

temporary increase in turbidity during construction adjacent to the point of discharge. Turbidity would return to normal levels once construction activities cease. Once completed the proposed project would result in an overall improved aesthetic quality. The placement of sand on the beach would restore the natural appearance of the shore. With the no-action alternative, the shoreline would continue to erode. This would result in the loss of existing shoreline, which would reduce the visual aesthetics of the area.

4.12 RECREATION

During nourishment activities, the use of the beach in the vicinity of construction would drop or be restricted temporarily. Use of the beach in the immediate area of the discharge pipe and equipment would be restricted for public safety. Noise from the heavy equipment needed to spread and smooth the sand would disturb some users as well. Many visitors would seek quieter areas for sunbathing or swimming. As portions of the renourished beaches come available, use by the general public would increase once more. After nourishment of the beach, use by the general public and those who stay at the condominiums and hotels would return to pre-erosion activity levels. The general public would be more inclined to use these beaches rather than by-passing them for others with more sand above the high tide line. There would be a temporary adverse effect on recreational fishing in the immediate area of beach fill operations due to construction activities and turbidity. Fishing would not be affected outside the area of immediate construction. Nearshore snorkeling, and SCUBA diving activities may also be impacted by increased turbidity during construction activities and shortly thereafter. Long-term adverse impacts to these water activities are not anticipated. Boat operations may be detoured during construction activities; however, the extent of these detours and time frame of operations render these impacts insignificant. With the no-action alternative, the shoreline would continue to erode. This would eventually reduce the amount of beach available for recreation and would result in the degradation or loss of shorefront property thus, adversely impacting beach recreational opportunities within the area. There would be no construction related impacts to fishing, snorkeling and SCUBA diving

4.13 HISTORIC PROPERTIES

No historic properties have been identified within the area designated for fill. Fill from an upland sand source on the Test Beach should not result in any impact to historic properties. Coordination with the State Historic Preservation Office has been done and is located in Appendix D.

4.14 ENERGY REQUIREMENTS AND CONSERVATION

The energy requirements for this construction activity would be confined to fuel for the dredge, labor

transportation, and other construction equipment. The no-action alternative would allow conditions to develop that may endanger coastal property from storm surges and wave erosion during future storm events. On-site preventive measures and post clean up under the no-action alternative would likely demand greater energy than that required of the proposed action.

4.15 NATURAL OR DEPLETABLE RESOURCES

In this case, the beach quality sand used to construct the project is considered a depletable resource. The gasoline and diesel fuel used by the construction equipment is also considered a depletable resource.

4.16 CUMULATIVE IMPACTS

Cumulative impact is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions (40 CFR 1508.7). Repeated placement of pipeline for periodic nourishment would have a cumulative impact on nearshore hardground habitat. However, using the same corridors for each renourishment to the extent practicable would minimize such cumulative impact. The proposed action would result in long-term benefits, which should outweigh any short-term environmental losses. The cumulative impact of shore protection projects along the Florida coast has been to restore and maintain many beaches which otherwise would have experienced severe erosion or would have totally disappeared. In addition, these activities have reduced property damage and helped maintain property value. Cumulative impacts to EFH for this project would be minimal. The re-utilization of pipeline corridors will minimize hardbottom impacts. Turbidity and disturbance associated with beach placement will be temporary and no long term impacts to EFH are anticipated.

4.17 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.17.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. Any impacts to larger hard coral could be irreversible for practical purposes given the long amount of time needed to regrow older and larger specimens. Measures would be taken to try to avoid such impacts and the mitigation plan calls for efforts to move, reattach, or otherwise salvage as much hard coral that might be damaged as possible.

An additional irreversible commitment is the removal of beach fill material from the upland sand source. The removal of this material would constitute an irreversible act. The energy and fuel used during

construction would also be an irreversible commitment of resources.

4.17.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction. Impacts from the placement of the pipeline which are temporary (soft corals, sponges, small hard corals, benthic invertebrates, etc.), would be an irretrievable loss of that resource for the period of time it takes to recover.

4.18 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Those species that are not able to escape the construction area are expected to recolonize after project completion. There would be an unavoidable reduction in water clarity and increased turbidity and sedimentation. This would be limited to the immediate areas of the beach fill operation. This impact will be temporary and should disappear shortly after construction activities cease. There would also be unavoidable impacts to hardground benthic organisms due to placement of pipelines across the nearshore reef. Measures will be implemented to minimize these impacts and any impacts that do occur will be mitigated.

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

We recognize that protection of the shoreline is a continual effort. No acceptable and permanent one-time fix has been identified. Using periodic renourishment is an ongoing effort. Renourishment efforts have a temporary and short-term impact on the biological resources on and near the shore. This project will not effect offshore borrow area resources since material for placement is to be obtained from upland sources.

4.20 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The proposed action would be consistent with the state's Coastal Zone Management plan (see Appendix C on consistency determination). We expect the preferred alternative to be consistent with Federal, State and local plans and objectives.

4.21 CONTROVERSY

In recent years, resource agencies, scientists and some environmental organizations have expressed concern about the impact of beach restoration and maintenance activities on nearshore resources. The controversy tends to involve issues relating to the duration or permanency of the impact and the

capacity of the resource to recover from perturbations caused by beach restoration activities; and the cumulative effect of multiple but unrelated projects in a region of the coast.

In response to this controversy, the USACE has subjected the regulatory compliance determination for the Miami-Dade Test Beach Project, to full review under the National Environmental Policy Act (NEPA). While public concern for impacts to nearshore habitats cannot be fully alleviated simply by analysis in an Environmental Assessment, the issues of concern will be more closely examined and the sufficiency of measures to avoid, minimize, and mitigate for impacts to resources can be better examined.

In addition, the proposed renourishment involves features not previously used in Miami-Dade County. The large-scale placement of material from upland borrow sites has not previously been utilized in beach nourishment projects within Miami-Dade County. The lack of potential borrow areas within the confines of Miami-Dade County requires that other sources of beach quality sand be utilized to protect both the environmental, private, and commercial resources located within the study area. With careful screening of potential borrow material before placement on the beach and monitoring of effects post placement, success for upland borrow areas can be judged.

4.22 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

Restoration of eroding sandy shorelines through periodic placement of sand from offshore borrow areas is a long established practice in Florida and in the region of the Miami-Dade County Test Beach Project. Consequently, with respect to the means and methods for constructing the project, general performance of the beach nourishment, and expected range of impacts, there are few if any risks that are uncertain, unique, or unknown. Burial of features along the shoreline within the fill template is a clear unavoidable impact if the beach is to be restored. What is not fully certain is the extent to which burial of these features, which have only been exposed by shoreline retreat in the last 50 years, will have long-term impact on the environment.

4.23 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

If the proposed action performs as expected, further use of these features could be indicated for Miami-Dade County and other coastal areas. A lack of sand borrow sources requires the need to locate and utilize other borrow area resources. Should the upland material perform as expected use of upland sand sources for other beach nourishment projects for Miami-Dade County may be warranted. Investigation of other potential upland or foreign sand sources may also be investigated.

5 ENVIRONMENTAL COMMITMENTS

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications:

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

(2) Take precautions during construction activities to insure the safety of the manatee. To insure the contractor and his personnel are aware of the potential presence of the manatee in the project area, their endangered status, and the need for precautionary measures, the contract specifications would include the standard protection clauses concerning manatees. The contractor would instruct all personnel associated with the construction of the project about the presence of manatees in the area and the need to avoid collisions with manatees. All vessels associated with the project shall operate at 'no wake' speeds at all times while in shallow waters, or channels, where the draft of the boat provides less than three feet clearance of the bottom. Boats used to transport personnel shall be shallow draft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and any workboat shall follow routes of deep water to the extent possible. Shore crews or personnel assigned to the disposal site for the workshift shall use upland road access if available. All personnel would be advised that there are civil and criminal penalties for harming, harassing, or killing manatees, which are protected under the Endangered Species Act and the Marine Mammal Protection Act. The contractor shall be held responsible for any manatee harmed, harassed, or killed as a result of the construction of the project. If a manatee is sighted within 100 yards of the dredging area, appropriate safeguards would be taken, including suspension of dredging, if necessary, to avoid injury to manatees. The contractor shall keep a log of all sightings, collision, injuries, or killings of manatees during the contract period. Any manatee deaths or injuries will be immediately reported to the Corps of Engineers and the USFWS (Vero Beach Office).

(3) To minimize adverse impacts to sea turtles, the Corps will implement the terms and conditions applicable to Miami-Dade County as outlined in the USFWS Biological Opinion for Region III of the Coast of Florida Erosion and Storm Effects Study issued on October 24, 1996 and amended by letter dated March 1, 2001 (Appendix E). (Measures to minimize adverse effects to sea turtles are summarized below:

a. Nourished beaches would be plowed to a depth of at least 36 inches within one week following the completion of the entire beach nourishment (or sooner on completed sections) if sand compaction is greater than 500 cone penetrometer units.

b. Nourished beaches would be checked for compaction every 500 feet along the project area. One station shall be at the seaward edge of the dune/bulkhead line (when material is placed in this area); one station shall be located between the dune line and the high water line; and one station shall be located just landward of the mean high water line. At each station three readings would be made at 6, 12, and 18 inch depths three times (three replicates). If any two or more adjacent stations have compaction at the same depth greater than 500 cone penetrometer units, the area would be plowed to a depth of at least 36 inches immediately prior to April 1. This process would be completed for three consecutive years following project completion.

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

d. Nest surveys and relocations would be conducted by personnel with prior experience and training in nest survey and relocation procedures, and with a valid Florida Fish and Wildlife Conservation Commission (FWC) permit.

e. Nests would be relocated between sunrise and 9 a.m. each day, and the relocation would be to a nearby hatchery in a secure setting where artificial lighting would not conflict with hatchling orientation.

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

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

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

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

j. Evaluation and monitoring of the effects of upland sand material will be evaluated both

pre-construction and post-construction. This monitoring program will involve the analysis of nesting parameters such as nesting success, temperature, and sex determination, for turtle nest laid in the test beach project area. Nests will be relocated to a beach hatchery area for analysis. Data collected post construction will be compared to studies previously done by Nelson et al. (1996,1997,1998,1999) and Blair et al. (2000).

(4) Monitor turbidity at the discharge site. Should monitoring reveal turbidity levels above State standards, outside the allowable mixing zone, work would be suspended until turbidity levels return to within those standards.

(5) Artificial reefs would be constructed to mitigate for adverse impacts to hardbottom habitat due to the placement of the discharge pipelines.

(6) Benthic infaunal studies pre- and post-construction will be implemented. Species abundance and diversity will be analyzed prior to beach fill placement and monitored following placement to determine the effects of upland sand source fill on benthic infaunal communities.

6 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

6.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project has been compiled and a Draft Environmental Assessment, has been prepared and will be circulated for public review and comment. The project is in compliance with the National Environmental Policy Act.

6.2 ENDANGERED SPECIES ACT OF 1973

On June 19, 1998 the Corps submitted a Biological Assessment (BA) to the National Marine Fisheries Service (NMFS) pursuant to Section 7 of the Endangered Species Act (ESA), for a proposed test beach fill at Miami Beach using oolitic aragonite as the source of fill material. Since no dredging would occur in U.S. waters, the Corps had determined in the BA that the project would not adversely affect any listed species under their jurisdiction. In a letter dated July 15, 1998, the NMFS concurred with that determination. On June 5, 1998 the Corps submitted a BA to the U.S. Fish and Wildlife Service (USFWS) for the test beach fill using aragonite. In the BA the Corps determined that the proposed action may affect listed sea turtles under their jurisdiction and requested formal consultation. In letters dated April 22, 1999 to NMFS and April 29, 1999 to USFWS the Corps modified the proposed action increasing the length and volume of beach fill and changing the source of fill material from aragonite to a domestic upland sand source. This modification did not change the Corps previous affect determinations on listed species for NMFS or the USFWS. The NMFS concurred in a letter dated April 29, 1999. On March 1, 2001 the USFWS issued their Biological Opinion included in their draft Fish and Wildlife Coordination Act Report for the project (Appendix E). Refer to Appendix D for correspondence relating to ESA coordination. This project was fully coordinated under the ESA and is therefore, in full compliance with the Act.

6.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A draft Fish and Wildlife Coordination Act (FWCA) Report dated March 1, 2001 was submitted by the USFWS (refer to Appendix E). There has been no change in the project design or the source of beach fill material since submittal of the CAR. This project is in full compliance with the Act.

6.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

(PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order 11593) Archival

research, field investigations, and consultation with the Florida State Historic Preservation Officer (SHPO), have been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. Refer to Section 4.12 for results of SHPO consultation. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places. The project is in compliance with each of these Federal laws.

6.5 CLEAN WATER ACT OF 1972

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

6.6 CLEAN AIR ACT OF 1972

No air quality permits would be required for this project. This project has been coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the Act. (See Section 4.9) The draft EA will be forwarded to EPA for their review.

6.7 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix C. State consistency review will be conducted during the coordination of the draft EA.

6.8 FARMLAND PROTECTION POLICY ACT OF 1981

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

6.9 WILD AND SCENIC RIVER ACT OF 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

6.10 MARINE MAMMAL PROTECTION ACT OF 1972

Incorporation of the safe guards used to protect threatened or endangered species during beach disposal operations would also protect any marine mammals in the area, therefore, this project is in compliance with the Act.

6.11 ESTUARY PROTECTION ACT OF 1968

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

6.12 FEDERAL WATER PROJECT RECREATION ACT

The principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, have been fulfilled by complying with the recreation cost sharing criteria as outlined in Section 2 (a), paragraph (2). Another area of compliance includes the public beach access requirement on which the renourishment project hinges (Section 1, (b)).

6.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

The project has been coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with the act (refer to correspondence from NMFS in Appendix D).

6.14 SUBMERGED LANDS ACT OF 1953

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

6.15 COASTAL BARRIER RESOURCES ACT & COASTAL BARRIER IMPROVEMENT ACT OF 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

6.16 RIVERS AND HARBORS ACT OF 1899

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

6.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the act.

6.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

No migratory birds would be affected by project activities. The project is in compliance with these acts.

6.19 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

This act requires the preparation of an Essential Fish Habitat (EFH) Assessment and coordination with NMFS. The EFH Assessment has been integrated within the draft EA and will be coordinated with NMFS during the normal NEPA coordination.

6.20 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (33 U.S.C. 1402)(f) does not apply to the disposal of material for beach nourishment. Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project. The disposal activities addressed in this EA have been evaluated under Section 404 of the Clean Water Act.

6.21 E.O. 11990, PROTECTION OF WETLANDS

No wetlands would be affected by project activities. This project is in compliance with the goals of this Executive Order.

6.22 E.O. 11988, FLOOD PLAIN MANAGEMENT

The project is in the base flood plain (100-year flood) and has been evaluated in accordance with this Executive Order. Refer to Dade County Beaches, Florida, Beach Erosion Control and Hurricane Protection, General Design Memorandum. Phase I, 1974. Project is in compliance.

6.23 E.O. 12898, ENVIRONMENTAL JUSTICE

The proposed action would not result in adverse human health or environmental effects, nor would the activity impact substance consumption of fish or wildlife. Project is in compliance.

6.24 E.O. 13089, CORAL REEF PROTECTION

The proposed action may affect U.S. coral reef ecosystems as defined in the Executive Order. Precautions would be implemented during construction to minimize impacts. Artificial reefs would be constructed to mitigate for any reef impacts associated with the placement of discharge pipelines. Section 4.4 outlines potential hardbottom impacts. The proposed project is in compliance.

7 LIST OF PREPARERS

This Environmental Assessment was prepared by the following personnel:

Preparer	Discipline	Role
Michael Dupes	Biology	Principal Writer
Jason Croop	Marine Biology	Associate Writer
Steve Blair	Marine Biology	Reef Impact Assessment
Thomas Birchett	Archeology	Historic Properties
Doug Rosen	Coastal Geology	Geotechnical Analysis

8 PUBLIC INVOLVEMENT

8.1 SCOPING AND DRAFT EA

A Notice of Intent (NOI) to prepare a Draft Environmental Impact Statement (DEIS) for a Test Beach Fill using a foreign source of carbonate sand appeared in the Federal Register on August 21, 1998. In addition, the NOI was mailed to interested and affected parties on October 7, 1998. A correction to this NOI was published in the Federal Register on October 27, 1998. This NOI was cancelled in the Federal Register on February 19, 1999. A new NOI for to prepare a DEIS for a Test Beach using a domestic upland sand source appeared on May 6, 1999 and was mailed to interested parties on May 18, 1999. This NOI was cancelled on May 16, 2002 after it was determined that there were no new significant issues and that an Environmental Assessment would be adequate. Copies of the NOI's and the transmittal

letters can be found in Appendix D as well as copies of any letters of comment/response received. The draft EA will be circulated for review and comment to the appropriate Federal, State and local agencies and other interested parties that have requested a copy. A notice of availability of the draft EA will be prepared and sent to all other known interested and affected parties.

8.2 AGENCY COORDINATION

The proposed project has been coordinated with the following agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Florida State Clearinghouse, Florida State Historic Preservation Officer (SHPO), Florida Fish and Wildlife Conservation Commission, and the Florida Department of Environmental Protection.

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APPENDIX A - SAND SPECIFICATION

BEACH FILL

1. PAYMENT

Payment for sand fill shall be made on the basis of the quantity of sand placed within each Acceptance Section, as measured by the volume of sand within the template shown on the plans. The total quantity may be modified depending on the Mean Grain Size of the sand delivered, according to these specifications and the Bid Schedule. During placement and prior to measurement, the fill sand must have been flooded to consolidate the sand, according to these specifications. Acceptance Sections will not be accepted by the Government until all Mean Grain Size analysis and calculations has been completed for that Acceptance Section, verifying the Mean Grain Size of sand delivered, and thus the proper quantity of sand for that Mean Grain Size, as shown on the Bid Schedule.

2. ACCEPTANCE SECTIONS

Acceptance Sections shall be every 500 feet along the project beach.

3. SAND SOURCE

This project is a test fill for a domestic, upland source of sand. No offshore sand sources shall be an acceptable source.

4. SAND FILL MATERIAL

The Contractor is responsible for providing a source, delivery and spreading of beach compatible sand that meet the following specifications. The sand supplied shall be naturally created. The sand may be processed, but manufactured sand is not allowed. Contractor's offering blended sand shall submit a Blending Plan, showing the method the sand components will be thoroughly mixed before final placement on the beach. The project requires the contractor to bid sand with an average mean grain size of 0.30 mm or greater. The sand will be placed and shaped on the beach to fill the construction template shown in the plans, except as modified by the Mean Grain Size. Final beach fill shape shall parallel the construction template shown in the plans.

The project will benefit from placement of coarser sand, and incentive is provided to bid the coarsest sand available.

- 1) The project design beach must be built to the template shown on the plans (52 percent of the total quantity).
- 2) For the advance nourishment portion of the project fill (48 percent of the total quantity), Table 1 shows a reduced quantity incentive for an increased Average Mean Grain Size.

Placed volume reduction for coarser sand is available on the Bid Schedule, up to a maximum allowable Mean Grain Size of 0.55 mm. The contractor should select the

largest (coarsest) Mean Grain Size he can provide. The contractor is warned that **failure to achieve the grain size class selected on the Bid Schedule, by delivering a finer Mean Grain Size sand, will increase the quantity of sand required for delivery to the project.** Correspondingly, a coarser sand delivered than selected on the Bid Schedule will reduce the volume of sand required

**TABLE 1
COARSE SAND INCENTIVES**

MEAN GRAIN SIZE (mm)	DESIGN BEACH		ADVANCE NOURISHMENT		TOTAL QUANTITY CY
	52% OF TOTAL QUANTITY	% Volume Reduction	48% OF TOTAL QUANTITY	% VOLUME REDUCTION	
0.30 – 0.32	312,000	0%	288,000	0%	600,000
0.33 – 0.35	312,000	0%	239,040	17%	551,100
0.36 – 0.39	312,000	0%	210,240	27%	522,240
0.40 – 0.44	312,000	0%	190,080	34%	502,080
0.45 – 0.49	312,000	0%	178,560	38%	490,560
0.50 – 0.55	312,000	0%	172,800	40%	484,800

5. CHARACTER OF MATERIAL

The character of the sand to be supplied by the Contractor shall meet the following physical specifications:

- Composed of quartz and/or carbonate with no more than 20 percent sand of other mineralogical composition.
- The carbonate sand grains allowable under this specification are naturally occurring, durable and solid carbonate grains. Many carbonate grains have excessive internal pore space dramatically reducing the grains density and durability. Carbonate grains delivered under this specification shall be 90 percent durable and solid carbonate grains. Internal pore space shall not exceed 10 percent.

Whole and broken mollusk shells from the beach environment are durable and solid carbonate grains. Due to the platy nature of shells and shell fragments, no more than 60% of the sand (quartz or carbonate) shall be whole or broken shell.

- Silt content (passing #200 sieve (.074mm)) of less than 5%.

- 99% of material must pass 3/8 inch sieve and shall contain no material larger than the 3/4 inch sieve.
- Average mean grain size greater than or equal to 0.30 mm and less than 0.55 mm.
- Phi Standard Deviation values from 0.50 phi to 1.75 phi.
- Free of debris, sharp rocks and pebbles, concrete rubble, clay, and organic material.
- Sand color shall be similar to the existing beach. Based on the Munsell Soil Color Chart, color must be within the range:
 - HUE of: 2.5 YR, 5 YR, 7.5 YR, 10 YR, 2.5 Y, 5 Y
 - CHROMA of: 1, 2, or 3
 - VALUE of: 6, 7, or 8.
 This color specification eliminates strongly colored or dark sand.

6. SUBMITTALS

Sand source information that shall be submitted with the proposal is:

- 1) the name, location and physical address of the proposed sand source;
- 2) written evidence that the proposed sand source is permitted under local, State, and other authorities, as applicable, with a Letter of Commitment from the Sand Source;
- 3) a grain size distribution of the proposed sand source as determined and reported by a Certified Testing Laboratory. The grain size data shall supply all information required for grain size distribution data under GRAIN SIZE REPORTING requirements.
- 4) a 1 to 3 pound sample of the proposed fill material; and
- 5) evidence that the proposed sand source contains sufficient quantity of acceptable material for the construction of the work.

Samples shall be provided in sealed plastic containers, either jars or bags, clearly marked with the name of the Contractor, the name of the source and any other identifying information.

The submitted grain size distribution data and the sample of the proposed sand source (including its color and texture) shall be representative of the typical nature of the entirety of the proposed sand fill. The Government will retain the submitted documents and samples.

7. SAND FLOODING

If the sand is placed in a state that is not completely saturated by hydraulic placement, the Contractor must saturate the dry placed sand to effect consolidation equal to hydraulic

placement. No more than 100 cubic yards of sand at a time shall be placed on the beach without saturating. Enough water must be used to completely saturate the sand, not less than 100 gallons of water shall be available for each cubic yard of sand placement. Run off water shall be controlled so as not to run off the project limits on the upland side and not to run directly to the ocean forming gullies, eroding the fill sand.

8. CALCULATION OF AVERAGE MEAN GRAIN SIZE

The Mean Grain Size and Phi Standard Deviation shall be determined by Method of Moments Statistics calculated from sieve analysis of the proposed sand source. A Certified Testing Laboratory shall perform laboratory testing in accordance with ASTM – D422. The Method of Moments Statistics shall be calculated according to the instructions contained within this section.

Mean grain size and phi standard deviation are statistical measures of the textural character of a sample of sand, corresponding to the mean and standard deviation of a statistically normal population (example: sand grain sizes). Laboratory sieving of sand provides the data for calculation of the mean grain size and phi standard deviation. There are several methods of calculating these statistics. For the purposes of this contract, Mean Grain Size and Phi Standard Deviation shall be calculated by the Method of Moments. The method of calculation is included in this section. The Average Mean Grain Size refers to the average of the Mean Grain Sizes calculated for individual samples sieved in the laboratory. The Average Mean Grain Size shall be used to evaluate price and quantity incentives for this contract.

9. GRAIN SIZE REPORTING

The grain size distribution information shall be based upon ASTM – D422, using U.S. Standard sieve sizes 3/8", 4, 8, 16, 30, 40, 50, 70, 100, 140, 200, 230. Each sample test results shall be represented by a gradation curve and a frequency curve. All gradation curves shall be submitted on ENG Form 2087, sample appended to this section. All title information shall be filled out with project name, date, sample number, location sample obtained, unified soil classification, percent silt passing the No. 200 sieve (0.074mm), percent silt passing the No. 230 sieve (0.063mm) and Method of Moments Mean Grain Size and Phi Standard Deviation. Each curve shall state what Mean Grain Size class the sample meets, according to the Bid Schedule. Frequency curves shall show percent retained on vertical axis and grain size on horizontal axis. Frequency curves shall be identified by sample number and date and accompany the gradation curve. A tabulation of the laboratory results of weight retained, percent retained and cumulative percent retained on each sieve, by weight, shall be provided with each gradation curve. Samples from the sand source shall be numbered consecutively. Samples from the project site shall be identified with the Acceptance Section, numbered consecutively for each Acceptance section, and a station and range location.

10. CERTIFIED TESTING LABORATORY

Certified Testing Laboratory refers to a geotechnical testing laboratory qualified under ASTM E329-95c standards and certified by AASHTO (American Association of State Highway and Transportation Officials) National Voluntary Accreditation Program; or MMRL (AASHTO Materials Reference Laboratory accreditation; and personnel qualified by NICET (National Institute for Certification of Engineering Technicians).

11. MEAN GRAIN SIZE AND PHI STANDARD DEVIATION CALCULATION USING THE MOMENT METHOD

The equations for calculating the Mean Grain Size and Phi Standard Deviation using the moment method are as follows:

$$\text{Mean Grain Size } M = \frac{\sum fx}{n}$$

$$\text{Phi Standard Deviation } \sigma = \sqrt{\frac{\sum (x - M)^2}{n}}$$

Use of these equations to calculate the moment method values is illustrated in Table 2. Column A is the sieve size used, Column B is the corresponding sieve opening in millimeters, and Column C is the sieve opening in phi. The phi values are used in the calculation.

Sieve analysis measures the percent retained on each sieve size by weight (Column D). Column E (x) is the midpoint value in phi between adjacent sieves. Column F (f) is the percent retained by the smaller of adjacent sieves. Column G is the product of Column E and F (x * f). The sum of the values in Column F is n, sum of the percent retained on the smallest sieve used. This value will generally be less than 100%, as some fine material passes through all the screens. The sum of the values in Column G is $\sum fx$, and its division by n produces the mean grain size in phi units of measure. The millimeter (mm) value is calculated as follows:

$$2^{-\text{phi}} = \text{mm}$$

$$\text{Example: } 2^{-1.25 \text{ phi}} = 0.42 \text{ mm}$$

Columns H and J are used to calculate the Phi Standard Deviation (σ) value of the material. If a sieve size is not used in the testing process it should be completely eliminated from the calculation table.

12. QUALITY CONTROL SAMPLING

The Contractor shall perform sampling that includes no less sample collection than described in the following plan. The Contractor shall conduct all testing in a location accessible to government inspectors. The Contractor shall include the sampling and testing procedure in his Contractor's Quality Control Plan for government review and acceptance within ten days of notification of acceptance of Bid. The Quality Control Plan shall include the name, address and point of contact for the Certified Testing Laboratory to be used for all grain size analysis. The location of the testing facility to be

Table 2								
CALCULATION OF MOMENT METHOD FOR MEAN GRAIN SIZE AND PHI STANDARD DEVIATION								
A	B	C	D	E	F	G	H	I
U.S. STANDARD SIEVE	GRAIN SIZE		CUMULATIVE PERCENT RETAINED*	* Cumulative Percent Retained is example results of laboratory sieving of a sand sample.				
	mm	PHI		x	f	fx	(x-M) ²	f(x-M) ²
3/4	19.00	-4.25	0.0%					
				-3.75	0.9%	-0.034	28.084	0.253
3/8	9.51	-3.25	0.9%					
				-2.75	3.8%	-0.105	18.498	0.703
4	4.76	-2.25	4.7%					
				-1.75	4.7%	-0.082	10.901	0.512
8	2.38	-1.25	9.4%					
				-0.75	9.5%	-0.071	5.298	0.503
16	1.19	-0.25	18.9%					
				0.25	10.5%	0.026	1.694	0.178
30	0.595	0.75	29.4%					
				1.00	4.5%	0.045	0.303	0.014
40	0.420	1.25	33.9%					
				1.50	5.3%	0.080	0.002	0.000
50	0.297	1.75	39.2%					
				2.00	9.0%	0.180	0.203	0.018
70	0.210	2.25	48.2%					
				2.50	12.3%	0.307	0.899	0.111
100	0.149	2.75	60.5%					
				3.00	24.8%	0.744	2.098	0.520
140	0.105	3.25	85.3%					
				3.50	10.6%	0.371	3.815	0.404
200	0.074	3.76	95.9%					
				3.88	1.1%	0.043	5.417	0.060
230	0.063	4.00	97.0%					
SUM				n=	97.0%			
SUM				Σ=		1.50	3.276	
MEAN GRAIN SIZE (PHI)				M(phi) =		1.55		
MEAN GRAIN SIZE (mm)				M(mm) =		0.34		
PHI STANDARD DEVIATION				σ=			1.84	

used for this contract shall also be included in the Quality Control Plan. Gradation test results shall be turned in daily with the daily quality control reports. Each sample collected shall be approximately one pound in weight and obtained from a single location. **All laboratory test results shall be reported to the Government.**

Sampling at the Sand Source

Sand samples for laboratory testing shall be collected at the sand source at the rate of one sample for every 2000 cubic yards of sand to be transported. Sampling and testing shall be completed before the sand is transported to the project site, and shall be representative of the sand being delivered to the project. Each day's samples Mean Grain Size and Phi Standard Deviation shall be averaged and the running average recorded on the gradation curve, along with the individual sample Mean Grain Size and Phi Standard Deviation. A new average shall be started each day. The Average Daily Mean Grain Size shall be used as an indicator for the Mean Grain Size for the sand proposed on the Bid Schedule and being delivered to the project. No individual sample Mean Grain Size shall be less than 0.25 mm. Any materials not meeting the Mean Grain Size requirements shall not be transported to the project site. Any materials not meeting the Contractor's Bid Mean Grain Size delivered to the project site shall fall into the lower Mean Grain Size class, and appropriately more sand shall be delivered.

Sampling at the Project Site

Sand samples for laboratory testing shall be collected at the project site. Sand samples shall represent the fill material only, avoiding existing beach sand below the project fill. Sand samples shall be collected from each beach fill Acceptance Section. Sand samples shall be collected at the rate of one sample representing 500 cubic yards of sand delivered. This represents approximately 100 samples taken per 500 foot Acceptance Section. The samples shall be collected on a regular sampling grid covering the entire Acceptance Section, and the location recorded on the gradation curve. The plan of beach sampling shall be submitted with the Contractor's Quality Control Plan. All sample collection in an Acceptance Section shall be distributed temporally over the entire filling operation. Half of the samples shall be collected during filling of the Acceptance Section, when the fill is approximately less than half of the final grade. The second half of the samples shall be taken from the surface of the completed Acceptance Section. Samples shall not be collected from the surface, but 6 inches below the ground surface. Before an Acceptance Section is surveyed for final payment and accepted by the government, all sample laboratory analyses shall be completed and submitted to the Government. All individual sample Mean Grain Size and Phi Standard Deviation shall be tabulated. The tabulation shall include sample identifying information including Acceptance Section, sample number and date. The Average Mean Grain Size and Average Phi Standard Deviation for each Acceptance Section shall be calculated from and indicated on the tabulation sheet. The Average Mean Grain Size from the sample analysis for each Acceptance Section shall be compared to the Bid Schedule Mean Grain Size class, and verify that the appropriate quantity of sand has been delivered for the

Mean Grain Size of the sand in that Acceptance Section. The survey of the Acceptance Section will verify the quantity of sand delivered. **The total quantity of sand in an Acceptance Section shall match the quantity shown on the Bid Schedule for the Mean Grain Size class of sand indicated by the Average Mean Grain Size of sand delivered to that Acceptance Section.**

13. PERMITS

The Contractor shall be responsible for obtaining all applicable permits for the sand source. As part of the proposal, the contractor shall submit evidence satisfactory to the Government that the sand source to be used for the project is permitted by local, State, and Federal authorities, as applicable. The Contractor is likewise responsible for obtaining all applicable permits and licenses for the transport of equipment and material undertaken as part of the work.

The Government shall obtain permits for the placement of the fill sand along the project beach area. By acceptance of the contract, the Contractor agrees to abide by all applicable conditions of the permits.

14. ENVIRONMENTAL QUALIFICATIONS AND ENVIRONMENTAL SAMPLING

GENERAL INFORMATION

It is important that any material to be used for a Dade Co. sand borrow source be considered to be as clean as what exists on Dade beaches or is normally used for playground quality sand. A Phase I HTRW (Hazardous Toxic and Radioactive Waste) Evaluation to meet the requirements of ASTM E-1527-97 shall be performed on the borrow source material. If the borrow site contains HTRW materials or is suspected of containing hazardous materials, fissionable materials, environmental contaminants or otherwise toxic materials it shall not be used as a borrow source. After the Notice to Proceed is issued, the Contractor shall submit an Environmental Sampling Plan, which will include the Phase 1 HTRW report. Approval of the Plan will not relieve the Contractor of his responsibility to document all potential sources of contamination of the borrow material, preexisting conditions in and around the borrow site, and to avoid contaminating any portion of the beach placement area with substandard material. Although an Environmental Sampling Plan needs to be submitted, actual environmental sampling may not be necessary. The Government will make the determination on the need for the Contractor to conduct environmental sampling and analysis at any point in time during the project, based on the information that is provided, and inspections of the borrow area and beach for the duration of the project.