*Within the month following a damaging storm:*

- Develop project description for use in notifying capable dredgers of bidding schedule and agency coordination.
- Make permit modification request if needed, and submit updated plans and specification based on post-storm surveys with a request of notice to proceed.
- Advertise bid without bid opening data.

*Within two months following a damaging storm:*

- Assemble preliminary plans and specifications. Update or finalize plans and specifications with the information from the post storm surveys
- Amend formal bid announcement and establish a bid opening date
- Open Bids

*Within three months following a damaging storm:*

- Activate financing plan with the final project costs (short term loan and sale of bonds)
- Implement restoration operations
- Request reimbursement of funds from appropriate sources
- Award contract

## Normal Project Milestone

### Monitoring

- Annual/bi-annual surveys as required by permit and physical monitoring plan
- Annual visual inspection of beach per O&M Plan

### Permitting

- Maintain multi-year multi-use permit
- Identify and permit new borrow areas

### Engineering and Design

- Analyze Hot Spots
- Design beach nourishment
- Prepare preliminary plans and specifications

### Bidding

- Update plans and specifications for bidding purposes
- Bid announcement
- Open bids
- Preconstruction Meeting & Turbidity Monitor Identification
- FDEP Notice to Proceed issued
- Award Contract

### Construction

- Pre-construction survey
- Design update based on pre-construction survey
- Mobilization
- Captiva Island Fill Placement
- Post-construction survey and As-built engineering report
- Corps project certification of beach construction
- Corps report of preliminary project cost
- CEPD Engineer Completion and total project cost estimate
- Dune vegetation planting

### Apportionment

- Prepare Apportionment, Engineering and Benefits reports.
- Review, hearings and notice of tentative apportionment plan
- Referendum
- Bond
- Final apportionment

## Administration

- Update and submit Local Government Funding Request to FDEP.
- Process and obtain approval of Project Cooperation Agreement (PCA or Section 206)
- Update interlocal agreements
- Seek local partners to issue a joint bid for multiple projects along the Gulf Coast
- Negotiate and process funding agreements with State and County
- Request reimbursements