

Jeb Bush  
Governor

WQC

# Department of Environmental Protection

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

David B. Struf  
Secretary

## CONSOLIDATED JOINT COASTAL PERMIT AND SOVEREIGN SUBMERGED LANDS AUTHORIZATION

**Permittee:**

Mr. Richard E. Bonner, P.E.  
U. S. Army Corps of Engineers  
Jacksonville District  
Post Office Box 4970  
Jacksonville, Florida 32232-0019

Permit Number: 0126527-001-JC  
Date of Issuance: August 30, 2000  
Expiration Date: August 30, 2010  
County: Dade  
Project: Dade County Sunny Isles Beach  
Renourishment and Submerged Offshore  
Breakwaters

This permit is issued under the authority of Chapter 161 and Part IV of Chapter 373, Florida Statutes (F.S.), and Title 62, Florida Administrative Code (F.A.C.). This permit constitutes a finding of consistency with Florida's Coastal Zone Management Program, as required by Section 307 of the Coastal Zone Management Act, and certification of compliance with water quality standards under Section 404 of the Clean Water Act, 33 U.S.C. 1344.

This activity also requires a proprietary authorization, as the activity is located on sovereign submerged lands owned by the Board of Trustees of the Internal Improvement Trust Fund, pursuant to Article X, Section 11 of the Florida Constitution, and Sections 253.002 and 253.77, F.S. The Department has the responsibility to review and take final action on this request for proprietary authorization in accordance with Section 18-21.0051, F.A.C., and the Operating Agreements executed between the Department and the water management districts, as referenced in Chapter 62-113, F.A.C. In addition to the above, this proprietary authorization has been reviewed in accordance with Chapter 253, F.S., Chapter 18-21, and Section 62-343.075, F.A.C., and the policies of the Board of Trustees.

As staff to the Board of Trustees, the Department has reviewed the activity described below, and has determined that the activity qualifies for a consent to use sovereign, submerged lands, as long as the work performed is located within the boundaries as described herein and is consistent with the terms and conditions herein. Therefore, consent is being granted to Miami-Dade County, pursuant to Chapter 253.77, Florida Statutes to perform the activity on the specified sovereign submerged lands.

The U. S. Army Corps of Engineers (Corps) is hereby authorized to construct the work in accordance with the permit project description and conditions, including the water quality monitoring requirements, and other documents attached hereto or on file with the Department and specifically made a part hereof.



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August 30, 2000

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Jacksonville District  
U. S. Army Corps of Engineers  
Post Office Box 4970  
Jacksonville, Florida 32232-0019

**Permit Number: 0126527-001-JC**  
**Dade County Sunny Isles Beach Renourishment and Submerged Offshore Breakwaters**

Dear Mr. Bonner:

Your request for a Joint Coastal Permit issued pursuant to Chapters 161, 373 and 403, Florida Statutes, has been approved by the Department of Environmental Protection. Please read the enclosed permit closely before starting construction. Particularly note the permit conditions which pertain to written reports which must be submitted to the Department of Environmental Protection at specified times.

Please direct any questions pertaining to this permit to me by letter at the above address (add Mail Station 300), or by telephone at (850) 487-4471, ext. 121.

Sincerely,

Keith J. Mille, Environmental Specialist  
Office of Beaches and Coastal Systems

Enclosures:

- Consolidated Joint Coastal Permit
- State of Florida Department of Environmental Protection and Miami-Dade County Agreement
- Physical and Biological Monitoring Program, Exhibit 1
- Monitoring and Evaluation Plan for Assessing Breakwater Performance, Exhibit 2
- Letter of Consent of Use issued to Miami-Dade County

Copies furnished to:

Charles Stevens, USACE, Jacksonville  
Jim McAdams, USACOE, Jacksonville  
Brian Flynn, Dade County  
Kevin Bodge, Olsen and Associates, Inc.  
Michael Addicott, Mayor, Town of Golden Beach  
Richard Stalker, DEP, West Palm Beach  
Todd Brown, DEP, West Palm Beach

Robbin Trindell, FWCC, BPSM  
Robert Brantly, DEP, OBCS  
Lethie Lanham, DEP, OBCS  
Jackie Thompson, DEP, OBCS  
DEP, Office of General Counsel  
File

**Permittee: U. S. Army Corps of Engineers**

**Permit No.: 0126527-001-JC**

**Page 2**

The Department will enter into a contractual agreement with the local project sponsor, Miami-Dade County, under which the County will be responsible for conducting monitoring, mitigation, and beach maintenance activities for the protection of natural resources and endangered species. The agreement is enforceable against the County independent of this permit.

The Department will also enter into a contractual agreement with Miami-Dade County under which the County will be responsible for conducting monitoring, analysis, and evaluation of project impacts on adjacent shores, and prepare recommendations to the Corps for further project evaluation or mitigation.

**Project Description:**

The project involves the beach nourishment of 2.75 miles of eroding shoreline along the Sunny Isles and Golden Beach areas of Dade County and includes the construction of two submerged offshore breakwaters. Approximately 1,000,000 cubic yards of sand are to be placed along a 13,000-foot section at Sunny Isles and Golden Beach between DEP reference monuments R-6 and R-19. The beach fill will have a typical berm elevation of +9 feet MLW, construction berm width of 120 feet from the Erosion Control Line (ECL), and construction foreshore slope of 1 vertical to 10 horizontal. All fill placed north of monument R-7 will be at or below Mean High Water. Fill material will be excavated from two offshore borrow sites (SGC-2 and SGC-1-Extension) located approximately 15,000 feet southeast of Government Cut. Rocks are present in the borrow area and separation will be necessary. A rock disposal area is provided for disposing the borrow area and separation will be necessary. A rock disposal area is provided for disposing rocks in excess of 1 inch in diameter. Rocks will be separated from the sand prior to transport to the beach and placed in the rock disposal site located approximately 8,500 feet directly offshore from Miami Beach. Work also includes the construction of two 375-foot offshore breakwaters, 250 feet apart, at the north end of Sunny Isles. The breakwaters will lie approximately 500 feet from the seawall at a depth of -8 to -11 feet MLW. Each breakwater will be a segmented rubble mound structure using 3.5- to 6.5-ton limerock armor stone and a 12-inch marine mattress and filter fabric. The beach at Sunny Isles will be used for deployment of breakwater materials.

**Location:**

The activity is located along the Atlantic Coast in Dade County, Section 2, Township 52 South, and Range 42 East within Class III waters of the State of Florida.

**General Conditions:**

1. All activities approved shall be implemented as set forth in the drawings incorporated by reference and in compliance with the conditions and requirements of this document. The Corps shall notify the Department in writing of any anticipated significant deviation from this authorization prior to implementation so that the Department can determine whether a modification is required. If the Department determines that a deviation is significant, then the Corps or the local sponsor, as appropriate, shall apply for and obtain the modification prior to its implementation.

2. If, for any reason, the Corps does not comply with any condition or limitation specified herein, the Corps shall immediately provide the Department with a written report containing the following information: a description of and cause of noncompliance; and the period of noncompliance, including dates and times; or, if not corrected, the anticipated time the noncompliance is expected to continue, and steps being taken to reduce, eliminate, and prevent recurrence of the noncompliance. Compliance with the provisions of this condition shall not preclude the Department from taking any enforcement action allowed under state law to the extent that federal sovereign immunity has been waived under 33 U.S.C. 1323 and 1344(t).
3. The Corps shall obtain any applicable licenses or permits which may be required by federal, state, local or special district laws and regulations. Nothing herein constitutes a waiver or approval of other Department permits or authorizations that may be required for other aspects of the total project. Projects shall not proceed until any other required permits or authorizations have been issued by the responsible agency.
4. Nothing herein conveys title to land or water, constitutes State recognition or acknowledgment of title, or constitutes authority for the use of sovereign land of Florida seaward of the mean high-water line, or, if established, the erosion control line, unless herein provided, and the necessary title, lease, easement, or other form of consent authorizing the proposed use has been obtained from the State.
5. Any delineation of the extent of a wetland or other surface water submitted as part of the application, including plans or other supporting documentation, shall not be considered specifically approved unless a specific condition of this authorization or a formal determination under section 373.421(2), F.S., provides otherwise.
6. Nothing herein conveys to the Corps or creates in the Corps any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the Corps or local sponsor, or convey any vested rights or any exclusive privileges.
7. This document or a copy thereof, complete with all conditions, attachments, modifications, and time extensions shall be kept at the work site on the authorized activity. The Corps shall require the contractor to review this document prior to commencement of the authorized activity.
8. The Corps specifically agrees to allow Department personnel with proper identification, at reasonable times and in compliance with Corps specified safety standards access to the premises where the authorized activity is located or conducted for the purpose of ascertaining compliance with the terms of this document and with the rules of the Department and to have access to and copy any records that must be kept; to inspect the facility, equipment, practices, or operations regulated or required; and to sample or monitor any substances or parameters at any location

reasonably necessary to assure compliance. Reasonable time may depend on the nature of the concern being investigated.

9. At least forty-eight (48) hours prior to the commencement of authorized activity, the Corps shall submit to the Department a written notice of commencement of activities indicating the anticipated start date and the anticipated completion date.
10. If historic or archaeological artifacts are discovered at any time on the project site, the Corps shall immediately notify the State Historic Preservation Officer, and if a significant deviation is necessary, shall also notify the Department.
11. Within a reasonable time after completion of project construction or a periodic maintenance dredging event, the Corps shall submit to the Department a written statement of completion. This statement shall notify the Department that the work has been completed as authorized and shall include a description of the actual work completed. The Department shall be provided, if requested, a copy of any as-built drawings required of the contractor or survey performed by the Corps.

**Specific Conditions:**

1. Prior to the commencement of construction, the Corps will provide two copies of final construction plans and specifications for all authorized activities, which include the project specifications referenced in the Department's Consolidated Notice of Intent to Issue a Joint Coastal Permit and Authorization to Use Sovereign Submerged Lands.
2. Reef edges and buffer zones depicted in the final plans and specifications shall be based on the most recent and most accurate data available. The results of updated side-scan sonar and visual verification of hardbottom areas shall be reflected in the final plans and specifications. A 400-ft. buffer zone minimum shall be maintained around each borrow area.
3. At least 7 days prior to the planned commencement date of construction, the Corps will schedule a pre-construction conference to review the specific conditions of this permit and the environmental protection contract specifications with the Corps' contractors, work crews, the Department's permit staff representative, and the marine turtle permit holder. The permittee shall provide a minimum of 7 days advance written notification to the following offices advising of the date, time, and location of the pre-construction conference:

DEP, Office of Beaches and Coastal Systems  
Mail Station 300  
3900 Commonwealth Boulevard  
Tallahassee, Florida 32399-3000  
fax: (850) 488-5257

OES, Bureau of Protected Species Management  
Fish & Wildlife Conservation Commission  
620 South Meridian Street  
Tallahassee, Florida 32399-1600  
fax: (850) 921-6988

Submerged Lands & Environmental Resources Program  
DEP, Southeast District Office  
400 North Congress Avenue  
West Palm Beach, Florida 33401  
fax: (561) 681-6780

Mr. Mark Taynton, Field Engineer  
DEP, Office of Beaches and Coastal Systems  
400 North Congress Avenue  
West Palm Beach, Florida 33401  
fax: (561) 681-6780

4. The Corps will immediately report to the Office of Beaches and Coastal Systems in Tallahassee any damage to the hardbottom/reef areas adjacent to the borrow site which can reasonably be attributed to the project.

5. In the event a hopper dredge is utilized for sand excavation, all conditions in the NMFS Biological Opinion for hopper dredging along the S.E. U.S. Atlantic Coast (dated August 25, 1995) and Interim Biological Opinion dated April 9, 1997, as amended in the Regional Biological Opinion dated September 25, 1997, must be followed. The Corps will forward to the Florida Fish and Wildlife Conservation Commission, Bureau of Protected Species Management in Tallahassee, copies of the reports specified in Term an Condition 6 of the NMFS Biological Opinion for hopper dredging along the Southeast U.S. Atlantic Coast.

6. In the event that Miami-Dade County does not conduct all necessary marine turtle protection and monitoring requirements, the Corps is still responsible for those marine turtle protection measures specified by the applicable U.S. Fish and Wildlife Service Biological Opinion and the plans and specifications for this project.

**Water Quality Monitoring Required:**

Parameter: Turbidity - Nephelometric Turbidity Units (NTUs)

Borrow Site:

Frequency: During each hopper run at the borrow site, approximately midway through each fill cycle while the dredge is actively dewatering or discharging overflow.

Background: 500 meters from the suction head in the opposite direction of the prevailing current flow, clearly outside the influence of any turbid plume. Samples shall be collected from the surface, mid-depth, and 1 meter above the bottom.

Compliance: No more than 150 meters downcurrent from the dredge site, in the densest portion of any visible turbidity plume. Samples shall be collected from the surface, mid-depth, and 1 meter above the bottom.

Beach Nourishment Site:

Frequency: Once during each beach disposal operation, approximately midway through each fill cycle.

Background: At a point approximately 150 meters offshore and 1,000 meters up-current from the point where discharge water is re-entering waters of the State (discharge point), clearly outside of the influence of any turbid plume. Samples shall be collected at the surface and one meter above the bottom.

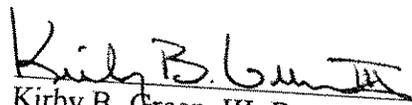
Compliance: At a point no more than 150 meters downcurrent from the discharge point within the densest portion of any visible turbidity plume. Samples shall be collected from the surface and 1 meter above the bottom.

The compliance locations given above shall be considered the limits of the temporary mixing zone for turbidity allowed during construction. If monitoring reveals turbidity levels at the compliance sites greater than 29 NTUs above the associated background turbidity levels, construction activities shall cease immediately and not resume until corrective measures have been taken and turbidity has returned to acceptable levels.

Copies of all reports (Turbidity Monitoring Test Report, Section 01131, Appendix No. A, Plans and Specifications) shall be submitted to the Office of Beaches and Coastal Systems in Tallahassee on a weekly basis within seven days of collection. The data shall be submitted under a cover letter containing the following information: (1) permit number; (2) a statement describing the methods used in collection, handling, storage and analysis of the samples; (3) a map indicating the sampling locations; and (4) a statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection and accuracy of the data.

Executed in Tallahassee, Florida.

STATE OF FLORIDA DEPARTMENT  
OF ENVIRONMENTAL PROTECTION

  
Kirby B. Green, III, Deputy Secretary

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to Section 120.52, Florida Statutes, with the designated Department Clerk, receipt of which is hereby acknowledged.

 8/30/00  
Deputy Clerk Date

**State of Florida Department of Environmental Protection  
and  
Miami-Dade County**

In re: File No. 0126527-001-JC  
Dade County Sunny Isles Renourishment and Submerged Offshore Breakwaters

**AGREEMENT**

I. WHEREAS, the U. S. Army Corps of Engineers has submitted an application for, and the Department has issued, Joint Coastal Permit No. 0126527-001-JC authorizing two submerged offshore breakwaters and beach renourishment of the beaches at Sunny Isles.

II. WHEREAS, the renourishment is part of a series of Congressionally authorized beach restorations which provides for the construction of a protective/recreational beach and a protective dune for 2.75 miles of shoreline along the Sunny Isles Beach area of Dade County between DEP reference monuments R-6 and R-19.

III. WHEREAS, issuance of a joint coastal permit under chapter 161 and part IV of chapter 373 of the Florida Statutes constitutes certification of compliance with state water quality standards pursuant to section 401 of the Clean Water Act, 33 U.S.C. 1341; and where applicable constitutes a finding of consistency with Florida's Coastal Zone Management Program, as required by section 307 of the Coastal Zone Management Act, 16 U.S.C. Section 1456, 15 C.F.R. Part 930, and section 380.23 of the Florida Statutes.

IV. WHEREAS, the U. S. Army Corps of Engineers and the Department have agreed to exclude non-water quality specific conditions from the final permit\water quality certification and include them in the U. S. Army Corps of Engineers final construction plans and specifications for the contract.

V. WHEREAS, the Miami-Dade County Department of Environmental Resources Management, has agreed to conduct a comprehensive monitoring program in partial fulfillment of special provisions of the U. S. Army Corps of Engineers final construction plans and specifications.

VI. WHEREAS, this agreement is entered into in consideration of the issuance by the Department of Permit No. 0126527-001-JC.

Miami-Dade County and the State of Florida, Department of Environmental Protection ("Department") agree as follows:

1. The County hereby agrees to perform the activities set forth in the Physical and Biological Monitoring Program attached hereto as Exhibit 1 and incorporated herein by reference. The aforementioned Monitoring Program will incorporate the Department's standard marine turtle monitoring conditions and will be in accordance with the Florida Fish and Wildlife Conservation Commission Bureau of Protected Species Management Guidelines for such activities.

2. The County hereby agrees to perform the activities set forth in the Monitoring and Evaluation Plan for Assessing Submerged Breakwater Performance At Sunny Isles Beach attached hereto as Exhibit 2 and incorporated herein by reference. The aforementioned Monitoring Plan will incorporate conditions under which the County will be responsible for conducting monitoring, analysis, and evaluation of project impacts on adjacent shores, and prepare recommendations to the Corps for further project evaluation or mitigation.

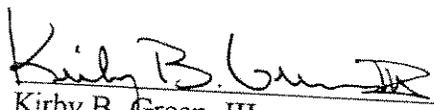
3. The County hereby agrees to place prefabricated concrete and limestone artificial reef modules as mitigation for adverse impacts to hardbottom communities caused by the placement of submerged pipeline or damage to corals due to sedimentation or turbidity attributed to this project.

4. This agreement constitutes Final Agency Action under Chapter 120, Florida Statutes. Miami-Dade County hereby recognizes and agrees that compliance with the terms herein will be enforceable by the Department against the County utilizing all appropriate remedies available, including, but not limited to, the provisions of Chapters 161.054; 373; 403.121, 403.141, 403.161; and 120, Florida Statutes.

5. Within thirty (30) days from the execution of this agreement, Miami-Dade County shall cause this agreement to be recorded in the public records of Miami-Dade County, Florida. A copy of the recorded agreement shall be sent to the Department within 5 days of recording.

STATE OF FLORIDA DEPARTMENT  
DEPARTMENT  
OF ENVIRONMENTAL PROTECTION

MIAMI-DADE COUNTY  
OF ENVIRONMENTAL  
RESOURCE MANAGEMENT

  
Kirby B. Green, III  
Deputy Secretary

\_\_\_\_\_  
John W. Renfrow, P.E.  
Director

8-30-00  
DATE

\_\_\_\_\_  
DATE

**SUNNY ISLES RENOURISHMENT – DESIGN MODIFICATION;  
DADE COUNTY EROSION CONTROL PROJECT**

**Physical and Biological Monitoring Program For Dade County, Florida,  
Beach Erosion Control And Hurricane Protection:  
SUNNY ISLES RENOURISHMENT – DESIGN MODIFICATION**

Submitted by  
Miami-Dade County Department of Environmental Resources Management

as partial fulfillment of special provisions of the  
U.S. ARMY CORPS OF ENGINEERS PLANS AND SPECIFICATION

and special conditions of  
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP)  
Joint Coastal Permit # 0126527-001-JC

**EXHIBIT 1**

## MONITORING PROGRAM COMPONENT OUTLINE

- I. BIOLOGICAL MONITORING.**
  - I.1 Monitoring Stations.
  - I.2 Monitoring Frequency.
  - I.3 Sampling Regime and procedures.
    - I.3.1 Quantitative Biological Surveys.
    - I.3.2 Qualitative Surveys.
- II. SEDIMENT AND SEDIMENTATION MONITORING.**
  - II.1 Sedimentation Deposition Rates.
  - II.2 Reef Sediment Accumulation Surveys.
  - II.3 Indicators Of Impending Or Imminent Sediment Impacts.
  - II.4 Sediment Violations.
- III. VISUAL SURVEYS OF HABITATS ADJACENT TO THE BORROW AREA AND BREAKWATERS.**
- IV. DREDGE SLURRY PIPELINE CORRIDOR CORAL PROTECTION AND IMPACT ASSESSMENT.**
  - IV.1 Hard Coral Protection Measures.
  - IV.2 Pipeline Coral Impact Assessment.
  - IV.3 Monitoring of Impacted Hard Corals.
- V. FILL MATERIAL ANALYSIS, COMPACTION AND BEACH TILLING.**
  - V.1 Compaction Monitoring.
  - V.2 Weekly Grain Size Analysis Of Beach Fill.
- V. SEA TURTLE MONITORING AND NEST RELOCATION PROGRAM.**
  - VI.1 Daily Beach Surveys For Nesting Activities.
  - VI.2 Nest Relocation Program.
  - VI.3. Escarpment Leveling.
- VII. HYDROGRAPHIC SURVEYS AND BEACH FILL PERFORMANCE.**
  - VII.1 Scope Of Hydrographic Survey Plan.
  - VII.2 Monitoring Plan Objectives.
  - VII.3 Monitoring Plan Components.
- VIII. REPORTING.**

## DESCRIPTION OF MONITORING COMPONENTS

**I.0. BIOLOGICAL MONITORING.** The biological monitoring will utilize a BACI (Before-After-Control-Impact) Design. This design establishes monitoring stations with randomly selected sites within an area of probable impact, and in areas of similar habitat outside the region of possible impact, for comparisons prior to and after conduct of the project. The inclusion of the "control" locations allows for correction of differences noted in the pre/post evaluations, for variations or differences that were not specifically associated with the project (i.e., storm effects, regional habitat disruptions).

**I.1 MONITORING STATIONS.** Minimally five biological monitoring stations will be established for this project. Three will be adjacent to, and two distant from, the borrow area. The sand source (borrow area) to be used for this project is located east of Key Biscayne (Figure 1) in approximately 43 to 48 feet of water. Extensive hardbottom reefs occur in the general region of the borrow source. North/south expanses of hardbottom reef are located to the east and west, and patch reefs occur on the western side of the borrow area. Proximity of the reefs to the borrow area ranges between 400 feet to greater than 1000 feet. Monitoring station location will be selected based on the neighboring hardground reef lines and known local current patterns, so that selected sites will represent the anticipated areas with highest probability of impact (relative to distance and current direction).

- A. A minimum of three stations will be established adjacent to the borrow area. Two "reference" or comparison stations will be positioned approximately 5 miles south of the borrow area in areas with similar water depths and based on qualitative assessment, show similar composition and densities of biological community components. Each station will be set (marked) by fixing a randomly selected "Station Reference Point" on the reef edge.
- B. Each Station will be comprised of five randomly placed 2.1 m X 2.0 m quadrats (total sample area of 21.0 m<sup>2</sup>/site) for determination of benthic community components. The quadrat location will allow for determination of any impacts across the entire reef tract.
1. The location of each of the quadrats will be determined by randomly choosing a distance and direction from the reference point (max distance = 100 m or one-half the width of the reef at the reference point, which ever is less).
  2. Each quadrat will be oriented normal to the prevailing direction of the reef tract (i.e., N/S), marked with an iron bar, and all have corner points marked with stainless steel pins to allow precise relocation.
    - a. Each quadrat will be subdivided into six 1.0 m X 0.7 meter subplots, to aid in photogrammetric analysis of the quadrat.
    - b. Each subplot will be marked with stainless steel pins to allow precise relocation.

**I.2. MONITORING FREQUENCY.** The sampling frequency for each monitoring task is summarized in Table 1. Each site will be visited quarterly for complete quantitative or qualitative photographic surveys.

- A. Quantitative assessments will be conducted minimally once prior to, once immediately after completion of project construction and every six months thereafter for a minimum of two years.

- B. Qualitative assessments will be conducted three months after the post construction quantitative survey, and every six months thereafter until completion of the monitoring program.

I.3. *SAMPLING REGIME AND PROCEDURES.* The quantitative and qualitative sampling procedures and techniques are described below.

### I.3.1 Quantitative Biological Surveys.

- A. Benthic community structure will be quantitatively evaluated at each monitoring station using a photogrammetric technique. The technique will include 35 mm photography, ground-truthing and video documentation during each quantitative sampling.
1. Density, frequency and diversity of hard-corals, soft corals, sponges, other noted benthic invertebrates and algae will be determined during quantitative surveys via mapping of 1.0 m X 0.7 m subplots of the 2.0 m X 2.1 m quadrats (six subplots per quadrat). All hard corals will be measured (major and minor axis) to determine hard coral coverage.
  2. All photography and mapping will be conducted by qualified biologists utilizing SCUBA. All hard and soft corals, and common sponges and algae will be field identified to the lowest possible taxonomic rank. Voucher specimens may be taken, outside of the sampling quadrat, for unknown organisms and identified in the laboratory.
  3. Each subplot will be photographed using an underwater camera (i.e., Nikonos-V) and strobe, mounted on a prefabricated "framer". The framer will hold and position the camera and strobe for optimal resolution of the subplot area. The photographs will be used to verify the percent of cover of hard corals through planimetric analysis of projected images as necessary. Further, the photographs will serve as documentation of the benthic community components within the subplots.
- B. Water Quality. Profiles of the water column will be conducted at each biological monitoring station, in 3 m depth increments (i.e., surface, 3 m, 6 m, 9 m, etc.), from the surface to the bottom for the parameters listed below. A single sampling assemblage consisting of a multi-sensor array, light sensor and water sampling tube, will be lowered into the water to insure simultaneous sampling of measured parameters and collection of water samples for laboratory analysis.
1. Light levels will be measured using a Li-Cor® dual sensor array (one surface, one underwater sensor). Surface and at-depth photon flux densities will be recorded with a Li-Cor® LI-1000 datalogger. Light measurement units will be  $\mu\text{E}/\text{m}^2/\text{s}$  (of PAR).
  2. Turbidity levels will be determined on samples collected during the Water Quality Profiling (minimally for the surface, mid depth and bottom samples). Samples will be read on a laboratory calibrated Hach® portable turbidity meter (or equivalent) and recorded in NTU's (Nephelometric Turbidity Units).
  3. Temperature, pH, salinity, dissolved oxygen and oxidation-reduction potential will be measured using a Hydrolab® "Surveyor-IV" multi-sensor data logger.

4. Nutrient levels (ammonia, organic nitrogen [NO<sub>x</sub>], and total phosphate) will be determined for the top, mid-level and bottom samples. Analysis will be conducted as per the D.E.R.M. Laboratory Comprehensive Quality Assurance Plan (FDEP Tracking # 870238G).

- C. Fish Populations of the hard-bottom habitats will be estimated via the Bohnsack and Bannerot (1986) Technique. A minimum of 6 replicates per station will be used to estimate the species composition, abundance and biomass of the fish population.

**I.3.2 Qualitative Surveys** of biological monitoring stations (Three months post-construction and every six months thereafter).

- A. Visual surveys and photographic documentation. Each station will be assessed visually for any abnormal or unusual characteristics. Each of the five quadrats at each station will be photographed using the techniques as described for the quantitative surveys, to document the interim status of the monitoring sites. Ground-truthing of the sites will not be conducted during these surveys, however, divers will note any obvious alterations or changes in the general hard-bottom habitat.
- B. Water Quality. Light penetration and water quality profiles, as described for the quantitative sampling, will be conducted during the Qualitative Survey period.

## **II. SEDIMENTATION AND SEDIMENT MONITORING.**

**II.1 SEDIMENT DEPOSITION RATES** The comparative rates of sediment deposition on hard-bottoms adjacent to the borrow area and comparison sites will be assessed on a quarterly bases.

- A. Relative sediment deposition rates will be measured via sediment traps located at the reef edge proximal to the borrow area. Minimally triplicate traps will be used to estimate the relative sediment "fallout" from the water column. The traps will sample 0.5 m above the reef bottom.
- B. A minimum of eight sediment deposition stations will be established. A sediment collection array will be placed at the following locations (Figure 1):
1. On the reefs adjacent to the biological monitoring stations located midway along the borrow area (minimum of 2 stations).
  2. 0.25 mile north of the northern limit of the borrow area (2 stations).
  3. 0.25 mile south of the southern limit of the borrow area (2 stations).
  4. On the reefs adjacent to the biological monitoring control stations (2 stations).
- C. Sediment arrays will be collected as described below to determine deposition rates. Rates will be expressed in milligrams sediment per square-centimeter per day (mg/cm<sup>2</sup>/day).
1. During Construction

- a. During periods with no indications of sediment stress on the hardgrounds, samples will be collected biweekly.
  - b. During periods with any level of sediment stress, samples will be collected weekly.
2. Pre-/Post-Construction. Samples will be collected during quantitative and qualitative samplings (i.e., quarterly).

**II.2 REEF SEDIMENT DEPTH/ACCUMULATION.** The depth of sediment on the reef areas will be measured at, and adjacent to the fixed sediment deposition stations. Reef sediment depth measures will be recorded at fixed stations and from random measures taken in the area around the sediment deposition arrays.

- A. At each monitoring site the sediment depth will be assessed by two means.
1. Random Measures. At each sediment deposition station, 15 random measures of the sediment depth will be taken on the reef surface during each assessment in the immediate area of the fixed station (measurements will exclude crevasses, depressions and gullies). Measures will be made with a ruler graduated in mm. Measures will be recorded to the nearest mm.
  2. Biological Monitoring Station Sub-quadrat Measures (semi-annual). At each biological monitoring station quadrat, a measure of the sediment depth will be taken at the corners of each sub-quadrat. Measures will be made with a ruler graduated in mm. Measurements will be recorded to the nearest mm.
- B. During the construction phase each Borrow Area station will be visited minimally on a weekly basis. If excessive levels are detected (See Sections II.3 and II.4), assessments of sediment levels will be conducted no less than 2 times a week until the sediment levels return to acceptable levels.
- C. The random measures will be averaged and, along with the fixed station measures, compared to previous sampling levels to determine accumulation rates. Measures taken at the biological stations will be used to correlate sediment levels with any documented biotic community changes.

**II.3 INDICATORS OF IMPENDING OR IMMINENT SEDIMENT IMPACTS.** Possible or imminent sediment impacts refer to identification of conditions or observations that indicate benthic organisms are being, or have been stressed by factors other than natural events. Thus, indications of possible impact will be based on comparative observations between borrow area locations and the "control" or comparison sites. In the event that an indication(s) of pending or imminent impact to benthic community components are documented during the construction surveys, the FDEP and the ACOE will be notified immediately of the possibility of violation of sediment levels on the reefs. Notification will be by phone, radio or fax, and followed by a written report to be submitted within 24 hours, or on the next work day if the indicators are noted on a weekend or holiday. Indicators of possible of imminent impact include but are not limited to:

- A. Standing sediment on hard corals, soft corals, sponge or other organisms that is not removed by normal currents or wave action.

- B. Excessive mucus on hard corals, without indications of bleaching.
- C. Excessively extruded polyps (e.g., sediment removal process).
- D. Mottling of color of benthic organisms (soft corals, algae, sponges, etc).

II.4 *SEDIMENTATION VIOLATIONS*. In the event that irreversible impacts (i.e., organism or organism tissue death) to benthic community components are documented during the construction phase surveys, the FDEP and the ACOE will be notified immediately of the possibility of a violation of sediment levels on the reefs and impact to the benthic reef community. Notification will be by phone, radio or fax, and followed by a written report to be submitted within 24 hours, or on the next working day. Should a violation be noted on a weekend or holiday, DERM will attempt to notify the ACOE Project Engineer and the FDEP "on-call" officer (if one is so designated). If no FDEP, "on-call" officer is designated, then notification will be given as soon as possible on the next business day. A violation will be defined as a significant build-up of sediment sufficient to cause any one or more of the following conditions:

- A. A frequency of observed bleaching (partial or complete) of hard coral colonies, significantly above the level found at the control stations.
- B. Excessive mucus produced by hard corals to remove sediment from their surface, resulting in binding of sediments and transport of bound sediments off the coral's surface and subsequent accumulation of the sediments at the base of the coral head. Such accumulations have been seen to initiate a "self burial" process, causing death of the lower tissue of the coral head.
- C. Covering of benthic community components (i.e., sponge, algae) by sediment for sufficient time or sufficient sediment so as to note death or degradation (i.e., bleaching, pigmentation changes) of the underlying organisms.

If a violation is found, DERM will initiate an assessment to determine the extent of impact to biological communities. DERM will monitor the sediment level after a violation, minimally twice a week to determine the point in time when the sediment level has decreased to within 0.5 cm from initial datum.

Any biological impact assessment will focus around the information in hand from DERM's Biological Monitoring Stations which are adjacent to the borrow area. Other sites can be added if it appears that the impact is significantly greater in areas distant to the existing biological monitoring stations.

### III. VISUAL SURVEYS OF HABITATS ADJACENT TO THE BORROW AREA AND THE BREAKWATERS DURING THE CONSTRUCTION PHASE.

III.1. *VISUAL SURVEYS OF HARDBOTTOM REEFS ADJACENT TO THE BORROW AREA*. Visual assessment of the condition and status of the benthic community has been found to be the best method for eliminating or minimizing impact to the hardground reef community. Visual

surveys of hardground adjacent to the borrow area will be conducted minimally on a semi-weekly (twice weekly) basis during periods of active dredging. During the survey, a qualified biologist using scuba, and assisted with diver propulsion vehicles, will visually inspect the hardground areas that are adjacent to the borrow area. The biologist will note the general level of sediment and watch for indications sediment impact, as described above (Sec. II.3 & II.4).

- A. At least one of the weekly surveys will be conducted by a DERM biologist with a degree in Marine Biology or related field and minimum of 5 years experience in impact characterization and assessment.
- B. The second weekly survey may be conducted by a qualified DERM biologist with knowledge and experience in marine organism identification and benthic monitoring of the offshore reef areas.
- C. Surveys of the hardground areas will be incorporated into the sedimentation monitoring as described in Section II of this plan.

III.2 *VISUAL SURVEYS OF SIGNIFICANT HABITAT AREAS ADJACENT TO THE BREAKWATER CONSTRUCTION AREA.* This portion of the monitoring plan has two elements: Pre and post project quantification of habitat components and biweekly visual surveys of the area during construction of the breakwaters.

- A. Pre and post project quantification of habitat components to allow determination of magnitude and extent of any impact.
  - 1. The benthic community within the area defined as significant habitat (Figure 1) will be quantitatively assessed prior to, and within three weeks following construction of the breakwaters, to determine what if any impact occurred in the area. A minimum of ten stations will be assessed in the area of significant habitat. At each station a randomly oriented 0.5m wide by 25.0m long belt transect will be assessed for benthic components by a DERM biologist experienced in assessment of marine benthic communities. Video documentation will be recorded by divers traversing the length of each transect with the camera, scanning a 0.5 m wide path (a pre-measured PVC pipe will be included in the video for scale) and the depth of each transect center point recorded. The benthic communities will be assessed as described below.
    - a) Each hard coral, soft coral, and sponge within the transect will be counted and identified to the lowest possible taxonomic rank. Additionally, the dimensions (major and minor axis) of any hard coral colonies documented will be recorded.
    - b) Relative abundance of other benthic organisms (common macroalgae, hydrocorals, and zooanthids) will be recorded as well.
- B. Visual monitoring of the areas adjacent to the breakwater construction areas, during construction to allow assessment of construction related activities (impact from misplaced materials; sedimentation, physical scouring, or dislodging of organisms associated with "prop-wash" from tugs and other vessels used during construction of the breakwaters).
  - 1. DERM divers will survey the western border of the area of significant habitat immediately adjacent to the breakwater construction area, twice weekly during the period

of breakwater construction (Figure 1). Divers conducting the surveys will have experience in identification and assessment of dredging/ construction activity related benthic impacts, as well as of identification of indicators of sedimentation stress on benthic organisms. The surveys will assess for:

- a) Indications of physical impacts associated with construction related equipment or activities. This may include:
  - i. Impacts associated with "prop-blast" from tugs or other heavy barge equipment used in the area.
  - ii. Scraping or dragging of cables, anchors or other construction related equipment.
  - iii. Debris or misplaced materials associated with the construction of the breakwaters.
- b) Indicators of sedimentation or sediment stress on the benthic organisms within the area. Divers will utilize the same criteria as listed in Section II.3 of the monitoring plan.

#### **IV. DREDGE SLURRY PIPELINE CORRIDOR HARD CORAL PROTECTION AND IMPACT ASSESSMENT.**

**IV.1 HARD CORAL PROTECTION MEASURES.** DERM will implement protection measures prior to and during the placement of the slurry pipeline to reduce hard coral and benthic impact associated with the pipeline placement. These measures will include:

- A. **Marking of the Pipeline Corridor.** The southern boundaries of the pipeline corridors will be marked prior to pipeline placement with 6-8" Styrofoam buoys. A Differential Global Positioning System (DGPS) will be used to determine the corridor's location and buoy placement.
  1. The corridor will be permanently set by exposing stainless steel eyebolts, or other durable fixture, into the substrate at intervals of approximately 0.1 NM (~600 ft). Subsurface buoys will be affixed to the eyebolts to allow rapid relocation of the corridor.
  2. Marked Styrofoam buoys will be affixed to the eyebolts and stay in place during the positioning and deployment of the pipeline.
- B. **Coral head Relocation.** The pipeline corridor will be surveyed by DERM prior to mobilization of the pipeline, to determine the feasibility of relocating hard coral colonies within the pipeline corridor. All hard coral colonies greater than 0.75 m in it's greatest dimension, that can feasibly be moved without causing damage to the colony, will be relocated to an area outside of, but adjacent to, the pipeline corridor.
- C. **Marking of Large Coral Heads.** All large hard coral heads ( $\geq 1.0$  m diameter) that exist within the corridor will be marked with a distinctive buoy (e.g. colored) prior to positioning of the pipeline. This will allow visualization of the line of minimal impact to the contractor, to assist in minimizing impact to coral heads.
  1. The position of each marked coral head will be recorded using DGPS.
  2. When possible (i.e., the size and structure of the coral head permit), the coral head may be moved to provide a clearer path for the pipeline. It should be noted, however, that pre-project surveys indicate the great majority of large coral heads within the corridor are considered non-movable, due to the coral head shape (i.e.,

flat, totally adherent plate form) or poor structural integrity (the mass of the coral head is highly bio-eroded).

3. DERM will work as closely as possible with the contractor to insure the pipeline is placed in such a manner to minimize impact and avoid marked large coral heads.

D. **Stabilizing Coral Heads.** After placement of the pipeline the region will be surveyed and all impacted coral heads, as well as all possible coral heads in jeopardy (i.e., within the shadow of the pipeline) will be moved to an adjacent area, away from the influence of the pipeline.

1. Fractured coral heads will be stabilized using either Portland cement or Liquid-Rock<sup>®</sup> epoxy. Coral heads will be stabilized in as natural a position as possible.
2. Threatened coral heads will be chiseled from the substrate, when feasible (See IV.A.2. for criteria) and moved to an area outside the pipeline corridor and stabilized.

**IV.2 PIPELINE CORAL IMPACT ASSESSMENT.** The actual impact from the placement of the pipeline placement will be determined by pre- and post-placement surveys of the pipeline corridors. Quantitative surveys of the corridor have been conducted to document pre-project conditions. The post-construction surveys will be conducted within 21 days after the removal of the pipeline. The damage assessment will be conducted as follows:

- A. The contractor will mark the true location of the pipeline with temporary buoys, placed sufficiently to allow divers to swim the length of the pipeline (no greater than 1000 feet apart). Buoys are to remain after removal of the pipeline.
  1. The contractor will notify DERM within 24 hours of the completion of placement of the pipeline location buoys.
  2. DERM will document the condition of the corridor after pipeline placement via video tape.
  3. After the pipeline has been removed from the reef, DERM will survey the damage path along the pipeline's length to determine the actual area of impact.
    - a. The width of the path will be considered the area within which the limestone "bedrock" has been cleared and exposed, and/or benthic organisms directly in the path or adjacent to the pipeline are crushed, fractured, abraded, heavily bleached or otherwise damaged.
    - b. Impact to organisms and areas of benthic damage will be quantified by direct measurement. Quantification will include:
      - aa. Measurement of all fractured, abraded, bleached or otherwise impacted hard corals.
      - bb. Count of all damaged (abraded, broken, loose) soft corals.
      - cc. Measurement of fractured, scarified, abraded or otherwise damaged substrate, where encrusting or low-profile organisms were growing.
    - c. Impact from the pipeline will be the total sum of impacts to hard coral, soft corals and bedrock. The calculated area of damage and subsequently used to calculate mitigation requirements.

- d. The corridor will be documented by video-tape and still photography.

**IV.3 MONITORING OF IMPACTED HARD CORALS.** All hard corals impacted or relocated in association with the pipeline placement will be monitored for a two year period following construction. The monitoring will utilize a photogrammetric technique, with ground truthing to document percent survivorship of the individual coral head. The relocation sites will be monitored at 3 months, 6 months and on a semiannual basis for the remainder of the monitoring period.

- A. Photogrammetric Technique. Coral heads will be photographed with a Nikonos®V 35mm camera, at a fixed distance from the coral head. All corals will be photographed with a scaled framer. All coral relocation/restoration areas will be mapped and all corals numbered to allow tracking of the coral head over time.
- B. Ground-Truthing. Each coral head will be measured (major and minor axis) at the time of photographing.
- C. Comparison stations adjacent to the relocation/restoration sites will be established to provide information as to the "natural" change in the hard coral cover. The documented changes in measurements of the coral heads (over time) will be compared to measurements made of the coral heads at the comparison stations.

**IV.4 MITIGATION FOR PIPELINE IMPACTS.** As the placement of the pipeline is anticipated to impact hardground reef, mitigation for the impacts will be conducted as approved by DEP. Prefabricated concrete and limestone modules will be placed with a corresponding artificial reef habitat creation-to-impact ratio of 1:1. The area of credit for the artificial reef modules will be the footprint of the module. Actual level of impact to be mitigated will be determined through the evaluation conducted during the post construction pipeline survey. These modules are to be constructed within 1 year of completion of the beach nourishment. Biological monitoring of the mitigation will be appropriate for the design and will be addressed in the Mitigation Proposal.

## **V. BEACH FILL COMPACTION AND SEDIMENT ANALYSIS.**

**V.1. COMPACTION MONITORING.** Compaction monitoring of the in-place beach fill will be conducted within one week of final grading of the beach fill, and quarterly thereafter for three years. A cone penetrometer, equivalent to that used by Nelson (1988) will be used for each assessment. Based on the results of the penetrometer analysis, the beach areas will be tilled to a depth of 36 inches prior to the start of the turtle nesting season and after consultation with the FDEP and the U.S. Fish and Wildlife Service, when the tilling criteria given in Section V.B. are present.

- A. Penetrometer analysis of the beach fill areas will be conducted along lines perpendicular to the shoreline, at 500 foot intervals, throughout the length of the beach fill segments.
1. Two stations per line will be established with the first station one-third the distance between the dune (or seawall) and the mean high water line, and the second station two-thirds the distance between the dune (or seawall) and the mean high water line.

2. Triplicate readings will be made at three depths (6, 12 and 18 inches) at each station.

- B. Tilling Criteria. Tilling of the beach fill will occur at the following times:
1. Along the entire length of filled beach within one week following completion of the placement and grading of fill material, and
  2. Tilling will occur along those segments of the beach where adjacent sampling lines have cone penetrometer readings exceeding 500 "cone penetrometer units", at the same depth, only after consultation with the U.S. Fish and Wildlife Service's Office in Vero Beach, FL.

V.2 *WEEKLY GRAIN SIZE ANALYSIS OF BEACH FILL.* Grab samples of beach fill will be collected weekly for grain size analysis. Three samples will be collected along the length of beach on which fill was placed during the preceding week. All samples will be dry sifted with a minimum of six standard sized screens. All procedures will follow ASTM procedures for "dry" determination of grain size.

## VI. SEA TURTLE MONITORING.

The Sea Turtle monitoring may be subcontracted during construction by the selected contractor, however, Dade County D.E.R.M. will ensure that Sea Turtle Monitoring is conducted in a manner which meets the criteria and conditions established in the above referenced permits and existing FDEP Protected Species permit.

VI.1 *DAILY BEACH SURVEYS FOR NESTING ACTIVITIES.* If the beach nourishment project will be conducted during the marine turtle nesting season (May 1 through October 30), daily early morning surveys for sea turtle nests shall occur beginning May 1 or 65 days prior to project initiation (whichever is later), and continue through September 30. The project area will be surveyed each morning to check for sea turtle nesting activity. These activities will be conducted by an individual approved and permitted by the FDEP for such activities. As per special condition in the FDEP Protected Species Permit for Miami-Dade County beaches, all nests found on Miami-Dade County beaches are relocated into a protective hatchery. Mr. Jim Hoover (Miami-Dade Parks and Recreation Dept.- Haulover Park) is the FDEP permitted sea turtle monitor for all of Dade County (excluding Golden Beach and Virginia Key) and manages the county's sea turtle hatchery and nest relocation program. The contractor will contact and coordinate all sea turtle monitoring needs and requirements with the permitted individual.

- A. All nest surveys and egg relocations shall only be conducted by personnel with prior experience and training in nest survey and egg relocation procedures and duly authorized to conduct such activities through a valid permit issued by the Department.
- B. Relocations will be conducted prior to 9 AM each day. Construction activity shall not occur in any location prior to the completion of necessary sea turtle protection measures.
- C. Report on all nesting activity and marine turtle protection measures taken during construction shall be provided for the initial nesting season following the completion of construction and for a minimum of three additional nesting seasons. Monitoring shall include daily surveys and additional measures for sea turtle protection authorized by the Department. Reports shall be submitted to the Department no later than 30 days after

completion of all monitoring activities, and shall include daily report sheets showing all activity including nesting success rates, hatching success of all relocated nests, dates of construction, and names of all personnel involved in nest surveys and relocation. All such personnel shall be qualified as noted above.

**VI.3 ESCARPMENT LEVELING.** Visual surveys for escarpments along the project area will be made immediately after completion of the beach nourishment project, and prior to May 1 for three consecutive years. Results of the surveys shall be faxed to the Bureau of Protected Species Management (850)921-4369, prior to any action being taken. Escarpments that interfere with sea turtle nesting or measuring 18 inches high or higher and 100 feet long or longer will be leveled to the natural contour within 24 hours of their discovery. The Department shall be contacted immediately if subsequent reformation of the escarpments that can interfere with sea turtle nesting or that exceed 18" in height for greater than 100' occurs during the nesting and hatching season to determine the appropriate action to be taken. An annual report summarizing escarpment surveys and corrective action taken shall be submitted to the Department and the Service.

**VI.4 NOTIFICATION.** If an unmarked sea turtle nest or a dead, injured, or sick turtle is discovered during construction activities the sea turtle permit holder and the Bureau of Protected Species Management will be notified immediately such that appropriate conservation measures can be taken.

## **VII. HYDROGRAPHIC MONITORING PLAN.**

**VII.1. SCOPE OF THE PLAN:** This is presented to document Miami-Dade County's comprehensive, long-term monitoring plan for assessment of the performance of the Dade County Beach Erosion Control and Hurricane Surge Protection Project, inclusive of the 10.5 miles of Beach restored from 1975 to 1982, 2.5 miles of Sunny Isles Beach restored in 1988 and segments of Key Biscayne (approximately from reference monument DA-R7 through DA-R113).

Miami-Dade County has served as local sponsor for all the Dade County projects noted, which includes eight separate beach restoration and three beach renourishment contracts for the areas outlined above. Each of these contracts was permitted separately, with separate monitoring plans. This has resulted in a temporally and spatially fragmented data set for the project and effectively prevented comprehensive analysis of project performance. Further, the format of data collection has necessitated additional processing, and limited compatibility with other agencies.

The present plan, initiated in 1995, is submitted to address the past limitations and difficulty of assessing compliance with multiple permit conditions by development of an ongoing comprehensive monitoring program that will be used for the present and all future projects.

### **VII.2. MONITORING PLAN OBJECTIVES:**

- A. Insure a spatially and temporally consistent beach survey program on an annual basis over the full length of the Dade County Beach Erosion Control and Hurricane Surge Protection Project.

- B. Establish a comprehensive beach profile database which will provide for easy data access and will be compatible with all existing State and federal agency database and GIS applications.
- C. Provide greater flexibility than the current project-specific survey schedule to allow for the assessment of acute erosion events due to storms or other causes.

### VII.3. *MONITORING PLAN COMPONENTS:*

- A. Annual Project Surveys and Aerial Photo Documentation. This component will consist of project-wide profile surveys at approximately 1000 ft intervals extending from the north Dade County line to the southern tip of Key Biscayne, inclusive of Golden Beach, Fisher Island and Virginia Key (Reference monuments R1 - R113). Survey profiles will be referenced to specific monuments (i.e., Range 0+00 = monument location). The profiles will extend from a position landward of the monument sufficient to include existing dune features or other topographic features located on the beach proper out to a distance of 2,500 feet seaward, or closure, whichever is greater. Elevations will be determined minimally at 25 ft intervals along the full length of the profile. In addition, 1":300' controlled aerial photographs will be provided of the coast over the entire project length and provided to the FDEP in a reproducible format.
- B. Project Specific Monitoring of Sunny Isles Renourishment Sites. New renourishment sites along the project length will have additional interim surveys, which will be conducted midway between the annual surveys for a period of 2 years, to better assess fill adjustment and project performance. To allow better assessment of the performance of the breakwater structures, profile lines shall be spaced at 250' intervals directly adjacent to the structures (between R7 and R8) and for a distance of 1000' north (to R6) and south to R9).
- C. Post Storm Monitoring. Surveys will be conducted to assess the erosional effects of major storms or other acute erosion events. The timing and extent of these surveys will be determined jointly by Dade County, FDEP and the Corps of Engineers. These surveys would serve to complement, not duplicate, any storm effects assessments that may be underway by other agencies.
- D. Erosion Triggers and Mitigation of Adverse Impacts. Prior to the Department issuing a Notice to Proceed, the county shall provide a plan proposing criteria by which potential adverse shoreline impacts shall be evaluated and mitigated, including specific thresholds which will trigger mitigation of adverse impacts. The mitigation plan shall include time frames for evaluating impacts, along with specific mitigation actions, up to and including the removal of the breakwater structures.

## VIII. REPORTING OF MONITORING DATA AND RESULTS

VIII.1 *BIOLOGICAL MONITORING AND SEDIMENTATION RATES.* Dade County DERM will submit semi-annual descriptive summary reports of the biological monitoring conducted for that period. Such reports will provide:

1. Date and personnel conducting the monitoring.
2. A descriptive summary of the monitoring conducted.
3. Any deviations from the prescribed monitoring program.
4. Available reduced data for that quarterly monitoring.
5. Any data not previously submitted for prior reporting periods.

**VIII.2 SEDIMENT ACCUMULATION AND SEDIMENT COMPACTION.** Reports of the sediment levels on the hardbottom areas adjacent to the borrow area will be submitted on a bi-weekly basis during the construction phase of the project. The report will include:

1. Date, time and personnel conducting the survey,
2. A descriptive summary of the sediment conditions on the hardbottom adjacent to the borrow area and the general health status of the benthic communities in the region as it relates to sedimentation.
3. A map of the borrow area and adjacent hardbottoms showing:
  - a. the location of the fixed sediment stations and the areas of hardbottom surveyed,
  - b. location and depth of any elevated levels of sediment on the hardbottom.

If indications of impacts (as described in Section III. above) are documented, the FDEP will be notified immediately by phone or fax, and a report will be forwarded within 24 hours.

**VIII.3 PIPELINE IMPACT ASSESSMENT.** A report on the impact to the reefs in association with the pipeline placement will be forwarded to the FDEP within three months after completion of completion of the corridor assessment. The report will contain:

1. Number and area (by species) of hard corals impacted.
2. Number and area of hard corals relocated due to proximity to the pipeline (i.e., shading).
3. Number of soft corals impacted.
4. Area of substrate impacted.
5. Comparison of actual area of impact to pre-project estimates.
6. Calculation of needed mitigation.

**VIII.4 BEACH FILL COMPACTION.** Measures of the beach fill compaction will be submitted annually with the descriptive summary report for the biological monitoring.

**VIII.5 BEACH FILL SEDIMENT ANALYSIS.** Reports on the grain size analysis of material placed on the beach will be forwarded to the FDEP within one week of sampling. Reports will include:

1. Date, time and personnel conducting the survey.
2. A map of the segment of beach to be restored showing:
  - a. The location of the area filled during the specified week.
  - b. Locations from which the sediment samples were taken within that week's filled area.

### VIII.6 *SEA TURTLE MONITORING.*

Reports detailing activities relative to the Sea Turtle monitoring and nest relocation activities will be forwarded to the FDEP:

1. Within 60 days of the completion of construction.
2. By December 31 of each year following construction.

### VIII.7 *HYDROGRAPHIC PROFILES.*

1. **Annual Reports.** An annual report assessing the performance of the project over the prior year will be provided. The report will provide a discussion of erosion/accretion trends documented by the survey program for the entire project with a specific emphasis on recently renourished areas. Specific problem areas will be identified and possible solutions discussed.
2. **Storm Monitoring Reports.** A report detailing and analyzing the results from Post-Storm hydrographic monitoring conducted during the previous year will be submitted with the annual reports.
3. **Data Format.** Data will be provided to FDEP on 3.5" High Density diskettes within 14 days of the completion of survey activities and data compilation. Data will be submitted in accordance with the F.D.E.P. "Procedures for submittal of Beach Monitoring Data" as revised on August 13, 1999.

Table 1. Quarterly Biological and Sediment Monitoring Program sampling periodicity, conducted in association with the Contract-2 of the Second Nourishment of Miami Beach.\*

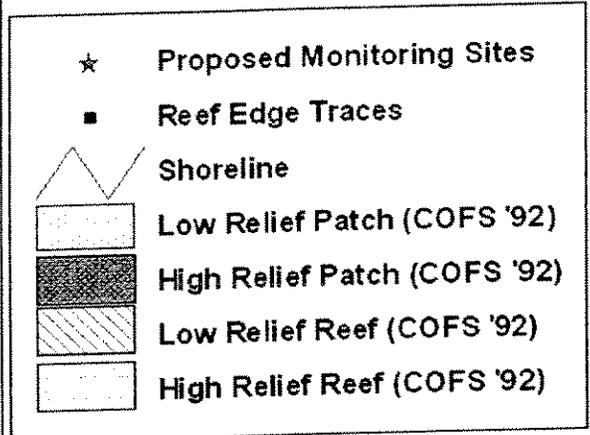
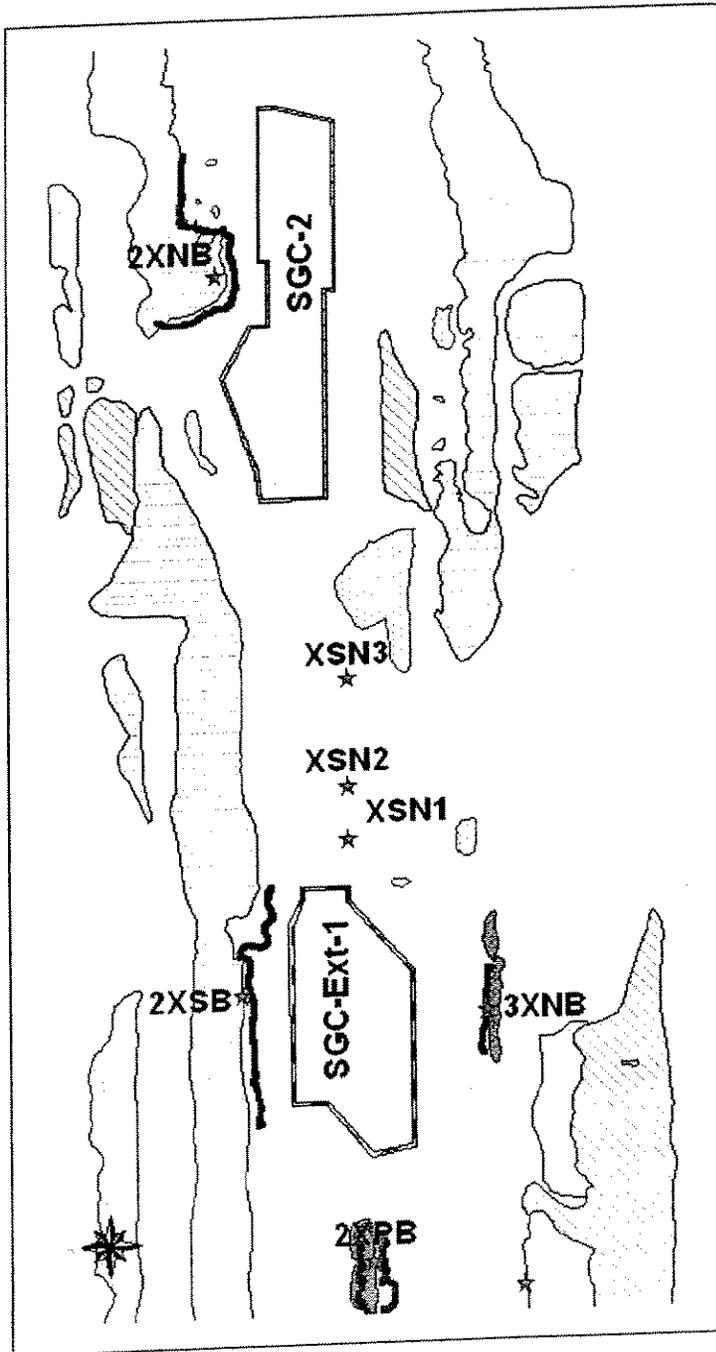
PC-Q#	Photo.	G-T	Light Profile	Turb.	Water Quality	Sed. Meas.	Fish Surveys	Sand Compact	Grain size
Pre-Const.	X	X	X	X	X	X	X	X	X
Const.			X	X		X			X
Post- Const. (PC-Q1)	X	X	X	X	X	X	X	X	X
PC-Q2	X		X	X	X	X			
PC-Q3	X	X	X	X	X	X	X	X	
PC-Q4	X		X	X	X	X			
PC-Q5	X	X	X	X	X	X	X	X	
PC-Q6	X		X	X	X	X			
PC-Q7	X		X	X	X	X	X	X	
PC-Q8	X		X	X	X	X			

\* Photo. = Benthic community station photography; G-T = Ground-truthing of photography; Sed. Meas. = Sedimentation deposition rate analysis and Sediment depth measures; Sand Comp. = Penetrometer compaction measures; Turb. = Turbidity; PC-Q# = Post-Construction quarter number.

Compaction tests (cone penetrometer) will be conducted after final grading of the beach fill, and at the beginning of each quarter thereafter for three years from the time of final grading.

Tilling of beach fill will be conducted on an "as needed" bases, when indicated by the compaction tests and after consultation with the FDEP and the U.S. Fish & Wildlife Service.

# Sunny Isles Design Modification Proposed Borrow Area Monitoring Sites



Point	Easting	Northing
2XNB	797201	501863
2XSB	797434	495161
2XPB	798598	492709
3XBB	799979	492470
XSN3	798400	498089
XSN2	798400	497089
XSN1	798400	496589
3XNB	799646	494974

Note: Proposed monitoring sites XSN1, XSN2, XSN3, and 2XPB will be sediment monitoring stations. The remaining sites will be both sediment and biological monitoring stations.



**Monitoring and Evaluation Plan for  
Assessing Submerged Breakwater Performance  
At Sunny Isles Beach**

**Submitted By  
Miami-Dade County  
Department of Environmental Resources Management**

**Pursuant to Special Conditions  
Of Florida Department of Environmental Protection  
Permit Number 0126527-001-JC**

**EXHIBIT 2**

## **Background**

The Sunny Isles Design Modification project includes the renourishment of Sunny Isles Beach from approximately R6 to south of R19, and the addition of two new project features intended to reduce end losses from the north end of the project. The new project features include the construction of a submerged transition berm extending approximately 1,350 north of the existing project limit offshore of the Town of Golden Beach, and the construction of two submerged rubble mound breakwater structures offshore of the north limit of Sunny Isles Beach. This plan is submitted to specify additional monitoring needed to assess the performance of the features, and to establish objective evaluation criteria, and progressive mitigation triggers, should the monitoring data indicate unintended shoreline effects.

## **Hydrographic Monitoring**

Profile Spacing and Distance. Hydrographic monitoring to determine the performance and effects of the breakwater structures shall be conducted as outlined on Page 14, Paragraph VII.3(B) of the comprehensive monitoring plan entitled "Physical and Biological Monitoring for Dade County, Florida, Beach Erosion Control and Hurricane Protection: Sunny Isles Renourishment- Design Modification", which was previously submitted by DERM to the Department. To better allow the effects of the submerged breakwaters to be assessed, it is proposed that profile lines be established at 150' intervals directly adjacent to the structures (approximately R7 to R8), and at 250' spacing north and south of the structures between and inclusive of R6 to R9+500'. Profile lines shall also be surveyed at R1 through R5, at R-5 +500' and from R10 through R15 during each event. The profiles will extend from a position on the beach sufficiently landward to include existing dunes or other significant topographic features located on the beach proper, out to a distance of 2,500' or closure, whichever is greater, except as noted below. All profile surveys will be conducted at and from existing or established reference monuments. Existing Control Monuments (R-monuments), with approximately 1000-ft spacing, are to be utilized throughout the monitoring area (R1 -R-15) supplemented with interim-spaced monuments, described above, established in approximate alignment with the R-monuments.

## **Survey Frequency**

A 'pre-construction' survey will be conducted that will include all survey lines identified in the "Hydrographic Monitoring" section above. In addition to conducting a countywide survey annually, the comprehensive monitoring plan specifies that all renourishment sites also have interim surveys conducted at six-month intervals for a period of two years. Due to factors such as adjustment from the construction profile, which will make establishing definitive trends difficult initially, it is proposed that profile surveys from R5 to R9+500' be continued for a minimum of three (3) years after project construction. In recognition of the potential for acute shoreline effects resulting from the influence of the breakwaters, it is proposed that in addition to the semi-annual profile surveys of Sunny Isles Beach as a whole, that the profiles between R1 and R9+500' also have wading depth surveys (to -5.0 NGVD) conducted at 3 and 9 months post-construction. Spacing of extra interim profiles will be same as principal surveys above.

These additional interim surveys will allow any acute shoreline effects to be more rapidly detected, and will provide a better basis for the trend-based criteria proposed below for evaluating the performance of the breakwater structures. In the event that significant adverse effects are suspected within the study area, additional surveys may be conducted following consultation with the Department and affected parties.

### **Evaluation Criteria**

Since the initial restoration of Sunny Isles Beach in 1988, there has been a significant quantity of survey data collected in that area, particularly at the north segment of the project in the vicinity of the proposed breakwater structures. In addition, historical shoreline position and volumetric trends in Golden Beach and the north end of Sunny Isles have been previously evaluated and summarized (Coastal Technology Corporation, 1994; Coastal Systems International 1997). Due to the availability of this historical data, it is proposed that the future performance and influence of the breakwater structures be evaluated relative to deviations from established erosion/ accretion rates for the study area. Interpreting the effects of the structures alone on littoral processes will be complicated, particularly for the first year, by adjustment of the construction profile in Sunny Isles, and the transition berm offshore of Golden Beach. As such, it is proposed that several parameters, including shoreline and elevation contour positions, and net volumetric changes be considered in evaluating this segment of the project.

### **Reporting**

Following each survey event, DERM shall provide the survey data to the Department as described in the comprehensive monitoring plan, as well as a brief interpretation and discussion of any significant observations. At one and two-years post construction, DERM shall provide a more comprehensive report which will discuss project-wide performance, as well as a section specific to breakwater effects, if any. The report shall summarize shoreline position and volumetric changes for the study area, and a general interpretation of these changes. A copy of each report and the survey data shall be provided concurrently to the Town of Golden Beach and/or its designated agent. Due to the profile adjustments which will occur following construction, it is not anticipated that a meaningful comparison to historic erosion/ accretion trends will be possible earlier than one-year post-construction. However, more obvious and immediate effects, particularly those which may indicate a possible negative effect, will be evaluated and discussed in greater detail, as discussed below.

### **Evaluation of Project Performance and Mitigation Thresholds**

The evaluation of project performance as a whole, and particularly the segment within the influence of the breakwater structures, will be a joint effort of the Army Corps of Engineers, DERM, and the Florida Department of Environmental Protection. For the purposes of this plan, we would propose that an adverse shoreline impact would be identified as a consistent and significant erosion that is greater than would have occurred in the pre-breakwater construction condition since 1988 when the project area was initially restored. The mitigation thresholds and associated actions proposed would be structured in two tiers:

1. Mitigation of acute shoreline impacts. It is anticipated that it will not be possible to establish any changes in historical erosion/ accretion trends over a period of less than one year due to a variety of factors. Nonetheless, the possibility of immediate adverse effects from the breakwater structures exists, and requires that an action plan be available to mitigate them should they occur.
2. Significant alterations in historic erosion rates in the vicinity of the structures. These effects would result from an analysis of erosion/ accretion rates near the structures after sufficient monitoring data exists to establish trends.

### **Proposed Mitigation Thresholds**

The thresholds proposed are intended to provide some objective benchmarks in advance of breakwater construction which might indicate the existence of unintended shoreline effects, and to establish a general protocol for mitigating potential negative effects. It should be noted that the net result of breakwater construction and fill placement is anticipated to result in a wider, more stable beach with a ten-year minimum nourishment interval. The structure was designed to provide minimal adverse impacts to the adjacent shorelines, however, the potential for some adverse effects still exists. As such, we would propose a plan that protects the interests of affected parties on the beachfront by mitigating acute effects, while allowing the necessary time and flexibility to evaluate of the performance of the structures, and develop appropriate modification/ removal options as warranted.

### **Acute Erosion- Recommended Action and Mitigation Triggers**

In the event that acute erosion is documented in the vicinity of, and possibly attributable to, the structures, the county, either individually, or in cooperation with other state or federal agencies, would mitigate the impact through fill placement as needed to approximate pre-project shoreline conditions. Fill material would be from an upland source subject to approval by the Department, and the extent of the mitigation would be developed in consultation with the Department. In addition, the county, in its role as local sponsor of the federal shore protection project, would request in writing that the Army Corps of Engineers, Jacksonville District, initiate and expedite the completion of a re-evaluation of the breakwater project design to identify and correct the unintended effects documented by the county's monitoring plan. The request would contain all project monitoring data collected to date, a description of the potential adverse effects noted, and a request that an interagency meeting between the county, the Department, and the Corps be convened to evaluate conditions at the site. The thresholds proposed to initiate these actions are as follows:

Sunny Isles Beach (within the limits of the federal project): Localized erosion within the study area (R6 to R9) which results in a reduction of the Corps design profile (not including advance nourishment) would trigger mitigation as proposed above. If other areas of Sunny Isles Beach also exhibit high rates of erosion consistent with that exhibited in the breakwater region, mitigation through fill placement would not occur until a full evaluation had been conducted, unless warranted due to emergency conditions.

Golden Beach: Prior to construction of the breakwaters or transition fill, the county shall establish permanent monumentation within the Town of Golden Beach shorefront, on or adjacent to existing seawalls, as needed for intermediate profile lines located between existing DEP monuments. For the purposes of assessing short-term (ie: within one year of construction) impacts, mitigation as described above shall be implemented if the beach width, as defined as measured from the existing reference monuments (approximating the existing seawall line) or the seawall to the Mean High Water Line, indicates that the beach width (in feet) has been reduced by more than 35%, on a continuous basis (i.e., two or more consecutive surveys), of the pre-project dimension, exclusive of storm erosion. Mitigation shall be implemented as described above in consultation with the Department.

In the event that an objectionable swale develops in the project taper region, the County will undertake grading and other maintenance measures necessary to regrade the beach. All grading work will be conducted in compliance with any marine turtle requirements.

NOTE: Additional fill, if needed to restore project dimensions along north Sunny Isles and Golden Beach is provided for in the Plans and Specifications following a thirty day stabilization period following breakwater construction.

#### **Assessment of Long-Term Breakwater Performance- Mitigation Triggers**

It is proposed that assessing the long-term performance of the breakwater structures and their effect on the north Sunny Isles/ Golden Beach shoreline, be based upon comparisons with historical erosion and accretion trends for that area. Because it is anticipated that the project area will experience significant profile adjustment following construction, meaningful analysis of these trends will likely be impossible within the first year unless the effects are dramatic. Should the county's monitoring data indicate that the erosion trends within the potential influence of the breakwaters are significantly greater than historical trends for that area, or are significantly greater than those generally being seen on other profiles within the Sunny Isles area, the County, as local project sponsor would initiate a written request to the Corps Jacksonville District, that they initiate and expedite the completion of a re-evaluation of the breakwater project design to identify and correct the unintended effects documented by the county's monitoring plan. The request would contain all project monitoring data collected to date, a description of the potential adverse effects noted, and a request that an interagency meeting between the county, the Department, and the Corps be convened to evaluate conditions at the site. While the design reevaluation is being conducted, mitigation associated with ongoing erosion would be conducted as described above using the mitigation triggers identified in the previous section.