February 2004

Volume II of II

FINAL

Pertinent Correspondence – Appendix D

For the

Miami Harbor Navigation Study
General Reevaluation Report

Miami-Dade County, Florida - 010140

US Army Corps
of Engineers®

Jacksonville District
South Atlantic Division

APPENDIX D

PERTINENT CORRESPONDENCE

TABLE OF CONTENTS

Item — Page No.

STUDY PARTICIPANTS – 2003 1

WRITTEN COORDINATION AND RESPONSES

USACE – 1999
- STUDY INITIATION NOTICE TO PORT OF MIAMI 7
- PROPOSED MAILING LISTS AND COORDINATION LETTERS 9
- CHANGES TO MAILING LISTS AND COORDINATION LETTERS 11

USACE – 2000
- ENVIRONMENTAL SCOPING LETTER 13
- DEPARTMENT OF ENVIRONMENTAL PROTECTION 17
- MIAMI-DADE DEPARTMENT OF ENVIRONMENTAL RESOURCES MANAGEMENT 19
- PORT OF MIAMI MODIFICATIONS 21
- RESPONSE TO PORT OF MIAMI CONCERNS 23

USACE – 2001
- BISCAYNE BAY PILOTS MODIFICATIONS 25
- UTILITY INFORMATION REQUEST (WATER/SEWER) 27
- RESPONSE REGARDING RELOCATION OF WATER MAIN 29

MIAMI-DADE COUNTY SEAPORT DEPARTMENT
- PLAN MODIFICATIONS 2000 31
- RESPONSE TO ECONOMIC ANALYSIS 2003 33

BISCAYNE BAY PILOTS ASSOCIATION
- REQUEST FOR IMPROVEMENTS 1997 55
- APPROVAL OF PROPOSED MODIFICATIONS 2001 59

US COAST GUARD
- USACE REQUEST TO REVIEW PLANS 2001 61
- USCG REVIEW OF PLANS 2001 65
- USCG CASUALTY DATA 2002 67

MIAMI-DADE WATER AND SEWER DEPARTMENT
- WATER MAIN CONCERNS 2000 75
- RELOCATION OF MAINS 2001 77

UNITED STATES FISH AND WILDLIFE SERVICE
SUPLEMENTAL RECCOMMENDATIONS TO FWCA REPORT 2003.....79

CITY OF MIAMI
COMMENTS 2000.....SEE EIS

NATIONAL MARINE FISHERIES SERVICE
NOTICE OF INVOLVEMENT 2000.....SEE EIS
COMMENTS ON ALTERNATIVES 2000.....SEE EIS

ENVIRONMNETAL PROTECTION AGENCY
REVIEW OF ALTERNATIVES.....SEE EIS

DEPARTMENT OF ENVIRONMENTAL PROTECTION
REVIEW OF ALTERNATIVES.....SEE EIS

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISION
REVIEW OF ALTERNATIVES.....SEE EIS

FLORIDA DEPARTMENT OF TRANSPORTATION
REVIEW OF ALTERNATIVES.....SEE EIS

SOUTH FLORIDA REGIONAL PLANNING COUNCIL
REVIEW OF ALTERNATIVES.....SEE EIS

APPENDIX D

PERTINENT CORRESPONDENCE

The study coordination effort was to keep the public informed and obtain feedback. The study participants are listed in this appendix along with the public views and comments obtained during the study.

STUDY PARTICIPANTS

Accomplishment of the study involved close coordination between the Corps of Engineers and the sponsor. The Corps of Engineers conducted the study, consolidated information from other agencies, formulated plans, and coordinated study findings at various points during the study. Coordination involved the following Federal and State agencies in addition to local interest and the sponsor, Miami-Dade County Seaport Department.

Federal
Fish and Wildlife Service
United States Coast Guard
Environmental Protection Agency
National Marine Fisheries Service

State
Department of Environmental Protection
Department of Natural Resources
State Historic Preservation Office
Florida Fish and Wildlife Conservation Commission
Florida Department of Transportation

WRITTEN COORDINATION AND RESPONSES

Coordination with local interests involved field visits and local interviews to obtain their views and provide information. The attached sheets list meetings in which the sponsor and involved agencies met with USACE to discuss the study.

Date	Group(s) Involved With USACE	Topic(s) Discussed
3/13/2000	Department of Environmental Resources Management Dial Cordy and Associates	Environmental Coordination
5/13/2000	Department of Environmental Resources Management National Marine Fisheries Service Department of Environmental Protection Environmental Protection Agency U.S. Fish and Wildlife Service Florida Fish and Wildlife Conservation Commission Port of Miami	Environmental Information Exchange Workshop
7/18/2000	All Port Users and Operators Port of Miami Curtis & Kimball	Overview of Project
11/1/2000	Port of Miami Department of Environmental Protection Environmental Protection Agency U.S. Fish and Wildlife Service Department of Environmental Resources Management Florida Fish and Wildlife Conservation Commission National Marine Fisheries Service	Discussion of Environmental Resource Survey Results
5/16/2001	Biscayne Bay Pilots	Review of Environmental Resource Survey Results And Proposed Navigation Improvements Review of Preliminary Ship Simulation Results
7/10/2001	Port of Miami	Environmental Impact Statement Kickoff Meeting
2/19/2002	Dial Cordy & Associates Inc.	Environmental Issues

Date	Group(s) Involved With USACE	Topic(s) Discussed
4/16/2002	Port of Miami Biscayne Bay Pilots Environmental Protection Agency Department of Environmental Protection U.S. Fish and Wildlife Service Department of Environmental Resources Management Florida Fish and Wildlife Conservation Commission National Marine Fisheries Service	Review of the 6 Potential Alternatives and Consequent Impacts
6/3/2002 to 6/7/2002	Dial Cordy and Associates	Mitigation Survey Field Trip Look At Mitigation Options
6/19/2002	Port of Miami Curtis & Kimball	Alternative Formulation Briefing Preparations
6/20/2002	USACE HQ Dial Cordy and Associates Port Pilots U.S. Fish and Wildlife Service Florida Fish and Wildlife Conservation Commission Department of Environmental Resources Management Department of Environmental Protection National Marine Fisheries Service	Alternative Formulation Briefing
7/3/2002	Port of Miami Curtis & Kimball Dial Cordy and Associates	Editing of Environmental Impact Statement
8/1/2002	Port of Miami Curtis & Kimball	Overall Schedule Utility Relocation Environmental Impact Statement
8/8/2002	Department of Environmental Protection Florida Fish and Wildlife Conservation Commission	Miami Harbor Blasting Issues (In Tallahassee)

file

March 15, 1999

Programs and Project Management Division
Project Management Office

Mr. Carl Fielland
Port of Miami-Dade
1015 North American Way
Miami, Florida 33132

Dear Mr. Fielland:

This letter is to inform you that we have initiated studies this fiscal year to examine channel improvements for Miami Harbor. As you know, the Committee on Transportation and Infrastructure of the U.S. House of Representatives authorized a study to consider deepening Miami Harbor. The funds for the study are now available. Jerry Scarborough, the project manager, will arrange a meeting with you near the end of this month to discuss the study process in more detail.

We look forward to working with you in the continued improvement of the Miami Harbor Federal channels. If you have any questions, please contact me at 904-232-2586 or Mr. Jerry Scarborough at 904-232-2042.

Sincerely,

SIGNED: Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer for
Project Management

bcc:
CESAJ-PD-PN (D. Powell)

Powell/PD-PN
Schmidt/PD-PN
Strain/PD-P
Duck PD
Scarborough/DP-I
Duke/DP-A
Bonner/DP

I:\group\pd\spo1_ltr.doc

Planning Division
Plan Formulation Branch

Mr. Carl E. Fielland, Port Engineer
Port of Miami
1015 North American Way
Miami, Florida 33132

Dear Mr. Fielland:

As requested in our telephone conversation on September 22, 1999, the enclosed copies of our proposed draft environmental and economic analysis coordination letters are provided for your review. Both letters contain mailing lists related to different interest groups along with a copy of the drawing explaining the proposed modifications to the harbor. Please advise us if you require any changes to the mailing lists, draft letters, or the proposed modifications drawing.

As suggested in a September 7, 1999, e-mail message from Ms. Amy Kimball-Murley to Mr. Robert King of my staff, we agree that a letter from the Port Director will encourage recipients of the benefit analysis coordination letter to respond quickly and thoroughly. A sample letter for that purpose is enclosed for your consideration. The main purposes of the coordination letter are to initiate communication, establish points of contact with the port users, and identify potential benefits associated with the proposed navigation improvements.

If you have any questions concerning the enclosed information, contact Mr. Jerry Scarborough at 904-232-2042 or myself at 904-232-2586.

Sincerely,
SIGNED: Dennis R. Duke

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosures

Copy Furnished:

Ms. Amy Kimball-Murley, AICP, The Curits & Kimball Company, 4101 Laguna Street, Coral Gables, Florida 33146
Ms. Nancy Case O'Bourke, P.E., 1521 Alton Road #112, Miami Beach, FL 33139

bcc:
CESAJ-PD-PN (D. Powell)
CESAJ-PD-ER (Boothby)
CESAJ-PD-D (King)

Planning Division
Plan Formulation Branch

Mr. Carl E. Fielland, Port Engineer
Port of Miami
1015 North American Way
Miami, Florida 33132

Dear Mr. Fielland:

During our visit to the Port of Miami on November 3, 1999, we agreed to correct proposed draft environmental and economic analysis coordination letters to include the revised alternatives discussed during that meeting. The enclosed letters contain the revised alternatives with a drawing explaining the requested modifications to the harbor. Based on additional information you provided, final mailing lists related to different interest groups are also included. Please advise us if you require any changes to the draft letters, the proposed modifications drawing, or mailing lists.

If no other changes are required, please notify us so that we can mail both the environmental and economic analysis coordination letters as soon as possible. We also understand Ms. Amy Kimball-Murley suggested additional revisions to the Port Director's cover letter for the economic analysis coordination letter and that the revised cover letter will be provided soon. As mentioned before, the main purposes of the benefit analysis coordination letter are to initiate communication, establish points of contact with the port users, and identify potential benefits associated with the proposed navigation improvements.

Thank you for providing the database of vessels visiting Miami Harbor. Our economists are using that information to expand their listings of vessels using the port's facilities. If you have any questions concerning the enclosed information, contact Mr. Jerry Scarborough at 904-232-2042 or myself at 904-232-2586.

Sincerely,

SIGNED: Dennis E. Duke

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosures

Copy Furnished:

Ms. Amy Kimball-Murley, AICP, The Curtis & Kimball Company, 4101 Laguna Street, Coral Gables, Florida 33146

bcc:
CESAJ-PD-PN (D. Powell)
CESAJ-PD-ER (Boothby)
CESAJ-PD-D (King)

*** D R A F T ***

Planning Division
Environmental Branch

TO WHOM IT MAY CONCERN:

The Miami-Dade County Seaport Department of the Port of Miami has requested that the U.S. Army Corps of Engineers (Corps), Jacksonville District, study the feasibility of widening and deepening portions of Miami Harbor, Dade County, Florida (enclosure 1). To assist in this effort, the Corps is gathering information to define issues and concerns that will be addressed in a general reevaluation and review (GRR) study of Miami Harbor to consider modifying portions of the deep draft navigation project.

Six alternatives identified by the Biscayne Bay Pilots and the Miami-Dade County Seaport Department are under consideration as indicated on the enclosed drawing and described below:

- The first involves flaring the existing 500-foot wide entrance channel to provide an 800-foot wide entrance at buoy 1. Deepening of the entrance channel along Cut-1 and Cut-2 from an existing depth of 44 feet in one-foot increments to a depth of 52 feet will receive consideration.

- The second alternative will consider adding a turn widener between buoys 13 and 15 and deepening to depths of 50 feet.

- Alternative three involves extending the existing Fisher Island turning basin to the north. A turning notch (1600 feet by 1450 feet) extending approximately 500 feet to the north of the existing channel edge along the West End of Cut-3 would require evaluation. Depths from 43 to 50 feet at one-foot increments below the existing depth of 42 feet will receive consideration in the area of the turning notch.

- Alternative four consists of relocating the main channel (cruise ship channel or Cut-4) about 175 feet to the south between channel miles 2 and 3 over a two or three degree transition to the existing cruise ship turning basin. No

dredging is expected for alternative four since existing depths allow for continuation of the authorized depth of 36 feet.

- Alternative five proposes to increase the width of the Lummus Island Cut (Fisherman's Channel) about 100 feet to the south of the existing channel. Deepening would include examination of depths below the existing 42-foot depth at one-foot increments from 43 to 50 feet along the proposed widened channel from Cut-3, Station 0+00 to Cut-3, Station 42+00.

- Alternative six includes deepening of Dodge Island Cut and the proposed 1200-foot turning basin from 32 and 34 feet to 36 feet. It also involves relocating the western end of the Dodge Island Cut to accommodate proposed port expansion.

Examination of the impacts of the proposed dredging alternatives on the harbor system and shoreline processes is also part of the study. During the study our objectives include identifying any problems and needs associated with deep-draft vessel movements serving cargo and cruise ship facilities within Miami Harbor and seeking a solution.

Approval of a prior study allowed the Port of Miami's Miami-Dade County Seaport Department to improve the entrance channel and deepen it from 38 feet to 44 feet during the past Phase I construction effort. That work included addition of a widener on the north side of Government Cut at the Fisher Island turning basin along with deepening from 36 feet to 42 feet through the Fisher Island turning basin to the first half of the Lummus Island Cut or Fisherman's Channel. Under the same authorization the Port of Miami's current Phase II deepening involves extending the 42-foot depth to the end of the Lummus/Dodge Island turning basin.

The Corps welcomes your views, comments, suggestions, and any information about resources, study objectives, and important features within the described study area. Letters of comment or inquiry should be addressed to the letterhead address to the attention of Planning Division, Environmental Coordination Section and received by this office within thirty (30) days of the date of this letter.

Sincerely,

James C. Duck
Chief Planning Division

file

July 10, 2000

Planning Division
Plan Formulation Branch
Coastal/Navigation Section

Dr. Al Devereaux
Director, Office of Beaches and Coastal Systems
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Mail Station 300
Tallahassee, Florida 32399-3000

Dear Dr. Deveraux:

A conference call was recently held between our respective staffs to discuss ways to improve Corps/FDEP project development/permit decision process for Federal Civil Works projects. It was suggested during the call that a member of your staff join the study teams of some of our current studies. One of the studies suggested was the Miami Harbor General ~~Review~~ Re-evaluation Report (GRR).

The Miami Harbor GRR will consider six alternatives that involve a combination of deepening and widening measures as outlined on the enclosed drawing. Responses from FDEP's letter dated February 22, 2000 have already helped us understand environmental concerns related to the proposed alternatives. Mr. David Mayer's (FDEP) participation in our environmental workshop at DERM on March 13, 2000 also helped us gain additional information concerning Biscayne Bay environmental resources.

Our next Miami Harbor GRR study team meeting is scheduled for July 18, 2000, 1:00 p.m., at the Port of Miami, 1015 N. America Way, 2nd Floor, Miami, Florida. That meeting will include discussions with port users, harbor pilots, and the Port Authority to discuss problems, needs, and opportunities. This is an important step toward determining the without project, existing, and future conditions and development of alternative plans of improvement.

We invite your active participation in the study, including attending study team meetings. We look forward to working together on these important efforts.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

Copy Furnished:
Mr. Carl E. Fielland, Port Engineer, Port of Miami, 1015 N. America Way, 2nd Floor, Miami, Florida 33132

Ms. Amy Kimball-Murley, AICP, The Curtis & Kimball Company, 4101 Laguna Street, Coral Gables, Florida 33146

bcc:
CESAJ-DP (Bonner)
CESAJ-DP-A (Duke)
CESAJ-DP-I (Scarborough)
CESAJ-PD-E (Smith)
CESAJ-PD-ER (Dugger)
CESAJ-PD-ER (Boothby)
CESAJ-PD-P (Strain)
CESAJ-PD-PN (Schmidt)

CESAJ-PD-PN Powell/1694
CESAJ-PD-PN Schmidt
CESAJ-PD-P Strain
CESAJ-PD-ER Boothby
CESAJ-PD-ER Dugger
CESAJ-PD-E Smith
CESAJ-DP-I Scarborough
CESAJ-DP-A Duke
~~CESAJ-DP~~ Bonner
CESAJ-PD Duke

L:\group\pdp\rbp\dep2_ltr_7_7_00

file

August 30, 2000

Planning Division
Plan Formulation Branch

Dr. Susan Markley
Miami-Dade Department of Environmental Resources Management
33 Southwest 2nd Avenue
Miami, Florida 33130

Dear Dr. Markley:

As you know, a proposed marine environmental baseline survey of Miami Harbor and vicinity will be accomplished as part of the ongoing Miami Harbor studies. We issued a Notice-To-Proceed (NTP) on a task contract order to Dial/Cordy Consultants to initiate this work on August 29, 2000.

The contract allows 90 days for completion of the required fieldwork. Collection of initial data is anticipated to require about two weeks. After the contractor has mobilized and completed a preliminary overview of the study area, we will coordinate with you to determine the best time for the Miami-Dade Department of Environmental Resources Management (DERM) and other interested state and Federal resource agencies to join the survey. We will set up a meeting with DERM to review the results after completion of data processing.

Thank you for assisting us in understanding environmental concerns relating to the study alternatives for Miami Harbor. If you have any questions concerning the enclosed information, contact our Project Manager Jerry Scarborough at 904-232-2042 or David Schmidt at 904-232-1697.

Sincerely,

James C. Duck
Chief, Planning Division

Copy Furnished:

Carl E. Fielland, Port Engineer, Port of Miami
Ms. Amy Kimball-Murley, AICP, The Curtis & Kimball Company
Ms. Nancy Case O'Bourke, P.E., Case O'Bourke Engineering Inc.
Mike Johnson, National Marine Fisheries Service
Chuck Sulzman, US Fish and Wildlife Service

bcc:
CESAJ-PD-ER (R. Boothby)
CESAJ-PD-EE (G. Schuster)
CESAJ-DP-I (J. Scarborough)

RBP Powell/PD-PN
Schmidt/PD-PN
Strain/PD-P
Smith/PD-E
Hundley/CT-C
Scarborough/DP-I
Duke/DP-A
Bonner/DP
Dunk/PD

L:\group\pdp\rbp\DERM _ltr_8_25_00.doc

file

Planning Division
Plan Formulation Branch

Mr. Carl E. Fielland, Port Engineer
Port of Miami
1015 North American Way
Miami, Florida 33132

Dear Mr. Fielland:

Receipt of preliminary ship simulation results has allowed further evaluation of the environmental resource surveys for Miami Harbor in relation to the current alternatives. The enclosed drawings include modifications to alternative-one (the entrance channel widener) and alternative-three (the Fisher Island Turning Basin) that will either avoid or reduce impacts to environmental resources.

A review of those proposed changes with the Biscayne Bay Pilots association will allow us to determine the best approach to avoid the impacted environmental resources and still provide the changes required to improve navigation of the Federal channels. From your May 8, 2001, telephone conversation with Jerry Scarborough tentative dates of May 15 or May 16, 2001, have been suggested for a meeting at your office with the Biscayne Bay Pilots to review the proposed changes.

Please contact Jerry Scarborough at 904-232-2042 to confirm the most convenient time and place that suits you and the Biscayne Bay Pilots. Thank you for your continued support and assistance.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosures

Copy Furnished:

Ms. Amy Kimball-Murley, AICP, The Curtis & Kimball Company, 4101 Laguna Street, Coral Gables, Florida 33146

Captain John Fernandez, Biscayne Bay Pilots, 2911 Port Blvd. Miami, Florida 33132

bcc:
CESAJ-PD-PN (D. Powell)
CESAJ-PD-ER (Boothby)
CESAJ-PD-D (King)
CESAJ-EN-HI (Choate)
CESAJ-EN-HI (Sylvester)
CESAJ-EN-DL (Henderson)

Powell/PD-PN
Schmidt/PD-PN
Strain/PD-P
Sylvester/EN-HI
Choate/EN-HI
Henderson/EN-DL
Duck/PD
Scarborough/DP-I
Dollar/DP-A
Bonner/DP

L:\group\pdp\Rbp\sponsor4_ltr.doc

Richard B Powell
07/07/2000 02:21 PM

To: carlef@miami-dade.fl.us@SMTP@Exchange
cc: Jerry W Scarborough/CESAJ/SAJ02, David V Schmidt/CESAJ/SAJ02, Shashi Makker/CESAJ/SAJ02, Gerald DeLoach/CESAJ/SAJ02
Subject: Miami Harbor GRR Relocations

Mr. Carl Fielland,

Thank you for your July 5, 2000 letter concerning sewer line relocations.

Relocation of the sewer line between Miami Beach and Fisher Island in the area of alternatives two and five depends on how many feet of deepening the economic analysis justifies. As mentioned in our July 5, 2000 telephone conversation with Jerry Scarborough, our design criteria generally requires six feet between the project depth of the navigation channel and the top of any pipeline. That six-foot clearance also extends about 25 feet beyond the edges of the channel bottom.

When our mechanical and electrical engineering design section has finished coordinating with the utility companies in the Miami area to locate not only the sewage force mains, but any other utility line that may cross the project study area, identification of the utility lines requiring relocation will be made based on the justified project depth, economic, and other environmental considerations. Our current schedule indicates that process should complete by December of this year. As soon as the evaluation is completed, we will discuss the results with you.

Could we also get a copy of any utility location drawings you may have. When we visit you on July 18, 2000, I would like to borrow any drawings you may have at that time. I will return them after copies are made.

Sincerely,

Dick Powell

JUL 16 2001

Planning Division
Plan Formulation Branch

Captain John R. Fernandez
Biscayne Bay Pilots
2911 Port Boulevard
Miami, Florida 33132

Dear Captain Fernandez:

The enclosed drawing contains modifications to the proposed study alternatives based on the recommendations of you and Captain Stephen McDonald at the Port of Miami offices on May 16, 2001. The enclosed drawing includes modifications to alternatives1, 2, 3, and 5 that will either avoid or reduce impacts to environmental resources.

Approval of those proposed changes by the Biscayne Bay Pilots association will allow us to continue calculations for our quantity and cost estimates. Please provide a written response by July 23, 2001.

Contact Jerry Scarborough at 904-232-2042 or Philip Sylvester at 904-232-1142 if you have any questions concerning the proposed changes. Thank you for your continued support and assistance.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

Copy Furnished:

Ms. Amy Kimball-Murley, AICP, The Curtis & Kimball Company, 4101 Laguna Street, Coral Gables, Florida 33146

Carl E. Fielland, Port Engineer, Port of Miami, 1015 N. America Way, 2nd Floor, Miami, FL 33132

bcc:
CESAJ-PD-PN (D. Powell)
CESAJ-EN-HI (Choate)
CESAJ-EN-HI (Sylvester)
CESAJ-EN-DL (Henderson)

7-9-01 RBP Powell/PD-PN/SLW 7/5/01
Schmidt/PD-PN
Strain/PD-P
Sylvester/EN-HI
Choate/EN-HI
Henderson/EN-DL
Duck/PD
Scarborough/DP-I
Dollar/DP-A
Bonner/DP

L:\group\pdp\Pilots_ltr.doc

July 20, 2001

Engineering Division
Design Branch

Mr. John Cherlog
Assistant Director, Engineering/Planning
Miami-Dade Water and Sewer Department (WASD)
P.O. Box 330316
Miami, FL 33233-0316

Dear Director Cherlog:

The U.S. Army Corps of Engineers is preparing an engineering appendix of the General Reevaluation Report for various improvements at Miami Harbor that may affect utility lines crossing the channels. The proposed improvements are shown highlighted on the enclosed sheet. Be advised that no decision has been made to accomplish either of the proposed improvements.

The purpose of this letter is to notify your agency of the reevaluation report and to request your assistance in compiling information regarding utilities at Miami Harbor.

At the request of Dade County, the Corps of Engineers will incorporate the sewer main relocation in work to be performed with other construction work at the harbor should channel improvements Alt 2a and 3b be accomplished. Please return by August 13, as-built drawings for the 52-inch force sewer main crossing the channels at Miami Harbor marked to show the locations, characteristics, and elevations or depths. Additionally, locations, depths and pipe characteristics are requested for the two water mains also shown on the enclosed drawing.

Thank you for your cooperation in this matter. The technical point of contact for discussion of these relocations is Mr. Gerald DeLoach at 904-232-1050; FAX 904 232-2131.

Sincerely,

Edward E. Middleton, Ph.D., P.E.
Chief, Engineering Division

Enclosure

bcc (wo/encl.):
CESAJ-DP-I (J. Scarborough)
CESAJ-PD-PN (R. Powell)

DeLoach/CESAJ-EN-DM/1050
Makker/CESAJ-EN-DM
Leicht/CESAJ-EN-D
Sanders/CESAJ-EN-A

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

FEB 28 2001

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Mr. William M. Brant, P.E.
Director
Miami-Dade Water and Sewer Department
4200 Salzedo Street
Coral Gables, Florida 33146

Dear Mr. Brant:

This is in regard to your request for the U.S. Army Corps of Engineers (USACE) to accomplish the relocation of the 54" force main that crosses Government Cut between Miami Beach and Fisher Island. As you know, the USACE is currently involved in a study of Miami Harbor to determine if additional deepening of the harbor is justified. Since the force main crosses the Federal Navigation Channel, the potential relocation of the force main is already being addressed in the USACE study.

At the channel's current depth the force main is barely within USACE guidelines which stipulate that utilities that cross Federal navigation channels should be at a minimum of 6 feet below project depth. The crown of the force main is at an elevation of -50 feet and the current channel depth is -42 feet required plus an additional 2 feet of allowable overdepth. If the allowable overdepth is achieved, as it typically is, there is a maximum of six feet of cover over the force main. Therefore, if any additional deepening is justified by the USACE study, the relocation will be mandatory.

USACE policy stipulates that relocations are the responsibility of the local sponsor, which in this case is Dade County/Port of Miami. The Water Resources Development Act of 1986, Public Law 99-662, established the criteria for utility relocations. This states that "Non-Federal interests shall perform or assure the performance of all relocations of utilities necessary to carry out the project. In the case of a project in excess of 45 feet, one-half of the cost of each such relocation shall be borne by the owner of the facility being relocated and one-half of the costs of each such relocation shall be borne by the non-Federal interests." The relocation costs borne by the

local sponsor will be eligible for a credit of up to 10% of the total costs of the general navigation features of the project.

Since the relocation to be done is part of a federal navigation project, the relocation can be done by the USACE on behalf of the non-Federal sponsor at the sponsor's expense. An agreement will be required between Dade County/Port of Miami and the USACE in order to accept the funding to perform the relocation. Miami-Dade Water and Sewer Department can provide funds to Dade County/Port of Miami for the relocation, but the transfer of funds to the USACE must come through the local sponsor, Dade County/ Port of Miami.

Preliminary results from the deepening study will be available in August 2001. These results should indicate whether any deepening is justified, and subsequently, if the relocation of the force main is imperative. In the interim, at the request of the local sponsor, the agreement for the transfer of funds to the USACE for the relocations can be drafted and a scope of work identified. To ensure that the channel dredging is not impeded by existing utilities, all necessary relocations will be scheduled well in advance of the dredging.

Hopefully, this has explained how this relocation can proceed. If you have any additional questions or if additional information is needed, please contact our Project Manager, Mr. Jerry Scarborough, at 904-232-2042.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Port of Miami

OFFICE OF THE DIRECTOR • 1015 NORTH AMERICA WAY • 2ND FLOOR • MIAMI, FLORIDA 33132-2081 • PHONE (305) 371-PORT (371-7678) • FAX (305) 347-4843

July 5, 2000

Richard Powell
Civil Engineering Planning Division
USACE
P.O. Box 4970
Jacksonville, FL 32232

RE: GRR

Dear Mr. Powell:

In conjunction with Alternates #2 and #5, please consider whether or not the existing sewer line between Miami Beach and Fisher Island needs to be relocated. Your earliest response will be appreciated.

Sincerely,

C. Fielland

Carl E. Fielland
Port Engineer

portofmiami@co.miami-dade.fl.us
MIAMI-DADE COUNTY FLORIDA **SEAPORT** DEPARTMENT
www.co.miami-dade.fl.us/portofmiami

Port of Miami

OFFICE OF THE DIRECTOR • 1015 NORTH AMERICA WAY • 2ND FLOOR • MIAMI, FLORIDA 33132-2081 • PHONE (305) 371-PORT (371-7678) • FAX (305) 347-4843

January 15, 2003 **VIA FACSIMILE & MAIL**

Mr. Richard Bonner
Deputy District Engineer
Project Management
US Army Corps of Engineers
400 W. Bay Street
Jacksonville, FL 32232-0019

Re: Port of Miami GRR
Economics Analysis

Dear Mr. Bonner:

Thank you for providing an opportunity for the Port of Miami to review draft economic assumptions for the Miami Federal Harbor Project GRR.

Our staff and consultants have analyzed data prepared by your team in response to the Advanced Formulation Briefing, and have also had a productive, informative dialog with your staff on key issues. The Port has information to contribute regarding two assumptions in the draft analysis: the controlling depth of ports on predicted itineraries; and, the growth projections for European and Asian imports.

An independent analysis conducted by the Port indicates that controlling depths for key U.S. East Coast Ports should be set at a minimum of 49' due to the status of approved and recommended deepening projects as well as the typical depths experienced at relevant European and Asian ports. A more detailed summary of our findings is included as Attachment A to this letter.

Further, the Port encourages the USACE to carefully review past growth rates for European and Asian markets, and supporting economic data, provided in Attachment B. The Port's analysis shows that Asian imports should be projected at 8.60 percent and European imports at between 11 and 12 percent.

Past USACE feasibility analysis of the Port of Miami (completed in 1989 for the existing authorized project), greatly underestimated cargo growth at the Port by almost 3,500,000 short tons for 2000. In fact, growth in exports was over two times higher than predicted, and growth in the Asian and European markets was three times that predicted for 2000 (see Attachment C). It is critical that the same underestimation is not repeated in the new study.

MIAMI-DADE
portofmiami@co.miami-dade.fl.us
MIAMI-DADE COUNTY FLORIDA **SEAPORT** DEPARTMENT
www.co.miami-dade.fl.us/portofmiami

We hope that the USACE will incorporate the Port's suggestions into its analysis. We are ready to provide additional input and support as the report moves towards further review by Headquarters.

Sincerely,

Charles A. Towsley
Port Director

Attachments

A: Controlling Depth Analysis
B: Memo dated January 13, 2003, from Lambert Advisory
C: Comparison of Projected Growth Rates in June 1989 Feasibility Study with Actual Rates

cc: Jerry Scarborough, USACE
Rene Perez, USACE
Bob King, USACE
Charles Towsley, Port of Miami
Gerry Cafiero, Port of Miami
Becky Hope, Port of Miami
Amy Kimball-Murley, The Curtis & Kimball Company
Paul Lambert, Lambert Advisory
Reading File

Insert: Pathname/Doc Name (9 pt)

Attachment A:
Analysis of Controlling Depths on Asian and European Itineraries

Issue: The draft Economics Appendix report establishes two important model trade routes for projection of post-Panamax vessel itineraries in the "with project" conditions at the Port of Miami. They are:

- Europe/US East Coast: Southampton, England; New York, US; Charleston; Miami, US; South Hampton, England.
- Mediterranean/US East Coast: Valletta, Malta; New York, US; Charleston, US; Miami, US; Valleta, Malta.
- Asia/US East Coast via Panama Canal: Hong Kong, China; Miami, US; Charleston, US; New York, US; Hong Kong, China.
- Asia/US East Coast via Suez Canal: Hong King, China; Valletta, Malta; Miami, US; Charleston, US; New York, US; Valletta, Malta; Hong Kong, China.

Depending upon the route, Miami is either the first or the last stop on the US East Coast.

The draft report assumes that depths at other key ports of call on European and Asian itineraries will limit the draft of vessels calling at the Port of Miami. Therefore, the USACE model does not assess benefits for post-panamax vessels for depths greater than the actual limiting port depth (including an additional tidal range factor) on the above-itineraries. The use of actual port depths causes benefits to end at 47' due to constraints at Charleston and New York harbors. Key Asian and European ports are all at 15 meters, or 49.2 feet.

Recommendation: The project timeframe for the Miami GRR study is 50 years, beginning in 2009. Port deepening and expansion projects are undergoing for all the US Ports in the model itineraries, as well as other major US east coast ports. Therefore, it appears reasonable to assess planned and approved port depths along the model itineraries and other major US ports and incorporate them into the model.

The top five US East Coast container ports are, in order of TEU movement in 2001: New York, Charleston, Norfolk (Hampton Roads), Savannah, and Miami (Source, AAPA, 2002). Not surprisingly, a review of proposed, approved and authorized deepening in the United States revealed that all five ports are in various stages of deepening construction, authorization, and study.

A table summarizing draft limitations existing today and predicted for the future, based on the status of federal deepening projects, is included below.

Port	Depth (existing or under construction)	Effective depth with tidal range factor	Expected depth	Expected effective depth with tidal range factor	Authoring mechanism for deepening
New York	45	47.3 [1]	50	52.3 [1]	WRDA 2000 [2]
Charleston	45	47.6 [3]	TBD	TBD	GRR (Congressionally funded 2001)
Norfolk (Hampton Roads)	45 inbound 50 outbound	47.6 [4]	50	52.6 [4]	Feasibility Study, Recommended NED Plan, December 2002 [5]
Savannah	42	45.6 [6]	48	51.6 [6]	WRDA 1999, pending Tier II EIS completion; study for additional depth expected
Miami	42	43.2 [7]	43-50	44.2 – 51.2 [7]	Current Study

(1) 4.6 feet mean tidal range, USACE, October 31, 2002
(2) Main channel scheduled for completion by 2009; total project by 2016
(3) 5.2 feet mean tidal range, USACE, October 31, 2002
(4) 45 feet depth plus half of 5.2 mean tidal range, as estimated from USACE, Economic Benefits of Channel Improvements at the Port of Hampton Roads, December 2002
(5) Estimated project completion by 2005, per USACE Economic Benefits of Channel Improvements at the Port of Hampton Roads, December 2002
(6) 3.6 feet mean tidal range, NOAA
(7) 2.5 feet mean tidal range, USACE, October 31, 2002

With the exception of Charleston, which is still in the study stage, all of the key US East Coast Ports have approved or recommended depths approaching 52' (when mean tidal range is considered). The Port of Miami would have equivalent operations with the shallowest of these ports (Savannah), with a dredged depth of 49.0 feet.

All of these U.S. ports will operate at depths consistent with key European and Asian Ports (15 meters or 49.2 feet, tidal range excluded). With European ports taken into account, it appears that the limiting depth used in the USACE analysis should be at least 49.0 feet.

Attachment B

Summary

The United States Army Corps of Engineers (Corps) is drafting a National Economic Benefit Report for the channel deepening at the Port of Miami which has certain assumptions associated with future cargo growth projections at the Port. These projections are important in that they influence the degree of benefit which accrues from further deepening of the channel and turning basin.

Our analysis indicates that the Corps current estimates of growth associated with European and Asian imports are below historical trends and do not fully take into account factors which are expected to drive import demand for the foreseeable future.

In the current draft report, the Corps estimates the annual growth in containerized import cargo to be 7.60 percent between 2001 and 2029 from both the European and Far East regions. Historic trends in these markets, between 1990-2002, have shown compound annual growth of 15 % and 8.14 % respectively. We believe there is a reasonable case to be made that European cargo will grow by 11 to 12 percent annually, and Far Eastern cargo will grow by at least 8.60 percent or 1.0 percent greater than currently projected. We believe that these projections will still allow the Corps to maintain a conservative stance within its overall analysis.

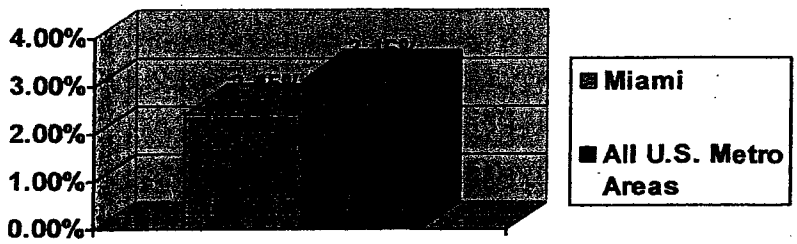
Support for these estimates is detailed below.

Far Eastern Cargo Trends

Between 1990 and 2000, the Port of Miami experienced a significant increase in imports of containerized cargo from the Far East. This increase was similar to Trans-Pacific Eastbound Containerized Trade into the United States, which grew at 9.1% per year (Mitsui O.S.K. Lines), Miami experienced a somewhat slower but similar trend, with 8.14% annual growth (Port of Miami).

Indeed, the Miami-Fort Lauderdale Consolidated Metropolitan Statistical Area (Miami CMSA) had slower Total Personal Income growth than the nation during the past decade. Total Personal Income generally shows a consistent positive correlation to cargo import trends (at least at the national level). The following graph shows Miami CMSA Total Personal Income growth between 1990 and 2000 against all metropolitan areas in the United States (all figures are in constant 1996 dollars).

Total Personal Income Growth:
Miami vs. MSA's 1990-2000
(Percent Change - Constant 1996 dollars)

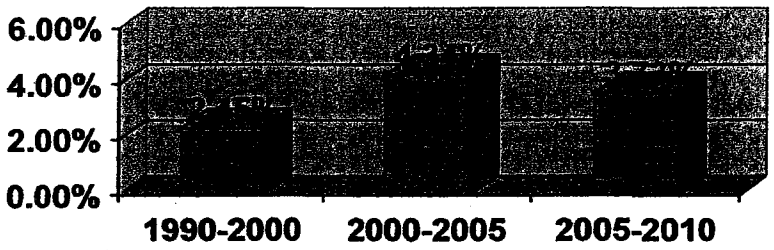


Source: U.S. Department of Commerce; NPA Data Research

More recently, despite slowing rates of growth in Personal Consumption Expenditure in the U.S over the past several years (2.5% in 2001and 3.4% annualized for 2002 vs. 4.9% in 1999 and 4.4% in 2000), the rate of growth in the Port of Miami's Asian imports has actually increased during the past two years. Short tons of Asian cargo increased by approximately 11 percent per year between 2000 and 2002 (compound annual growth). This growth is partially due to the fact that the Miami CMSA is now experiencing increased rates of Personal Income Growth which is in contrast to much of the United States and particularly other markets served by major east coast ports.

The following table depicts historical and projected annual Total Personal Income growth for the Miami metro area for the periods 1990-2000, 2001-2005, and 2005-2010. The projections are developed as part of NPA Data Services' regression model which projects population, income and construction trends for all 315 metropolitan areas of the United States. The model is updated semi-annually and has served as one of the most respected regional projection models available for over a decade.

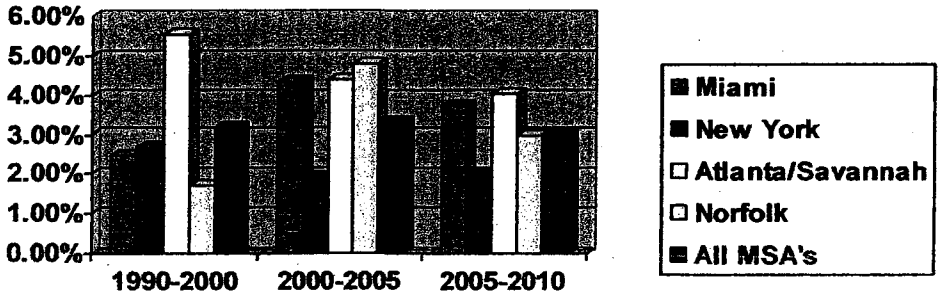
Historical and Projected Personal Income Growth
(1990-2010):
Miami CMSA
(Percent Change - Constant 1996 Dollars)



Source: U.S. Department of Commerce; NPA Data Research

While NPA projects a decline in the growth rate of Total Personal Income for some of the other major U.S. markets served by the largest containerized ports on the east coast of the United States between 2000 and 2005 (with the exception of Norfolk), Miami's is projected to increase at a 4.3% rate between 2001 and 2005 in comparison to 2.5% during the period between 1990 and 2000. The following graph shows a comparison between historical trends and NPA's projections for Miami in comparison to Savannah/Atlanta, New York, Norfolk, and all U.S. Metropolitan Statistical Areas. It should be noted that all data is presented for the Consolidated Metropolitan Statistical Areas when one exists (in this case, Miami and New York).

Historical and Projected Personal Income Growth
(1990-2010):
Miami CMSA vs. Selected Other Markets
(Percent Change - Constant 1996 Dollars)



Source: U.S. Department of Commerce; NPA Data Research

We believe the enhanced personal income growth, which already took hold in the later part of the 1990's and is expected to continue, is the result of a "catching up" from the lingering impacts of Hurricane Andrew in late 1992 which caused a forced out migration from the region. If not for the impact of Hurricane Andrew, Miami CMSA Total Personal Income would have grown at a significantly faster rate through the 1990's. In 1992 alone there was an actual decrease in Total Personal Income in the region of approximately 4 percent. Only recently has the region entirely caught up from this shock to the regional economy.

Given the enhanced growth in Asian cargo imports to Miami during the past two years in the face of a broad national economic downturn, and the fact that an independent respected source projects that the a principal driver of consumption and trade in a regional economy (Total Personal Income) will increase at a significantly faster pace in the future than has been the case during the last decade, there is a reasonable expectation that future growth will at least meet the pace of the last twelve years (8.56 percent annual growth) and may even exceed that rate.

For the above reasons, we encourage the Port to make a case to the Corps of Engineers that Asian import growth in their model should be increased to at least the historical 8.6 percent growth rate. Additionally, the model should be updated to include historical 2001 and 2002 figures as well which only support these higher projections.

European Cargo Trends

The case for increasing the Corps model's growth rate of European imports for the Port of Miami is entirely different than the case for increasing Far Eastern imports.

Unlike Far Eastern imports, European imports into the Port of Miami have for the past decade grown at a rate which far exceeded that of any other major Eastern U.S. market served by a major containerized cargo port, even those markets where Total Personal Income growth has been as much as double the Miami CMSA's.

The following table compares Annual Total Personal Income growth between 1990 and 2000 in key markets to annual growth in European imports expressed in loaded TEU's (as opposed to short tons given the available comparative data).

Market Area	**Total Personal Income Compound Annual Growth (1990-2000)**	European Imports Loaded TEU's Compound Annual Growth (1991-2000)
Miami CMSA	**2.45%**	15.40%
Savannah MSA + Atlanta MSA	5.53%	9.28%
New York/New Jersey CMSA	1.70%	8.21%
Norfolk MSA	2.68%	6.82%

Source: U.S. Department of Commerce; PIERS

The Port of Miami's European imports grew at more than 6.0 times the rate of the region's Personal Income growth in comparison to 1.7 times for Savannah/Atlanta, 4.8 times for New York, and 2.5 times for Norfolk. The Port of Miami's European imports grew at an annual which was more than six percentage points above Savannah's rate of growth despite the fact that the Savannah/Atlanta market's ability to consume goods grew at a rate more than double the Miami CMSA's.

It is clear that the Port of Miami's tremendous growth in European imports over the past several years is driven by factors which are not entirely quantifiable. We believe one key factor in driving European trade in Miami (and clearly not to the detriment of the other major east coast container ports given their significant albeit slower growth in European trade) is the ability of Miami traders to tap into new and varied supply networks. Indeed, Miami's success is driven by a more traditional driver of trade - relationships; as quaint as that might sound in this electronic and global age. These relationships are largely the result of the multi-ethnic and multi-lingual nature of the region, the relative affluence and high education level of these groups, and particularly strong European language and ethnic ties. This is the one factor which sets Miami apart from each of the other east coast markets served by a major container port with the notable exception of New York (although New York's immigration is now driven to a much greater extent by Far Eastern, Southeast Asian and African born peoples than was the case during previous generations). While hard data does not exist on the nature or extent of these relationships, there are some facts which tend to support this notion.

According to the Immigration and Naturalization Service, the Miami metro area in 2001 was the third ranked metro area behind Los Angeles and New York as the intended place of residence for legal immigrants. This is despite the fact that Miami-Fort Lauderdale is only

the 12th largest metropolitan area in the nation. Of a total 65,011 legal immigrants in 2001 who intended on settling in the Miami-Fort Lauderdale CMSA (excluding Canadian immigrants) 68 percent were from a country where the principal language was of European origin. This compares to 59 percent for Los Angeles and 44 percent for New York. Additionally, the second home market in Miami and Miami Beach is heavily driven by affluent international purchasers. Major developers report that over 70 percent of all condominiums priced over $300,000 in the City of Miami are being sold as second homes to international buyers (largely Latin American and European), and as much as 30 to 40 percent in the City of Miami Beach are being sold to this group (principally European).

In sum, there is no quantitative or qualitative support for halving the growth of European imports from its historic pace (as the Corps is projecting). However, we do believe that for the sake of being conservative, and because of the extraordinary growth in the past which is not entirely quantifiable, a more moderate rate than the historical trend is reasonable to use in projections. Therefore, we would suggest that an 11 to 12 percent growth rate as opposed to the historic 15 percent rate be used with regard to projecting European growth for at least the next ten year period.

Attachment C
Comparison of Projected Growth Rates in June 1989 Feasibility Study with Actual Growth Rates (Short Tons)
Port of Miami, Florida

IMPORTS	1990 USACE	Actual 1990	Difference	% Difference	2000 USACE	Actual 2000	Difference	% Difference
Caribbean	152,800	259,214	106,414	170%	194,800	313,280	118,480	161%
Central America	292,500	412,452	119,952	141%	366,800	879,169	512,369	240%
Europe	350,600	502,519	151,919	143%	463,800	1,513,975	1,050,175	326%
Far East/Asia	225,100	278,654	53,554	124%	298,000	609,198	311,198	204%
Mid-East/Africa	16,600	30,035	13,435	181%	22,700	35,840	13,140	158%
South America	498,500	464,920	-33,580	93%	640,500	869,682	229,182	136%
	1,536,100	1,947,794	411,694	127%	1,986,600	4,221,144	2,234,544	212%

EXPORTS	1990 USACE	Actual 1990	Difference	% Difference	2000 USACE	Actual 2000	Difference	% Difference
Caribbean	752,700	595,982	-156,718	79%	901,200	894,252	-6,948	99%
Central America	325,100	356,024	30,924	110%	405,600	719,388	313,788	177%
Europe	66,400	218,188	151,788	329%	90,200	344,650	254,450	382%
Far East/Asia	48,500	23,127	-25,373	48%	66,800	278,311	211,511	417%
Mid-East/Africa	13,500	32,800	19,300	243%	16,900	9,042	-7,858	54%
South America	648,700	339,797	-308,903	52%	781,200	1,017,768	236,568	130%
	1854900	1,565,918	-288,982	84%	2261900	3,263,411	1,001,511	144%
TOTAL	3,391,000	3,513,712	122,712	104%	4,248,500	7,484,555	3,236,055	176%

Note: Comparison does not include North American trade, which was not factored into the 1989 USACE Analysis

Source: Navigation Study for Miami Harbor Channel, Florida, Feasibility Report, June 1989; Port of Miami-Dade, 2002

BISCAYNE BAY PILOTS
Serving the Port of Miami since 1911

2911 PORT BOULEVARD. • MIAMI, FLORIDA 33132 • TELEPHONE (305) 379-9483 • CABLE: MIAMIPILOT

4/7/99 -
Nancy -
This was given to Andy Lapot.
Fernandez at yesterday's
Waterways Committee
meeting. They (the Pilots)
consider it valid.
Thx.
John Perez
(4851)

October 23, 1997

Mr. Claude Bullock
Assistant Port Director
1015 N. America Way
Miami, Florida 33132

Dear Claude,

In order to assist the seaport in determining its needs for future dredging projects, the Biscayne Bay Pilots Association submits the following recommendations. We believe that as the channel is deepened it is vitally important that the channel also be widened. As you know Miami is one of the busiest ports in the nation. Last year our association handled over 9800 ship movements. The worlds largest cruise and container ships call here on a regular basis.

We have identified three specific areas in the channel that need to be widened. I have enclosed charts for each of these areas and highlighted that portion of the channel we feel should be widened.

The first and most critical area is the main channel entrance at Outer Bar Cut. The currents in this area are variable and unpredictable, putting large deep draft vessels are at risk when making their approach to Miami. Several Maersk container vessels have already grounded off of buoy "1". Our recommendation is to create a tapered entrance channel with an 800 foot wide entrance.

The second area of concern is on the south side of government cut between beacon 13 and beacon 15. This is an area where ships are turning from one channel into another. The strong currents in this area compounded by the necessity for the ship to have as little speed as possible, makes it important for the ship to have as much swinging room as possible. On at least three occasions that I know of, tugboats assisting ships in this area have grounded and sustained damage. Our recommendation is to widen the channel as much as possible between beacons 13 and 15.

Finally, Lummus Island Cut just south of the gantry crane area should be widened. At the present time ships transiting this area pass extremely close to vessels docked at the gantry berths. This results in a "surging" effect on the ships at the dock. Also, all too frequently, we are encountering vessels docked at Lummus Island with their cranes swung outboard 90 degrees

thereby blocking a portion of the channel. Given the variables of wind, current, ship size, draft, etc., this creates an unsafe condition. Our recommendation is to extend the southern edge of Lummus Island Cut 100 feet further to the south.

I am certain that these critical channel improvements will enhance the commercial viability of the Port of Miami. Please feel free to call me if you have any questions.

Sincerely,

Robert K. Brownell

Robert K. Brownell
Chairman
Biscayne Bay Pilots

Encl.: 2
cc: Captain of the Port

BISCAYNE BAY PILOTS
Serving the Port of Miami since 1911

2911 PORT BOULEVARD · MIAMI, FLORIDA 33132 · TELEPHONE (305) 375-9453 · CABLE: MIAMIPILOT

J 5

July 20, 2001

Richard E. Bonner, P.E.
Deputy District Engineer
For Project Management
Department of the Army
P.O. Box 4970
Jacksonville, Fl. 32232-0019

Dear Mr. Bonner,

Please be advised that the Biscayne Bay Pilots approve the proposed modifications to the alternatives 1,2,3 and 5.

Should you need further assistance please feel free to call on Captain McDonald or myself.

Sincerely,

John R. Fernandez,
Chairman
Biscayne Bay Pilots

JS
RP
Perez

BISCAYNE BAY PILOTS
Serving the Port of Miami since 1911

2911 PORT BOULEVARD · MIAMI, FLORIDA 33132 · TELEPHONE (305) 375-9453 · CABLE: MIAMIPILOT

May 14, 2003

Mr. Rene Perez
Project Manager
U.S. Army Corps of Engineers
PO Box 4970
Jacksonville, Florida 32232

Dear Mr. Perez:

The Miami harbor pilots wholeheartedly endorse all components of the Locally Preferred plan to deepen and widen the Miami ship channel.

Large newly constructed vessels are routinely arriving at ports of call with drafts in excess of 46 feet. If the Seaport of Miami is to remain a viable and competitive destination for ocean-going commerce on the eastern seaboard then the outer channel should be dredged to preferably 52 feet and the inner channel deepened to 50 feet.

The proposed widening of the channel (cut 1 from 500 feet to 800 feet) is needed to ensure safe transit of the large post panamax ships. With a length of 1138 feet and a beam of 141 feet, these vessels will encounter strong cross currents requiring a leeway or crab angle of 10 to 15 degrees to stay in the channel. This significantly increases the effective beam. Widening Fishermen's Channel an additional 100 feet is another critical "must." The present 500 foot channel provides only 100 to 120 feet of open water clearance if a large beamed vessel (141 feet) using tug assistance was to pass another berthed vessel of similar beam. Increasing the width would reduce the surge affect, increase clearance and should allow for safe routine passages.

If the Miami pilots can be of any assistance please contact us.

Thank you.

Yours truly,

Michael M. Wiegert

Michael M. Wiegert
Vice Chairman

August 9, 2001

Planning Division
Plan Formulation Branch
Navigation Section

Commander, Seventh Coast Guard District (oan)
ATTN: (Mr. Joe Embres)
Chief, Planning and Marine Information Section
Aids to Navigation and
Waterways Management Branch
909 Southeast 1st Avenue (Rm 406)
Miami, Florida 33131

Dear Sir:

We request your review of the enclosed figures 1-7 containing proposed modifications to Miami Harbor. Provide an estimate for initial and annual navigational aids costs for the enclosed plans. Since the plan formulation process may eliminate some alternatives, please breakdown your estimate by the following alternatives:

- Alternative 1C - Figure 1 shows Alternative 1C which increases the entrance channel width from 500 feet to 800 feet over a distance of about 900 feet and then tapers back to the 500-foot width about 2000 feet from the beginning of the existing channel.

- Alternative 2A - Figure 2 contains a widener labeled Alternative 2A near beacon #15.

- Alternative 3B - Figure 2 also contains Alternative 3B which enlarges the Fisher Island Turning Basin to the area shown in the dark blue color.

- Alternative 4 - Figure 3 includes Alternative 4 which shifts the channel alignment to the south. Figure 4 contains the west end of alternative 4.

- Alternative 5 - Figure 5 includes sheet 1 of 2 for Alternative 5 which adds a 100-foot widener to the south of the existing Lummus Island Cut or Fisherman's Channel. Figure 6 has sheet 2 of 2 for Alternative 5 which reduces the diameter of the existing Lummas Island Turning Basin and adds a widener to the west end of the proposed turning basin.

- Alternative 6 - Figure 7 contains alternative 6 which adds a 1200-foot diameter turning basin and extends the Federal channel to the west end of Dodge Island.

A drawing showing the entire Miami Harbor system of Federal channels is also enclosed. If you have any questions or need clarification on the above matter, contact Dick Powell at 904-232-1694.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosures

bcc: CESAJ-DP-I (J. Scarborough)
EN-DL (B. Henderson)

RBP Powell/PD-PN/1694/slw 8/9/01
Schmidt/PD-PN
Strain/PD
Henderson/EN-DL
Scarborough/DP-I
Duck/PD

L:\group\pdp\rbp\USCG_LTR_Miami GRR.doc

U.S. Department
of Transportation
United States
Coast Guard

Commander
Seventh Coast Guard District

909 S.E. 1st Avenue
Miami, FL 33130-3050
Staff Symbol: (oan)
Phone: (305) 415-6730
FAX: (305) 415-6757

16500
Serial #: 1906
31 Oct 01

Mr. James C. Duck
Chief, Planning Division
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

Thank you for your letter of August 9, 2001 regarding possible aid to navigation changes required as a result of your proposed modifications to Miami Harbor.

After review of the proposed plans, outlined below are the costs for changes to aids to navigation associated with each plan.

ALT 2A – Relocation of several buoys, no cost.

ALT 2A – Relocate Light 15 to the center of the widener. Cost $150,000, annual maintenance $15,000. Due to water depth work will need to be done by a private contractor.

ALT 3B – Relocate 1 Light. Cost $7,100

ALT 4 – No changes

ALT 5 – Relocate 1 Light. Cost $7,100
Discontinue 1 Light. Cost $1,100

If you have any questions, please do not hesitate to call me at (305) 415-6730.

J.B. EMBRES
Chief, Planning and Marine Information Section
Aids to Navigation Waterways Management Branch
Seventh Coast Guard District
By direction of the District Commander

The attached Excel workbook contains the casualty data for the area you described for Miami Harbor for Calendar Years 1992 through 2001. These data were taken from our Marine Safety Management System (MSMS Sybase NT) which contains data up to 13 December 2001.

Our analysis techniques and methods involve writing SQL for extracting data, which limits our finding data for specific locations to those in the shape of squares or rectangles, and not polygons of asymmetric shape. Our moving to GIS capability over the next several months will allow us that capability.

May I call your attention to the fields pri_nature and events 1 through 4. Pri_nature is a single statement of evaluation of the casualty and is subject to interpretation from investigator to investigator. Events 1 through 4 are a sequence of events as they occurred to the vessel in the casualty. Some vessels may be involved in a casualty and yet do not have a chain of events associated with them - this may be due to the vessel being involved causally (maneuvering caused the other vessel to ground) or the casualty/incident did not meet specific reporting or investigation criteria.

Please contact me if you have any questions regarding these data. I remain at your service.

James G. Law
Operations Research Analyst, U.S.Coast Guard
Compliance Analysis Division (G-MOA-2)
Office of Investigations and Analysis, Field Operations Directorate
Assistant Commandant for Marine Safety, Security and Environmental Protection
US Coast Guard Headquarters room 2407
(Voice: 1-800-842-8740 ext. 7-2612 or 202-267-2612
+ Fax: 202-267-1416
- Email: jlaw@comdt.uscg.mil

Visit our office website at:
http://www.uscg.mil/hq/g-m/moa/casualty.htm
or the Oil Spill Compendium at:
http://www.uscg.mil/hq/g%2dm/nmc/response/stats/aa.htm

incident_dt	location	service	pri_nature
19-Jan-01	PORT OF MIAMI	PASSENGER	FIRE
25-Dec-93	PORT OF MIAMI	PASSENGER	COLLISION
13-Mar-93	MIAMI SHIP CHANNEL	PASSENGER	ALLISION
14-Oct-96	PORT OF MIAMI	PASSENGER	FIRE
15-Oct-96	PORT OF MIAMI	PASSENGER	FIRE
3-Jan-98	UNDERWAY	PASSENGER	EQUIP FAIL
27-May-93	MIAMI, FL	FREIGHT SHIP	GROUNDING
18-Jul-95	GOVERNMENT CUT ENTRANCE	FREIGHT SHIP	EQUIP FAIL
27-Sep-95	CG BASE MIAMI BEACH FL	FREIGHT SHIP	ALLISION
16-Feb-97	PORT OF MIAMI	PASSENGER	EQUIP FAIL
26-Dec-97	MIAMI ANCHORAGE	FREIGHT SHIP	GROUNDING
14-Dec-95	MIAMI ANCHORAGE	FREIGHT SHIP	CAPSIZE
12-Oct-97	MIAMI BEACH	FREIGHT SHIP	GROUNDING
23-Aug-98	MIAMI ANCHORAGE	FREIGHT SHIP	EQUIP FAIL
29-Jun-99	PORT OF MIAMI ANCHORAGE	FREIGHT SHIP	COLLISION
21-Sep-95	MARKER 25 ICW PORT OF MIAMI	FREIGHT SHIP	POLLUTION
13-Jan-94	PORT OF MIAMI, FLORIDA	FISHING BOAT	GROUNDING
21-Sep-96		FREIGHT SHIP	GROUNDING
6-Mar-93	DODGE ISLAND, MIAMI, FL	FREIGHT SHIP	FLOODING
12-Jan-99	MIAMI BEACH/SOUTH POINT	FREIGHT SHIP	GROUNDING
8-Oct-95	GOVERNMENT CUT	FREIGHT SHIP	GROUNDING
20-Jul-98	MIAMI SEABUOY	PASSENGER	FIRE
23-Sep-99	GOVERMENT-CUT - POM	FREIGHT SHIP	GROUNDING
15-Aug-94	MIAMI ANCHORAGE	FREIGHT SHIP	GROUNDING
22-Oct-00	MIAMI ANCHORAGE	FREIGHT SHIP	SINKING
31-Jan-97	PORT OF MIAMI TERMINAL 2	PASSENGER	ALLISION
27-Jan-00		FREIGHT SHIP	FIRE
18-Nov-00	MIAMI BEACH MARINA	PASSENGER	EQUIP FAIL
22-Sep-93	MIAMI RIVER	FREIGHT SHIP	ALLISION
8-Oct-98	MIAMI BEACH MARINA	PASSENGER	EQUIP FAIL
30-Sep-98	MIAMI RIVER	FREIGHT SHIP	COLLISION
27-Dec-98	GOVERNMENT CUT CHANNEL	FREIGHT SHIP	EQUIP FAIL
25-Dec-99	MIAMI MAIN ENTRANCE CHANNEL	PASSENGER	EQUIP FAIL
15-Dec-99		FREIGHT SHIP	ALLISION
6-Aug-00	FISHER ISLAND SLIP	TOWBOAT/TUGBOAT	EQUIP FAIL
19-Oct-92		RECREATIONAL	SINKING
21-Nov-92	VENETIAN CAUSEWAY BRIDGE	TOWBOAT/TUGBOAT	ALLISION
21-Nov-92	VENETIAN CAUSEWAY BRIDGE	FREIGHT BARGE	ALLISION
11-Aug-94	DODGE ISLAND BRIDGE	TANK BARGE	ALLISION
8-Mar-95	FISHERMANS CHANNEL	TOWBOAT/TUGBOAT	ALLISION
24-Oct-95	MIAMI	TOWBOAT/TUGBOAT	STRUCT FAIL
25-Aug-96	MIAMI BEACH, ICW	PASSENGER	EQUIP FAIL
12-Feb-98	N MIAMI BEACH	RECREATIONAL	SINKING
22-Jun-98	WATSON ISLAND	FISHING BOAT	EXPLOSION
6-Jun-98	GOVERNMENT CUT, MIAMI	PASSENGER	CAPSIZE
18-Nov-99	SUNSET HARBOR MARINA	PASSENGER	COLLISION
20-Jan-00	PORT OF MIAMI, FL	PASSENGER	EQUIP FAIL
11-Dec-99	SW 2ND AVE BRIDGE MIAMI RIVER	TOWBOAT/TUGBOAT	ALLISION
11-Dec-99	SW 2ND AVE BRIDGE MIAMI RIVER	TANK BARGE	ALLISION
11-Dec-99	SW 2ND AVE BRIDGE MIAMI RIVER	TOWBOAT/TUGBOAT	ALLISION
25-Aug-00	FISHER ISLAND FERRY LANDING	PASSENGER	EQUIP FAIL

4-Nov-00	MIAMI - GOV'T CUT	PASSENGER	EQUIP FAIL
26-Jan-01	MIAMI, FL - GOV'T CUT	PASSENGER	EQUIP FAIL
10-Feb-01	MIAMI, FL	PASSENGER	EQUIP FAIL
3-Feb-01	MIAMI, FL (GOV'T CUT)	PASSENGER	EQUIP FAIL
11-Mar-01	MIAMI, FL - GOV'T CUT	PASSENGER	EQUIP FAIL
19-Mar-01	MIAMI, FL - GOV'T CUT	PASSENGER	EQUIP FAIL
15-Feb-01	PORT OF MIAMI	TANK BARGE	GROUNDING
15-Feb-01	PORT OF MIAMI	TOWBOAT/TUGBOAT	GROUNDING
28-Apr-01	MIAMI, FL - GOV'T CUT	PASSENGER	EQUIP FAIL
19-May-01	CAUSEWAY ISLAND, MIAMI, FL	PASSENGER BARGE	ALLISION
19-May-01	CAUSEWAY ISLAND, MIAMI, FL	COMMERCIAL	ALLISION
1-Oct-01	GOVERNMENT CUT	PASSENGER	EQUIP FAIL
18-Jun-92	GOVERNMENT CUT, MIAMI, FL	TOWBOAT/TUGBOAT	GROUNDING
15-Oct-94	1200 WEST AVE. FORTE APTS.	RECREATIONAL	POLLUTION
1-Mar-94	LUMMUS ISLAND	FREIGHT SHIP	ALLISION
19-Jul-95	WEST VENETIAN BRIDGE	TOWBOAT/TUGBOAT	ALLISION
31-Jul-95	PORT OF MIAMI	TOWBOAT/TUGBOAT	CAPSIZE
9-Sep-95	JULIA TUTTLE AND VENETIAN CSYS	TOWBOAT/TUGBOAT	ALLISION
9-Sep-95	JULIA TUTTLE AND VENETIAN CSYS	FREIGHT BARGE	ALLISION
27-Sep-95	CG BASE MIAMI BEACH FL	PUBLIC VESSEL,UNC.	ALLISION
8-Oct-95	GOVERNMENT CUT	TOWBOAT/TUGBOAT	GROUNDING
8-Oct-95	GOVERNMENT CUT	TOWBOAT/TUGBOAT	GROUNDING
2-Dec-95	MIAMI ANCHORAGE	TOWBOAT/TUGBOAT	COLLISION
2-Dec-95	MIAMI ANCHORAGE	FREIGHT BARGE	COLLISION
2-Dec-95	MIAMI ANCHORAGE	RECREATIONAL	COLLISION
8-Mar-96	GOVERNMENT CUT	TOWBOAT/TUGBOAT	GROUNDING
16-Oct-96	SOUTH CHANNEL - P.O.M.	TOWBOAT/TUGBOAT	ALLISION
17-Dec-96	GOVERNMENT CUT BUOY #16	TOWBOAT/TUGBOAT	ALLISION
17-Dec-96	GOVERNMENT CUT BUOY #16	TOWBOAT/TUGBOAT	ALLISION
17-Dec-96	GOVERNMENT CUT BUOY #16	FREIGHT SHIP	ALLISION
19-Mar-97	BAKERS HAULOVER INLET BRIDGE	TOWBOAT/TUGBOAT	ALLISION
16-Apr-97	HAULOVER	PASSENGER	GROUNDING
3-Dec-97	HAULOVER	PASSENGER	GROUNDING
2-Dec-97	PORT OF MIAMI	PASSENGER	COLLISION
2-Dec-97	PORT OF MIAMI	RECREATIONAL	COLLISION
22-Mar-98	GULF OF MEXICO/MIAMI	TANK BARGE	STRUCT FAIL
22-Mar-98	GULF OF MEXICO/MIAMI	OSV	STRUCT FAIL
29-Mar-98	MIAMI HARBOR CHANNEL ENTRANCE	PASSENGER	EQUIP FAIL
22-Jun-98	WATSON ISLAND MARINA	FISHING BOAT	EXPLOSION
27-Jun-98	MIAMI ANCHORAGE	FREIGHT SHIP	EQUIP FAIL
12-Oct-98	MIAMI SOUTH CHANNEL/CUMMUS CUT	PASSENGER	EQUIP FAIL
22-Oct-98	PORT OF MIAMI ENTRANCE CHANNEL	PASSENGER	EQUIP FAIL
31-Oct-98	BISCAYNNE BAY, FL	PASSENGER	EQUIP FAIL
30-Dec-98	HAULOVER INLET, MIAMI BEACH	FREIGHT BARGE	ALLISION
26-Apr-99		PASSENGER	EQUIP FAIL
29-Jun-99	PORT OF MIAMI ANCHORAGE	INDUSTRIAL VESSEL	COLLISION
3-Jul-99		PASSENGER	EQUIP FAIL
20-Aug-99	TERMINAL 12, PORT OF MIAMI	INDUSTRIAL VESSEL	POLLUTION
20-Aug-99	PORT OF MIAMI/	INDUSTRIAL VESSEL	SINKING
15-Dec-99		TANK BARGE	ALLISION
25-Dec-93	PORT OF MIAMI	TANK SHIP	COLLISION
8-Mar-95	FISHERMANS CHANNEL	TANK BARGE	ALLISION

18-Nov-99	SUNSET HARBOR MARINA	RECREATIONAL	COLLISION
22-Sep-93	MIAMI RIVER	TOWBOAT/TUGBOAT	ALLISION
22-Sep-93	MIAMI RIVER	TOWBOAT/TUGBOAT	ALLISION
1-Mar-94	LUMMUS ISLAND	FREIGHT SHIP	ALLISION
19-Jul-95	WEST VENETIAN BRIDGE	FREIGHT BARGE	ALLISION
19-Mar-97	BAKERS HAULOVER INLET BRIDGE	FREIGHT BARGE	ALLISION
30-Sep-98	MIAMI RIVER	TOWBOAT/TUGBOAT	COLLISION
30-Sep-98	MIAMI RIVER	TOWBOAT/TUGBOAT	COLLISION
30-Sep-98	MIAMI RIVER	FREIGHT SHIP	COLLISION
30-Dec-98	HAULOVER INLET, MIAMI BEACH	TOWBOAT/TUGBOAT	ALLISION

MIAMI-DADE WATER AND SEWER DEPARTMENT
4200 Salzedo Street, Coral Gables, Florida 33146 • Tel: 305-669-3700

SERVE • CONSERVE

March 20, 2001

Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Attn: Richard Bonner, P.E.
Deputy District Engineer for Project Management

Re: 54 inch Force Main Relocation Crossing
Government Cut between Miami Beach and Fisher Island

Dear Mr. Bonner:

Thank you for the positive response to our request to have the subject relocation done by the USACE as ancillary work to the proposed Government Cut Deepening Project. It is understood that the port deepening project is not definite at this time, with the study not due to be completed until August 2001. The County would like to go ahead with the preparation of an agreement and scope of work as offered in your letter. It is also understood that the agreement would be between the USACE and the local sponsor, Miami-Dade County/Port of Miami and that the transfer of any funds for this project would be between the local sponsor and the USACE.

Having the 54 inch force main relocation as ancillary work has several advantages. As you indicated, the relocation must be done prior to the dredging, so the schedule coordination will be easier with both projects being managed by the USACE. In addition, the design coordination should be more efficient with a single project manager. Additionally, the construction sequence and overall program management should benefit from engineers experienced in port operations as well as dredging and pipeline construction. We see this partnership in a very positive way with many advantages for both Miami-Dade County and USACE.

As a matter of clarification, both the Port of Miami and Miami-Dade Water and Sewer Department (WASD) are departments of Miami-Dade County, a political sub-division within the State. As such, the local sponsor Miami-Dade County/Port of Miami would include the Miami-Dade Water and Sewer Department. All funding from this project will come from the Miami-Dade Water and Sewer Department through the Port of Miami.

I have contacted Charles Towsley at the Port of Miami to alert him of our intentions and the need for the Port to be involved in the process. John Chorlog, Assistant Director, Wastewater (305)-669-3743 and Carl Fielland, Chief Engineer with the Port will be the primary contacts at Miami-Dade County on this project.

Sincerely,

William M. Brant, P.E.
Director

cc: C. Towsley, Port of Miami
C. Fielland, Port of Miami
J. Chorlog, WASD
H. Codispoti, WASD

MIAMI-DADE WATER AND SEWER DEPARTMENT
P.O. Box 330316, Miami, Florida 33233-0316 • 3575 S. LeJeune Road • Tel: 305-665-7471

SERVE • CONSERVE

Jerry S

October 23, 2000

Ms. Lauren P. Milligan
Environmental Specialist
Office of Beaches and Coastal Systems
Department of Environmental Protection
Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

RE: DEP File No.: 0173770-001-, EI, Dade County
Applicant: U.S. Army Corps of Engineers
Project: Miami Harbor Channels
Maintenance Dredging

Dear Ms. Milligan:

WASD has subaqueous facilities at the following locations not shown on the Corps of Engineers drawings:

1.) A 54-inch sewer force main penciled in on Corps Drawing No. 8. This is the main from South Beach to Fisher island which was broken by a pile driving contractor on June 22, this year. As-built ES-4605 shows a top of pipe elevation of minus 50.0 feet. Proposed dredging depth is minus 44.0 feet plus a 2 foot allowable over dredge to a total cut of minus 46.0 feet.

2.) A 20-inch water main penciled in on Corps Drawing No. 9. This main goes from Terminal Island to Lummus Island. WASD as-built E-2326 only goes to the Lummus Island deed line, where it may change ownership to the City of Miami Beach. Their as-built UW73C shows a top of pipe at minus 48.0 feet. Proposed dredging depth is minus 38.0 feet plus a 2 foot allowable over dredge to a total cut to minus 40.0 feet.

3.) A continuation of the above mentioned 20-inch water main crossing Fisherman's Channel, from Lummus Island to Fisher Island penciled in on Corps Drawing No. 14. As-built E-2326 shows a top of pipe elevation of minus 53.8 feet. Proposed dredging depth is minus 44.0 feet plus a 2 foot allowable over dredge to a total cut to minus 46.0 feet

All three (3) mains are in conflict with any dredging of the channel sides.
As-built locations will have to be field verified, which could be a long and costly process.

Sincerely,

John W. Chorlog, P.E.
Assistant Director, Engineering/
Planning

JWC/RAJ/as

Enclosures: USACOE Drawings Nos. 8, 9 and 14

c: Richard E. Bonner, P.E., Deputy District
Engineer, US Army Corps of Engineers
Craig K. Grossenbacher, Coastal Resources Section Chief,
Miami-Dade County, Environmental Resources Management

HrbrChan

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

January 14, 2003

James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Dear Mr. Duck:

As discussed in the September 17, 2002, teleconference with the U.S. Army Corps of Engineers (Corps), the Fish and Wildlife Service (Service) is providing supplemental recommendations to those listed in our Draft Fish and Wildlife Coordination Act (FWCA) Report dated July 24, 2002, for the proposed Miami Harbor Expansion Project located in Miami-Dade County, Florida. This letter is submitted in accordance with provisions of the FWCA of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*). The supplemental recommendations discussed in this letter will be included in the Final FWCA report.

History

As stated in the Draft FWCA Report, the Corps estimates that a total of 446.4 acres of aquatic resources, including seagrass communities, unvegetated softbottom, hardbottom, and coral reef habitat will likely be adversely affected as a result of construction activities associated with the expansion of Miami Harbor. Specifically, 6.3 acres of seagrass; 236.4 acres of unconsolidated/ unvegetated benthic habitat (softbottom); 123.5 acres of rock/rubble bottom; 31.4 acres of low relief hardbottom; and 20.7 acres of high relief hardbottom and coral reef habitat may be adversely affected. A portion of the acreage occurs in areas that were impacted during previous dredging activities within Miami Harbor.

The Corps has proposed mitigation for the impacts to hardbottom reefs which were not dredged under previous authorizations, as follows: (1) mitigate for the removal of 2.7 acres of high-relief coral reef habitat at a ratio of 2:1 through the creation of 5.3 acres of high-relief artificial reef habitat based on the National Oceanic and Atmospheric Administration's (NOAA) Habitat Equivalency Analyses (HEA and (2) mitigate for the 0.6 acre of impact to low-relief hardbottom habitat at a ratio of 1.3:1 through the creation of 0.8 acre of low-relief artificial hardbottom habitat.

However, the Corps has not proposed compensation for the removal of the biotic communities, which have colonized the channel hardbottom following the 1990 Miami Harbor dredging event. The Service believes that compensation for the temporal loss of habitat value of previously dredged low and high-relief hardbottom should also be added to the hardbottom mitigation acreage proposed for new impacts to those habitats.

In the Draft FWCA Report for the Miami Harbor Expansion Project, the Service based its hardbottom mitigation recommendations on acreage calculations that omitted impacts to previously impacted low and high-relief hardbottom (Table 1). Therefore, we are supplementing our hardbottom compensation recommendations, as discussed below.

Table 1: Draft FWCA Hardbottom Impact Acreage Summary.

Habitat type	Low-relief hardbottom (previously dredged)	High-relief hardbottom (previously dredged)	Low-relief hardbottom (new impacts)	High-relief hardbottom (new impacts)
Proposed impact acreage	30.7	18.0	0.6	2.7
Proposed mitigation (acres)	0	0	0.8	5.3
			Total= 6.1 acres	
Draft FWCA Report mitigation recommendations (acres)	0	0	4.3 (incl. 2.66 acres of side-wall impacts)	5.3
			Total= 9.6 acres	

Supplemental Recommendations

The Service conducted a Mitigation Bank Review Team (MBRT) analysis to determine the mitigation acreage for previously impacted hardbottom habitat (Table C-1, enclosed). Using a temporal loss factor of 12 years for full functional habitat recovery, the creation of 68.04 acres (58.44 acres for temporal loss of previously mitigated hardbottom plus 9.6 acres for new hardbottom impacts) artificial reef would meet the hardbottom mitigation requirements. However, approximately 48.7 acres of similar habitat base (low relief hardbottom, rock rubble) will remain on the channel bottom after dredging that will likely be recolonized and/or utilized by similar affected biotic communities. Thereby, the remaining 48.7 channel bottom acres could then be subtracted from the 68.04 acres (MBRT temporal loss mitigation acres), which would result in a deficit of 9.74 acres to be fulfilled by "outside-of-channel footprint" hardbottom artificial reef creation. Therefore, if you add the 9.97 acres of outside-of-channel footprint hardbottom to the 9.6 acres of new-impact hardbottom mitigation as recommended in the Draft FWCA report, the Service's total recommended supplemental hardbottom mitigation is 19.34 acres (Table 2).

Table 2: Summary of the Service's supplemental hardbottom mitigation recommendations

	Proposed impact acreage	Proposed mitigation (acres)		Draft FWCA Report Recommendations (acres)		Revised Draft FWCA Report Recommendations (acres)		
Low-relief hardbottom (previously dredged)	30.7	0		0		58.8 (MBRT)	68.04 Total	Post-dredging channel footprint
High-relief hardbottom (previously dredged)	18.0	0		0				48.7 Total
Low-relief hardbottom (new impacts)	0.6	0.8	6.1 Total	4.3	9.6 Total	9.6 (HEA)		
High-relief hardbottom (new impacts)	.27	5.3		5.3			Total of supplement hardbottom mitigation recommended (Table 1+2) 9.6+ 9.74 = 19.34	
Softbottom mitigation recommendation	23.3	0		0		23.3		

The Corps has not proposed mitigation for the permanent loss of shallow sandy bottom, which has not been previously dredged. The Service believes that, in southeast Florida in general, this is productive benthic habitat supporting diverse faunal assemblage, as documented and referenced in the Draft FWCA Report for the Port Everglades Navigation Project. Therefore, we recommend that the Corps consider minimization of impacts to shallow sandy bottom. If the impact acres cannot be minimized, then the Service recommends a mitigation ration of 1:1 for the impacts to 23.3 acres of shallow sandy bottom habitat. This may be accomplished by filling dredge holes or channels in Biscayne Bay and/or adjacent waterways. In addition, biological monitoring should be instituted in the sandy bottom mitigation areas.

To summarize, the Service is providing the following additional recommendations:

(1) A minimum of 19.3 acres of in-kind mitigation should be provided for hardbottom impacts to newly and previously dredged hardbottom habitat. This should be included in the hardbottom monitoring plan.

(2) In-kind mitigation should be provided for dredging 23.3 acres of shallow sandy softbottom habitat, at a ratio of 1:1, such as filling or partially filling existing dredge holes and/or abandoned channels in nearby waters.

In addition, the Service is providing the following modifications and clarifications to Section 8 of the Draft FWCA Report, as identified by report recommendation number:

(1) This recommendation addresses monitoring; however, we would like to clarify that the monitoring plan should encompass channel walls **and** previously dredged channel bottom, if it is to be an element of mitigation. Also, hardbottom reef sedimentation monitoring should be instituted during dredging regardless of the water column exemption for turbidity monitoring within the stated 150 foot mixing zone.

(5) Amend: *"Remove and relocate all ~~brain and star coral~~* hard coral colonies larger than 6 inches in diameter *within the ~~2.7 acres of high-relief coral reef impact area related to Component 1~~* project footprint (including the previously dredged areas) *by experienced personnel* through established methods *to suitable* nearby hardbottom substrate~~. and include monitoring provisions~~." Biological monitoring should be instituted.

(7) Reads as follows: *"The Service recommends decreasing the impact area as much as possible by narrowing the channel width as much as practicable. Likewise, impacts to reefs at the east end of the entrance channel should also be reduced as much as practicable."* The Service would like to emphasize this recommendation to reduce channel expansion in hardbottom, seagrass, and shallow sandy bottom habitats **prior** to the consideration of mitigation.

Thank you for the opportunity to provide these revisions. If you have any questions concerning these supplemental recommendations and clarifications of our Final FWCA Report, please contact Trish Adams at (772) 562-3909 extension 232.

Sincerely yours,

Allen D. Webb for

Linda S. Ferrell
Assistant Field Supervisor
South Florida Ecological Services Office

Enclosure

cc:
NMFS, Miami, Florida
FWC, Vero Beach, Florida
FWC, Tallahassee, Florida
DEP, Tallahassee, Florida

February 2004

Volume II of II

FINAL

Preliminary Assessment-DMMP – Appendix E

For the

Miami Harbor Navigation Study
General Reevaluation Report

Miami-Dade County, Florida - 010140

US Army Corps
of Engineers®

Jacksonville District
South Atlantic Division

PRELIMINARY ASSESSMENT

MIAMI HARBOR, FLORIDA

NATIONAL HARBORS PROGRAM:
DREDGED MATERIAL MANAGEMENT PLANS

FEBRUARY 2004

PRELIMINARY ASSESSMENT

MIAMI HARBOR, FLORIDA

NATIONAL HARBORS PROGRAM:
DREDGED MATERIAL MANAGEMENT PLANS

TABLE OF CONTENTS

1. Project Name and Description 1
2. Authority 5
3. Economic Assessment 6
4. Maintenance Dredging 10
5. Dredged Material Disposal Site Capacity and Usage 14
6. Environmental Compliance 18
7. Conclusions 20
8. Recommendations 21

LIST OF TABLES

TABLE 1 - PROJECT STATUS: 4
TABLE 2 - ECONOMIC DATA: 9
TABLE 3 - MAINTENANCE DREDGING OF DEEPER DEPTH FEATURES SERVING THE PORT 11
TABLE 4 - DREDGING HISTORY: 12
TABLE 5 - CHANNEL COST HISTORY: 12
TABLE 6 - ANTICIPATED DREDGING: 13
TABLE 7 - CHANNEL MAINTENANCE COST PROJECTIONS: 14
TABLE 8 - PLACEMENT HISTORY: 15
TABLE 9 - DISPOSAL SITE DATA: 17
TABLE 10 - PROJECT COMPLIANCE: 20
TABLE 11 - MAINTENANCE SUMMARY STATUS FOR MIAMI HARBOR: 21
TABLE 12 - ECONOMIC ASSESSMENT OF CONTINUED MAINTENANCE DREDGING 22

LIST OF FIGURES

FIGURE NO.

1 Miami Harbor **2**

2 Proposed Dredged Material Disposal Sites and Mitigation Locations.22

PRELIMINARY ASSESSMENT
MIAMI HARBOR, FLORIDA

NATIONAL HARBORS PROGRAM:
DREDGED MATERIAL MANAGEMENT PLANS

1. Project Name and Description

1a. Name: Miami Harbor

1b. CWIS #: 010140

1c. Project Description:

The Federal navigation project is in Biscayne Bay, a shallow salt water sound on the Atlantic coast near the southern end of the Florida peninsula. Shallow natural passages between the keys and two artificial cuts, called Bakers Haulover Inlet and Government Cut, connect the bay to the ocean. Government Cut is the main deep-draft ship channel to the Port of Miami. The City of Miami is situated on the western shore of Biscayne Bay. The project is 23 miles south of Port Everglades, 71 miles south of Palm Beach Harbor, and about 130 miles northeast of Key West Harbor.

The authorized project for the Port of Miami is on figure 1. The harbor project provides for following features identified by section:

Section A - An approach channel 44 feet deep over a bottom width of 500 feet from the ocean to the beach line;

Section B - A channel with a 42-foot depth and bottom width of 500 feet from the beach line to the Fisher Island turning basin;

Section C - The Fisher Island turning basin with a depth of 42 feet depth over a triangular shaped bottom area;

Section D - A channel (Fisherman's Channel) 42 feet deep over a bottom width of 400 feet from the Fisher Island turning basin along the south side of Lummus Island to the Lummus Island turning basin;

11" x 17"

FOLD-OUT

FIGURE 1, PAGE 2

MIAMI HARBOR GENERAL REEVALUATION REPORT

PROPOSED NAVIGATION CHANNEL MODIFICATIONS

NOTES:
1] DRAFT Environmental Baseline Resource Survey (underwater features) provided February 2001, by Dial Cordy & Associates, Jacksonville Beach, FL
2] USACE Survey Number 00-058, March 2000
3] Beacons, aids to navigation, and soundings are in approximate locations based on NOAA Nautical Charts (number 11468, 36th Ed., July 24 1999, and number 11466, 34th Ed., February 6 1999)
4] Elevations in feet and refer to mean lower low water
5] Projection Stateplane Coordinate System, NAD27, Fipszone 0901
6] Background aerial photos taken September 1 1999

LEGEND:
Existing Navigation Channel
Existing Centerline
Existing Channel Edge

Proposed Components
Cmp1c, Cmp4, Cmp6
Cmp2a, Cmp5, Cmp6a
Cmp3b, Cmp5a

2000 0 2000 4000 6000 Feet

MIAMI HARBOR GENERAL REEVALUATION REPORT
Proposed Navigation Channel Modifications

N

U.S.ARMY CORPS OF ENGINEERS
Jacksonville District

Figure 1

Section E - The Lummus Island turning basin with a depth of 42 feet and a turning diameter of 1600 feet;

Section F - A channel 34 feet deep over a bottom width of 400 feet extending west 1200 feet from the Lummus Island turning basin;

Section G - A (Municipal) channel 36 feet deep over a bottom width of 400 feet from the Fisher Island turning basin west along the north side of Lummus and Dodge Islands to a third turning basin;

Section H - A (Municipal) turning basin 36 feet deep with a turning diameter of 1650 feet at the west end of the 36-foot channel;

1d. Current Project as Being Maintained:

The Federal project exists as authorized except for a portion along the south side of Lummus and Dodge Islands. Construction is underway as indicated in table 1 to complete the remaining authorized portion. About half of the 42-foot Fisherman's channel south of Lummus Island was completed under a 204 (e) agreement with the Port of Miami in 1993. Completion of the remaining half of the Fisherman's channel construction and the Lummus Island (Middle) turning basin is pending completion of a new Project Cooperation Agreement (PCA) with the Port of Miami. Completion of the new PCA is scheduled for 2004. The 34-foot channel west of the Lummus Island turning basin has been completed. Figure 1 shows the authorized project and identifies the project features as well as land areas associated with the new work dredging.

New construction in the entrance channel and work underway on the 42-foot depth features of the project have an authorized 1 foot of allowable overdepth for dredging inaccuracies. No allowance is in the authorization for a required overdepth to enable maintenance in the rock bottom. Policy at the time precluded any required overdepth dredging in rock except as justified on the basis of advanced maintenance.

TABLE 1 - PROJECT STATUS:

CWIS Number	Reach or Segment (if more than one)	Nominal Depth (feet) [1] (as auth.)	(as maint.)	Nom. Chan. Width (feet) (as auth.)	(as maint)	Max. Sailing Draft[2] (feet)	Project Sponsor (Y/N)
010140	Entrance Channel	44	44	500	500	41	Y
	Inner Channel	42	42	400	400	39	Y
	Fisher Is. T. B.	42	42	39 acres	39 acres	39	Y
	Fisherman Channel	42	[3]	400	[3]	[3]	Y
	Lummus Island Turning Basin	42	[3]	1600 dia	[3]	[3]	Y
	Fisherman Channel	34	34	400	400	31	Y
	Municipal Channel & T. B.	36	36	400 & 1650 dia	400 & 1650 dia	33	Y

Source: Waterborne Commerce of the United States (CY 2000).

Name: Miami-Dade County Seaport Department, c/o Port of Miami		
Address: 1015 North American Way		
City: Miami	State: Florida	ZIP: 33132
Point of Contact: Carl Fielland	Phone #: (305) 347-4890	

NOTES: [1] Does not include 1-foot allowable overdepth.
[2] For vessels currently using the harbor with no use of tides. Mean tidal variation is 2.5 feet at the entrance and 2.0 in the bay.
[3] Project feature under construction and not yet complete pending new PCA in 2003.

1e. Sponsor: Miami-Dade County Seaport Department
c/o Port of Miami Harbor
1015 North American Way
Miami, FL 33132

Point of Contact: (307) 347-4890

1f. Name and Status of Cooperation Agreement:

There are several cooperation agreements in effect covering new construction and maintenance dredging contracts including a 203(e) agreement signed in November 1991, which has been amended three times. A new Project Cost Sharing agreement scheduled for execution in 2003 is currently under review by the Miami-Dade County Seaport Department to allow the Corps to takeover completion of the remaining western half of the 42-foot Lummus Island (Fisherman's) channel from the Port of Miami.

2. Authority

The authorizing documents are as follows:

a. River and Harbor Act of June 13, 1902 provided for a channel (Government Cut) 8 feet deep land cut across the peninsula and for jetty construction;

b. River and Harbor Act of March 2, 1907 set the width of the channel at 100 feet
and enabled construction of the south jetty;

c. River and Harbor Act of July 25, 1912 enlarged the channel depth to 20 feet and width to 300 feet and extended the jetties;

d. River and Harbor Act of March 3, 1925 provided for the deepening of the channels to 25 feet and increasing the width of the entrance channel to 500 feet and widening the inner channel to 200 feet across Biscayne Bay;

e. The River and Harbor Act of July 3, 1930 provided for a width of 300 feet in the channel across Biscayne Bay and for enlarging the turning basin;

f. River and Harbor Act of 1935 enabled dredging to provide a depth of 30 feet in the channel and turning basin;

g. River and Harbor Act of 1937 provided for the widening of the 30-foot deep turning basin by 200 feet southward;

h. River and Harbor Act of 1945 enabled the Virginia Key improvements;

i. River and Harbor Act of 1945 consolidated the Miami River and Miami Harbor projects;

j. River and Harbor Act of 1960 widened the channel to 400 feet and enlarged the turning basin 300 feet along both the south and northeasterly sides, and dredged a 39-acre turning basin with a depth of 30 feet along the north side of Fisher Island; deleted the Virginia Key development and Dinner Key approach channel;

k. River and Harbor Act of 1968 enlarged the entrance channel to a 38-foot depth and 500-foot width from the ocean to the existing beach line; deepened the 400-foot wide channel to 36 feet; and deepened the turning basins at Biscayne Boulevard terminal and Fisher Island to 36 feet;

l. Water Resources Development Act of 1986 deauthorized the widening at the mouth of Miami River to existing project widths; the channels from the mouth of Miami River to the turning basin, to Government Cut and to a harbor of refuge in Palmer Lake;

m. Water Resources Development Act of 1990 Public Law 101-640 authorized deepening the existing Outer Bar Cut, Bar Cut, and Government Cut to a depth of 44 feet, enlarging Fisherman's Channel, south of Lummus Island, to a depth of 42 feet and a width of 400 feet, and construction of a 1600-foot diameter Turning Basin near the end of Lummus Island to a depth of 42 feet; and

n. Water Resources Development Act of 1996 authorized deepening a channel to a depth of 34 feet over a bottom width of 400 feet from the Lummus Island turning basin west a distance of 1200 feet.

3. Economic Assessment

The Port of Miami is an important stimulus to the economic growth and progress of the Miami and South Florida area. Job-related industries, transportation of finished products, and cruise-oriented activities have contributed significantly in the expansion of economic activity. The Port of Miami having an estimated impact of $8 billion on the surrounding community supports over 45,000 jobs.

Transportation networks, connecting Miami Harbor to Florida and the remainder of the region, are extensive. A 5-lane high span bridge across the Intracoastal Waterway provides a super highway connection from the port to downtown Miami Streets for access to Interstate 95, a major north-south artery. Two major railroads provide direct service to port facilities. The Miami International Airport is a few miles west of the port and handles a majority of cruise passengers using the port.

The most recent statistical information available on vessels and tonnage is from 2000. During the period of January 1, 2000, to December 31, 2000, the number of vessels calling at Miami Harbor averaged more than 871 per month. The facilities that handled those vessels were on Dodge and Lummus Islands, and Fisher Island Tanker Terminal. About 16 percent of these vessels had drafts of 25 to 40 feet requiring the deeper depths of Miami Harbor for access. Major commodities moving through Miami Harbor in 2000 included tile, marble and granite; textiles; paper and paper products; and refrigerated fruits and vegetables. These commodities account for only 15 percent of Miami's total imports and exports. The majority of traffic is categorized as General Cargo, and accounts for 45.17 percent of imports and 63.7 percent of exports. Waterborne Commerce of the United States shows a total of 8,610,000 tons of waterborne cargo in 2000. Dodge and Lummus Islands accommodate cargo and cruise ship operations, while Fisher Island handles petroleum product, that is, bunker fuel for the cruise ships.

Passenger Terminals and cruise ship operations are mainly on the northwest portion of Dodge Island. The 36-foot deep channel and turning basin provide vessel access to that area. Some of those terminals handle both cargo and passengers. Remaining facilities are for cargo and include some roll/on-roll/off platforms. The number of cruise ship passengers increased from 2,734,816 in 1990 to 3,364,643 in 2000 while general cargo increased from 4,720,000 tons in 1991 to 8,610,000 tons in 2000. The year 2000's tonnage is 212 percent of the projected amount set by a 1989 USACE feasibility study of Miami Harbor [1].

A port development plan in 1979 evaluated the need for further improvements to increase the port's facilities for handling anticipated growth at that point in time for cruise and cargo traffic. That study resulted in an expenditure of about $250 million for capital improvements to expand the port. The main development centered on increasing the acreage of Lummus Island and connecting it to Dodge Island using material dredged from the waterway (Fisherman's Channel) south of the island. That dredging provided deeper channel access to the south side of Lummus Island. Development on Lummus Island included four gantry cranes, container berths and terminals. Development on Dodge Island included construction of a passenger terminal on the south side.

[1] Source: Miami-Dade County Florida Seaport Department, Port of Miami GRR Economics Analysis, 2002

The Waterborne Commerce of the United States, 2000, reported 10,456 commercial inbound vessel movements for Miami Harbor in 2000. Those movements include tankers, cargo vessels, barges, and cruise ships. The cargo in 2000 totaled about 8,610,000 short tons in comparison to 4,720,000 short tons in 1991. The average annual increase is about 6.9 percent. The inbound and outbound movements amounted to about 10.4 and 10.4 million, respectively, in 2000. Total petroleum products to the port amounted to about 1,784,000 short tons in 2000. Primary manufactured products through the harbor were 2,249,000 short tons. Food and farm products totaled about 1,969,000 tons. The port's commercial activity is summarized in table 2.

A significant portion of the tonnage movement was in containers and involved transshipment to other ports. The Port of Miami is an important transshipment point for cargo coming from Asia and Europe. That cargo arrives in larger vessels and is then reloaded into smaller vessels for destinations in the Caribbean as well as Central and South America. The port also helps supply various commodities to the Greater Miami and Dade County area. That support includes petroleum products and general cargo.

About 10 percent of the commodities and containerized goods that enter Miami Harbor are transported through terminals and cargo handling facilities along Miami River. The river terminals supply goods to ports in the Caribbean Basin where larger vessels cannot enter due to restricted harbor depths. The terminal operations are structured to a scale that can efficiently utilize the vessel fleet calling on shallower Caribbean Basin ports.

TABLE 2 - ECONOMIC DATA:

Reach or Segment	Benefit Indicators[1]	Current Operations[2]	Trend (Up, Down, Steady)	Summary/ Remarks
Project	COMMODITY TYPES	Petroleum and petroleum prod. Primary manuf. gds. Food and Farm products	Upward Upward Upward	Tonnage Traded by Region (% of Total Tonnage) S. America 24.2 Caribbean 15.5 Far East 11.3 Europe 23.8 Central Am. 20.5 Other 4.7
	TONNAGE	8,610,000	Upward	
	GROWTH RATES	7.2% per year for 1990 to 2000 period	Upward	
	VESSEL TYPES	Breakbulk and container. Bulk carriers, product tankers, tug and barge, commercial fishing vessels and cruise ships	Steady	
	VESSEL SIZES	965 ft./144.4 design draft,/39 ft. constrained draw 60635 DWT. 4300 TEUs Cruise ships - 1035 ft./35 ft. draw	Increased length and draw Increased length and width	3.36 million cruise ship passengers
	RECREATIONAL VESSEL TYPES	Mega yachts; sail and power boats	Upward	
	RECREATIONAL VESSEL SIZES	15 feet to 80 feet	Upward	
	COMMERCIAL FISHING, CHARTER	None	N/A	
	COMMERCIAL FISHING, OTHER	None	N/A	

NOTE: [1] Pertinent indicators taken from sponsor's correspondence, annual report and directories.

[2] For calendar year 2000

4. Maintenance Dredging

Shoals form in three primary areas on the deeper depth portion of the project serving the Port of Miami. The entrance channel shoal occurs mainly from the outer end of the jetties and the shoreline. Surveys in 1996 showed depths of 37.5 and 18.9 feet along the right outside quarter of the channel in that area. Shoaling in Fisherman's channel occurs about midway between Fisher Island and Lummus Island turning basins. Surveys in that area indicated depths of 31.8 feet near the eastern end of Lummus Island. The Municipal Turning Basin has shoaling along the periphery of the bottom. Depths between 29.3 and 32.9 feet can be found along the outside of the Main Turning Basin.

Bar pilots report navigational difficulties in the entrance channel. Large ground swells, effects of the Gulfstream, and northeasterly winds have an impact on vessel movements in that channel. Those conditions vary at different times of the year and make entrance into the harbor very difficult for deep draft ships. The shoaled areas of the channel reduce the bottom width of the channel for the deeper draft vessels. To lessen the probability of groundings, the port monitors the need for maintenance frequently. Maintenance dredging is to the authorized project depths where constructed with an allowance of 1 foot for dredging inaccuracies.

The deep depth project for the port overall experiences very little shoaling with an annual rate of about 15,000 to 21,000 cubic yards. Maintenance volumes for that portion of the project through 2000 are as shown in table 3. Since 1973, the deeper depths have been maintained four times. There are no known reasons for the variance in quantities and intervals of past maintenance dredging events. The 15,000 cubic yards dredged in 1985 may have resulted from the effects of a beach nourishment north of the project. Some material may have passed through the north jetty into the channel. That jetty has been sand tightened now since 1999.

TABLE 3 - MAINTENANCE DREDGING OF FEDERAL CHANNEL FEATURES SERVING THE PORT

Year	Quantity (cubic yards)
1957	80,083
1960	79,689
1965	210,218
1985	15,000
1989	250,000
1993	247,000
1995	3,000

The project has undergone construction dredging 18 times since 1904. The larger construction contracts were in 1927, 1937 -1938, 1939, and 1964. During those years, the total amount of dredged material was about 10.6 million cubic yards. Over 90 percent of the material went to expand Lummus, Dodge, and Fisher Islands as well as Virginia Key. Virginia Key has primarily received new work material, but it could also be available for maintenance material. An additional 8.4 million cubic yards of material planned to come from new work construction that began in 1991 was planned for completion by 1999 under two separate contracts. The first contract required the dredging of 2,395,000 cubic yards (Phase I) and was completed in 1993. All of that dredged material was deposited on Virginia Key. The second contract (Phase II) planned to produce about 6,000,000 cubic yards of material. Negotiations with the Miami-Dade Seaport Department (Port of Miami) are currently in progress for the Corps to take over completion of that Phase II work. The material for Phase II that was completed by the Port of Miami went to the ODMDS, which amounted to about 2.3 million cubic yards. Using the original 6,000,000 cubic yard estimate and subtracting the work done by the Port of Miami (2.3 million) leave about 3,700,000 cubic yards remaining for phase II. More recent surveys used for plans and specifications (D.O. File 20-38,332 provided by EN-DL on 11 Mar 04) for completion of phase II indicate 1,107,000 cubic yards for the base plan plus 199,000 cubic yards for berthing areas if all options are incorporated. The new phase II quantities total 1,306,000 cubic yards if all berthing area options are included.

Maintenance dredging for 1999 through 2003 is in table 4 for the deep draft ship channels. That table shows no maintenance dredging from the project over the past 5 years. The average annual shoaling rate of 21,000 cubic yards shown in table 4 was computed using the most recent survey data available from D.O. File No. 20-38,332 which indicates approximately 232,000 cubic yards of maintenance material could be removed. No significant maintenance dredging has occurred in Miami Harbor since 1993. If dredging does occur in 2004, that maintenance material represents the first significant maintenance-dredging event since 1993 or over the past 11 years (232,000/11 = 21,000). Approximately 91% (210,000 cubic yards) of that maintenance quantity comes from the outer

perimeter of the cruise ship or main turning basin located at the extreme western end of the 36-foot Federal project. The Intracoastal Waterway also crosses through the middle of that turning basin. The remaining 22,000 cubic yards is located primarily along the edges of Cuts 1-2 of the entrance channel and east of the end of the jetties.

TABLE 4 – MAINTENANCE DREDGING HISTORY:

Reach or Segment	Primary Dredging Method[1]	Dredging History[2] (000 CY per year)						Disposal Site(s) Used (Identifier)
		1999	2000	2001	2002	2003	Ave.	
Project	1	0	0	0	0	0	21[3]	ODMDS

NOTE: [1] Hopper Dredge with Pump-Off. [2] Amount dredged by year for each of last 5 years. [3] Average for 1993 to 2004 period (232,000/11 = 21,000).

As of 2000, a total of $ 42,938,423, including contributions by the sponsor, has been expended on construction and maintenance on the project. Table 5 shows the expenditure of construction and maintenance dredging cost. Maintenance dredging costs since 1925 indicate an annual average of $298,000 a year.

TABLE 5 - CHANNEL COST HISTORY:

Reach or Segment	Construction/ Acquisition		Dredging Cost (thousands of dollars per year)						
	Year	Cost		1991	1992	1993	1994	1995	Ave
Project	1927 to 1939	3,651,000	Dredging:			980			298
	1964	2,587,423	Transpor-tation:						
	1993	26,000,000	Placement:						
	1994-1999	10,700,000	Env. Studies:						
			Total:			980			298

The most recent hydrographic survey for Miami Harbor No. 02-086 dated February/March 2002 for maintenance dredging indicates 22,000 cubic yards of material in Cut-1 and Cut-2. The north edge of Cut-4 and all four sides of the main (cruise ship) turning basin contain 210,000 cubic yards of material. Removal of those maintenance quantities will occur along with completion of the phase II new construction dredging project currently scheduled to start in 2004 and finish in 2005 as shown in table 6.

As noted above phase II plans and specifications D.O. File No. 20-38,332 (provided by EN-DL on 11 Mar 04) incorporates the latest survey information which indicates that approximately 91% (210,000 cubic yards) of that maintenance quantity comes from the outer perimeter of the cruise ship or main turning basin located at the extreme western end of the 36-foot Federal project. The Intracoastal Waterway also crosses through the middle of that turning basin. The remaining 22,000 cubic yards is located primarily along the edges of Cuts 1-2 of the entrance channel and east of the end of the jetties.

TABLE 6 - ANTICIPATED DREDGING:

Reach or Segment	Programmed Dredging (000 CY) (consistent with 10-year O&M maintenance plan)											Disposal Site(s) to be Used
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	AVG.	
Project	1200[2]	1000[3]	400[3]	900[3]	1100 [3]	670[3]	0	0	0	0	527	ODMDS
Project	274[1]		480[3]	400[3]						190[4]	134	Virginia Key
Project		800[3]									80	Seagrass Mitigation
Project			250[3]								25	Offshore Reef

NOTE: [1] Identified maintenance dredging (232,000) plus allowance for annual sediment accretion (21,000 in 2004 + 21,000 in 2005). [2]1,200,000 cubic yards consist of phase II new work. [3]Represents about 6,000,000 cy of phase III new work dredging, which will go to the ODMDS, Virginia Key CDF, North Biscayne Bay seagrass mitigation borrow sites, and offshore artificial reef mitigation sites identified in figure 2. [4]Next anticipated maintenance dredging project.

The programmed amount of dredged material averages 766,000 cubic yards every year as identified in table 6. The next programmed maintenance dredging is scheduled to occur in 2005 as shown in table 7. As indicated in table 7, the annual maintenance cost is projected to be $2,740,000 over a ten-year period or an average of $274,000 per year.

TABLE 7 - CHANNEL MAINTENANCE COST PROJECTIONS:

Reach or Segment	Programmed Dredging Cost (millions of dollars per year, consistent with 10-year project O&M maintenance schedule)											
		2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Ave[1]
Project	Dredging		2.74									
	Transpor-tation:	BREAKDOWN IS NOT AVAILABLE										
	Placem't:											
	Env. Studies:											
	Disp.Site O&M: ODMDS											
	Total:	0	2.74	0	0	0	0	0	0	0	0	.274

NOTE: [1] Average cost over 10 years.

5. Dredged Material Disposal Site Capacity and Usage

All project dredging in the deep harbor area has been in navigable waters of the United States. Since 1990, disposal of dredged maintenance material was offshore in a designated ocean dredged material disposal site (ODMDS). Table 8 shows the placement history of maintenance material from the deeper harbor area between 1998 and 2002. EPA has approved past disposal in the ODMDS, which is centered 4.5 nautical miles southeast from the mouth of the harbor.

The ODMDS is square with each side being 5,000 feet and the center at 25 degrees 45 minutes north and 80 degrees 3 minutes and 22 seconds west. Depths at that site are from 390 to over 630 feet as shown on figure 2. Disposal in the past has had little impact on depths. Routine maintenance is sporadic and not likely to have a significant impact on depths in that area.

TABLE 8 - PLACEMENT HISTORY:

Disposal Site(s) (Identifier)	Primary Disposal Method[1]	Placement History[2] (000 CY)					
		1999	2000	2001	2002	2003	Ave.
ODMDS	Bottom Dump	2,300[3]					21[2]

NOTE: [1] Bottom Dump
[2] Computed average per year shown since site not used in last 5 years for maintenance.
[3] New work material from phase II placed at ODMDS.

Table 9 provides available information about the ODMDS. That site is in use for disposal of dredged material from the deepening of the harbor serving the port. The first contract for the new work, completed in 1993, did not require disposal of material in the ODMDS.

If all the construction material stayed in the ODMDS, the depth of material in that site would be roughly less than 7 feet assuming a somewhat uniform spread over the entire area. Potential maintenance from the deep harbor area use at about 21,000 cubic yards a year results in about 420,000 cubic yards over 20 years. That is equivalent to less than a foot of depth in the ODMDS. The assessment of the ODMDS capability is that the site can easily handle another 20 to 30 years of disposal including new work dredging without a significant reduction in existing depths of 390 to over 630 feet.

Virginia Key (figure 1) is an upland confined disposal facility (CDF) that could be used during the phase III (February 2004, Miami Harbor GRR and EIS) dredging to potentially receive some of the material dredged from Cuts-1, 2, 3, and 5 by a cutter-suction dredge. Sand removed from the widening of the entrance channel and Fisherman's channel by the cutter-suction could be placed at Virginia Key for later reuse. About 80,000 cubic yards of that sand material from Virginia Key will serve as a beneficial use of dredged material by providing a 2-foot cap over approximately 720,000 cubic yards of rock material from the phase III deepening to fill of a borrow site within north Biscayne Bay for seagrass mitigation as shown in figure 2. As a beneficial use of dredged material the City of Miami has mined material from Virginia Key to use as construction fill. Currently the Virginia Key CDF requires rehabilitation of the dikes and weirs. Rehabilitation of the CDF would provide approximately 1.5 to 2.0 million cubic

yards of capacity using existing material within the CDF to rebuild or raise the dikes.

Currently District Project Management and Miami-Dade County Seaport Department plan to develop an agreement with the City of Miami for use of Virginia Key upland CDF as a potential disposal sites for placement of material from the upcoming phase II dredging project. Use of Virginia Key for phase III dredging would also involve a similar agreement.

Other potential beneficial uses of dredged material from the phase III (February 2004, Miami Harbor GRR and EIS) deepening include about 250,000 cubic yards of rock material for development of low and high relief artificial reefs. The artificial reefs will provide mitigation for impacts to existing reef areas as a result of the entrance channel widener shown as component 1C in figure 1.

Future maintenance activities warrant consideration of both the borrow site north of the Julia Tuttle Causeway for placement of dredged material to continue rehabilitation of seagrass areas contiguous to the planned sites and additional artificial reef development. Both future maintenance activities would require the appropriate NEPA documentation and coordination with Local, State and Federal agencies.

TABLE 9 - DISPOSAL SITE DATA:

Disposal Site(s) (Name or Identifier)	Site Type [1] (select)	Disposal Site Capacity		Beneficial Uses (CY/Year)		Other Users[2]	Disposal Site Sponsor (Y/N)
		Original (000)	Percent Filled	Existing	Anti-cipated	(select)	
ODMDS	2	N/A	N/A	N	N	B	Y
Virginia Key	6	1600[8]	N/A	N/A	880	B	Y
Proposed Artificial Reef POM	2	N/A	N/A	0	250	B	Y
Proposed Seagrass Mitigation POM	1	N/A	N/A	0	800	B	Y

Sponsor(s) for Disposal Site(s) (List all individual sponsors)		
Name: Miami-Dade County Seaport Department, c/o Port of Miami		
Address: 1015 North American Way		
City: Miami	State: Florida	ZIP: 33132
Point of Contact: Carl Fielland	Phone # (305) 347-4890	

NOTES:

[1] Disposal Sites:

1 - Open Water, unrestrained
2 - Designated Open Water
3 - Near Shore (surf zone)
4 - On Shore (beach nourishment)
5 - Near Shore Confined (in-water CDF)
6 - Upland Confined (on-shore CDF)
7 - Upland Unconfined
8 – Assumes RFP process for phase II dredging exercises all bid options & rehabs Virginia Key dikes

[2] Non-Corps Users:

A - None, [Corps has exclusive use]
B - Authorized [Other parties allowed to use, with or without Corps consent]
C - Allocated [Space available for project related non-Corps dredging at no cost]
D - Permitted [Space available for non-Corps dredging in the area at a cost]
E - Restricted [Non-Corps use controlled by another party, Corps has full use]
F - Royalty [Site controlled by another party, Corps uses at a cost]

6. Environmental Compliance

A final Environmental Impact Statement (EIS) dated August 09, 1995, resulted in designation of a new ODMDS. Investigations revealed three areas of controversy. The State of Florida believes that all ODMDSs should be restricted to prohibit the disposal of:

a. Beach quality sand,
b. Material with a grain size less than .025 mm, and
c. Material constituted by more than 10 percent fine-grained material.

No issues remain unresolved. The first two issues concerning beach quality sand disposal and prohibition of fine-grained material were resolved with the State. The August 09, 1995 EIS contains the resolution of those issues with associated responses to comments. The EIS states that only dredged material suitable for ocean disposal will be disposed in the Miami ODMDS. The suitability of dredged material for ocean disposal must be verified by the Corps of Engineers and agreed to by EPA prior to disposal. The disposition of beach compatible sand from the deep harbor project will be determined during State water quality considerations. The site management and monitoring plan requires a real-time current monitoring program during disposal until the effects of disposal during eddy currents are better understood. Disposal of fine-grained materials occurs only during certain current conditions.

An Environmental Impact Statement (EIS) submitted as part of the February 2004 Navigation Study for Miami Harbor General Reevaluation Report and Environmental Impact Statement proposes disposal of new work dredging materials at up to four disposal sites. The four sites include seagrass mitigation sites in north Biscayne Bay, artificial reef areas south of the entrance channel, the Virginia Key upland confined disposal facility, or the offshore Miami ODMDS.

The February 2004 EIS, Appendix E, contains an environmental baseline resource survey of the Miami Harbor area. The environmental resource survey includes the results of field investigations (video and diver surveys) which characterize marine habitats with the areas to be impacted.

Few environmental quality resources exist in the deep harbor portions of the project serving the port. Upland areas of the port on Dodge and Lummus Islands are fully developed. The deep-water areas serving the port have low and high relief harbottom reef habitat and seagrass areas outside the edges of the Federal channel. Benthic organisms can be found on the bottom and sides of

the deep project. The rocks and crevices of the jetties provide habitat for a variety of fish.

Most terrestrial mammals and birds have been effectively extirpated from the Port of Miami. Development is intense in those areas. Aquatic birds such as pelicans and gulls still range over the areas.

Species that are listed as threatened or endangered that can be found in the area are as follows:

Reptiles	Mammals	Fish
Green turtle	West Indian manatee	Smalltooth Sawfish
Hawksbill turtle	Finback whale	Proposed (E)
Kemp's Ridley turtle	Humpback whale	Designated Critical Habitat
Leatherback turtle	Right whale	Johnson's Seagrass:
Loggerhead turtle	Sei whale	Manatees
American Crocodile	Sperm whale	
	Blue Whale	

A notice of intent to prepare a draft EIS was published in the Federal Register on August 13, 2001. After completion of independent technical reviews and approval by higher authority initiation of the public review period as well as State and Federal agency reviews of the draft EIS will occur.

Archival and literature review along with consultation with the Florida State Historic Preservation Officer (SHPO) identified the potential for significant cultural resources within the channel expansion areas. A survey for underwater cultural resources was recommended and conducted. No significant cultural resources were identified as a result of the survey. Based on that survey SHPO concurred (April 18, 2002 DHR #2002-03669) with the Corps determination that the dredging project would have no effect on cultural resources.

The dredge material will be disposed in existing disposal areas or used to fill previously dredged borrow site areas near the Julia Tuttle Causeway. As such the disposal has no potential to affect cultural resources. The reef construction was developed as mitigation for this project and will require separate SHPO consultation.

Table 10 notes that the environmental documentation is in the process of being updated for completion of the phase II new work dredging and maintenance (WQC #138023199). NEPA documentation for the proposed phase III deepening and widening project is scheduled for submission to higher authority in February 2004 as part of the Navigation Study for Miami Harbor General Reevaluation Report and Environmental Impact Statement.

TABLE 10 - PROJECT COMPLIANCE:

Reach or Segment	Document[1]	Preparation Date	Expiration Date	Scheduled Update
Project	WQC#0173770-001EI	7 March 1986	7 March 2001	April 2004
	General Reevaluation Report & EIS	February 2004	Concurrent with Final Report	Concurrent with Final Report

NOTE: [1] NEPA Document or documentation showing compliance with environmental law or regulation, e.g. Water Quality Certification.

7. Conclusions

Preliminary assessment of the deep harbor serving the port indicates that the disposal of shoal material has no major problems for the foreseeable dredging cycle. Future dredging will utilize the designated ODMDS and/or Virginia Key. The ODMDS is in deep water and has an estimated potential capacity for over 20 years of disposal for maintenance and new work dredged material. Virginia Key has significant capacity remaining with rehabilitation of the dikes, and current fill will continue to be recycled as construction fill and also be a potential source of material for stabilization of the shoreline and preservation of the historic Virginia Key Beach Park or other nearby beach erosion control projects. The Environmental Protection Agency has approved past placements of dredged material from Miami Harbor into the ODMDS.

The economic viability of Miami Harbor is not in question at the present time. Over the years, the amount of cargo tonnage in the deep harbor area has increased from 4,720,000 tons in 1991 to 8,610,000 tons in 2000. Port-related industries have significant investments in terminals and infrastructure to handle the tonnage volume. Available information indicates that Miami Harbor is an economically viable project and justified for future maintenance as indicated in table 11.

Environmental compliance will continue concurrently with the study process for phase III dredging and with subsequent development of plans and specifications for phases II and III. Water Quality Certification (WQC) on that portion will be obtained and environmental impact statements will be updated as noted in table 10.

TABLE 11 - MAINTENANCE SUMMARY STATUS FOR MIAMI HARBOR:

The ability to maintain this project for the next 20 years is limited by:	
Disposal Site Capacity	N
Economic Viability	N
Environmental Compliance	N

8. Recommendations

Miami Harbor - Continued maintenance of this project is warranted on the basis of project usage and indicators of economic productivity, sufficient disposal capacity available, and maintenance activities in compliance with applicable environmental laws and regulations for the next 20 years. Therefore, no additional dredged material management plan (DMMP) is necessary beyond this assessment. See table 12.

This assessment supports that this project's disposal requirements can be met for the next 20 years. A DMMP is not required.

TABLE 12 - ECONOMIC ASSESSMENT OF CONTINUED MAINTENANCE DREDGING

	ECONOMIC STATISTICS	AUTHORIZING STUDY [1]	RECENT STUDY [2]	CURRENT CONDITIONS [3]	ASSESS-MENT	SUMM-ARY
BENEFIT INDICATORS	COMMODITY TYPES	GENERAL CARGO [4]	GENERAL CARGO	GENERAL CARGO	+	+
	TONNAGE ESTIMATES	2.4 MILLION [5]	8.6 MILLION [6]	8.6 MILLION [6]	+	
	GROWTH RATES	5% [7]	8.07% [8]	8.07% [8]	+	
	TRADE ROUTES	[9]	[9]	[9]	+	
	VESSEL TYPES	CONTAINER RO/RO	CONTAINER RO/RO	CONTAINER RO/RO	+	
	VESSEL SIZES	PANAMAX [10]	POST-PANAMAX [11]	PANAMAX [12]	+	
	VESSEL OPERATIONS	MAX LOAD [12]	MAX LOAD [12]	CONSTRAINED [13]	+	
COST INDICATORS	DREDGING CYCLE	NA	10	10	0	0
	DREDGING QUANTITIES/CYCLE	NA	100,000	100,000	0	
	AVG. ANN.MAINT. COST	NA	$3,000,000	$3,000,000	0	
	PRICE LEVEL	NA	2003	2003		
CONCLUSION	JUSTIFICATION OF CONTINUED MAINENANCE DREDGING IS WARRANTED BASED ON THE FEB 2003 ECONOMIC ANALYSIS IN THE MIAMI HARBOR GRR					

Note:

[1]- JUNE 1989

[2]- FEB 2003

[3]- FEB 2003

[4]- 2002 (PORT CARGO DATA RECORDS)

[5]- 2.4 MILLION SHORT TONS (1986)

[6]- 8.6MILLION SHORT TONS

[7]- 5% Average Annual Growth Rate 1976 to 1986

[8]- 8.07% Average Annual Growth Rate 1990 to 2000

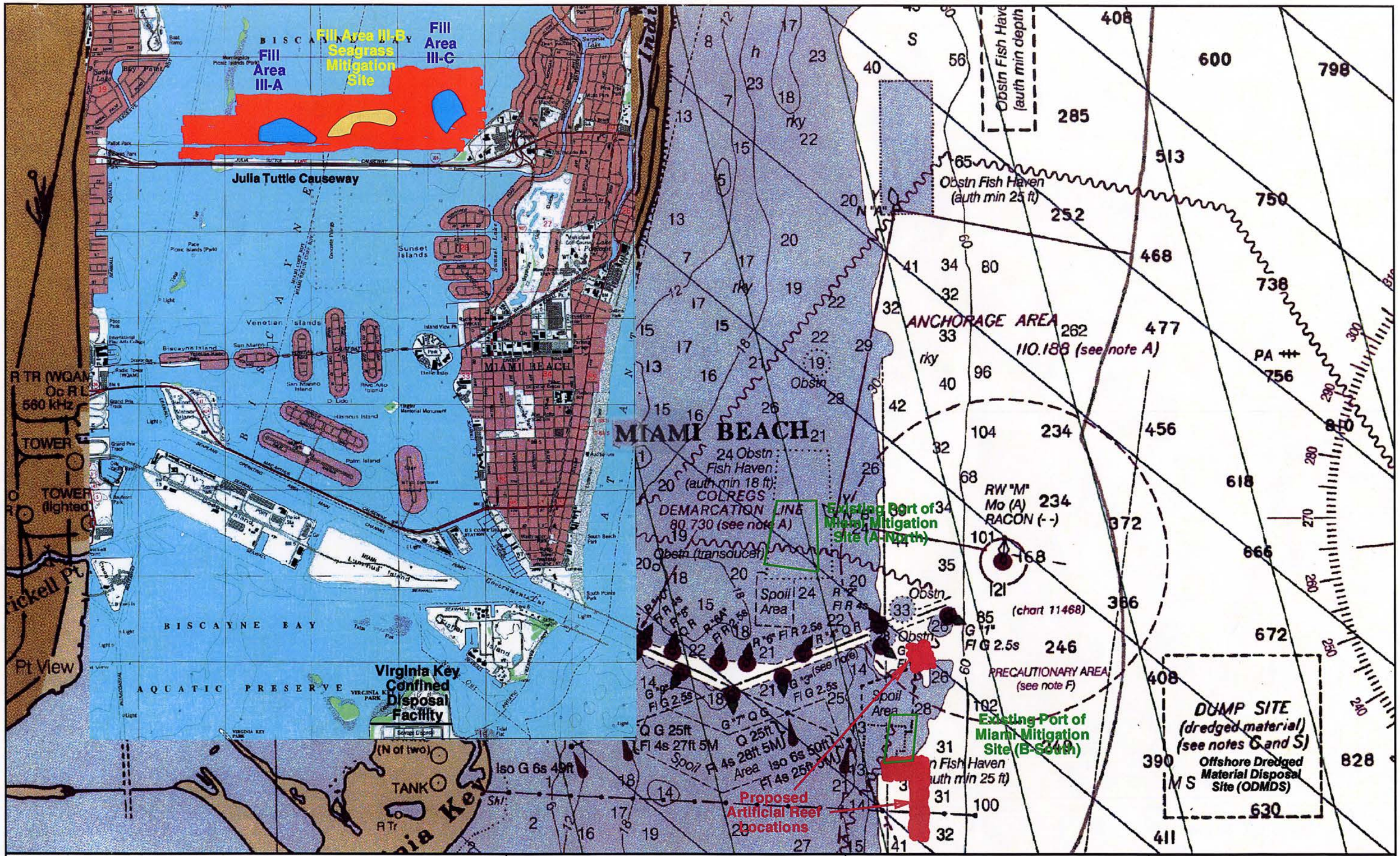
[9]- Latin America, Europe, Mediterranean, Far East

[10]- Panamax: 950 feet LOA, 106 feet beam, 43.0 feet draft

[11]- Post-Panamax: 1,138 Feet LOA, 141 feet beam, 47.6 feet draft

[12]- Panamax: 965 feet LOA, 106 feet beam, 44.4 feet draft

[13]- Lightloaded prior to deepening



NOTES:
1] Background images combined NOAA navigational charts 11466, 35th Ed. dated June 2000 and 11468, 38th Ed. dated March 2001.
2] Soundings in feet at mean lower low water.
3] Projection Universal Transverse Mercator (UTM), NAD27, units meters, zone 17.

2000 0 2000 4000 6000 Feet

N

PROPOSED DREDGED MATERIAL DISPOSAL SITES AND MITIGATION LOCATIONS

U.S.ARMY CORPS OF ENGINEERS
Jacksonville District

Figure 2

February 2004

Volume II of II

FINAL

Mitigation Plan – Incremental Cost Analysis

Appendix F

For the

Miami Harbor Navigation Study
General Reevaluation Report

Miami-Dade County, Florida - 010140

US Army Corps
of Engineers®

Jacksonville District
South Atlantic Division

TABLE OF CONTENTS

ARTICLE I. SEAGRASS MITIGATION **1**

SECTION 1.01 INTRODUCTION 1
(a) Impacted Acreage and Associated Mitigation Requirements *2*
(b) Potential Mitigation Sites *2*
SECTION 1.02 ALTERNATIVE SEAGRASS MITIGATION PLANS 2
(a) Placement Method *2*
(i) Plant 2
(ii) Recolonize 3
(b) Construction Method *3*
(i) Sheet Pile 3
(ii) Rock 3
(iii) Combination Sheet Pile and Rock 4
(c) Alternative Plans *4*
SECTION 1.03 EXPECTED COSTS OF ALTERNATIVE SEAGRASS MITIGATION PLANS ... 4
(a) Initial Cost *4*
(i) Construction of Site Cost 4
(ii) Planting Cost 4
(b) Chance of Success *5*
(c) Secondary Cost *5*
(i) Planting Cost 5
(ii) Discounted Planting Cost 5
(d) Estimated Expected Cost of Each Seagrass Mitigation Alternative *5*
SECTION 1.04 SEAGRASS MITIGATION BENEFITS 6
(a) Coverage *6*
(i) Plant 6
(ii) Recolonize 6
(b) Density *6*
(i) Plant 6
(ii) Recolonize 6
(c) Total Expected Acreage by Half Year *6*
(d) Average Annual Equivalent (AAE) Acreage *7*
SECTION 1.05 COST-EFFECTIVE PLAN 7
(a) AAE Cost per AAE Acre *7*
(b) Cost-Effective Seagrass Mitigation Plan *8*
SECTION 1.06 ESTIMATION OF SEAGRASS MITIGATION COSTS FOR ALTERNATIVE PROJECT PLANS 8
(a) Implemented Plan and Costs Employed for Comparison of Alternative Project Plans *8*
(b) Incremental Seagrass Mitigation Costs by Project Increment *8*
(c) Seagrass Mitigation Costs by Alternative Plan *8*

ARTICLE II. ARTIFICIAL REEF MITIGATION **9**

SECTION 2.01 INTRODUCTION 9

(a) Impacted Acreage and Associated Mitigation Requirements *9*
(i) Request For Proposal (RFP) Process to Avoid Impacts 10
(ii) Worst Case Impacts 10
(b) Possible Mitigation Sites *10*
SECTION 2.02 ALTERNATIVE ARTIFICIAL REEF MITIGATION PLANS 11
(a) Placement Method *11*
(i) Divers 11
(ii) Crane Barge 12
(b) Construction Material *12*
(i) Dredged Rock 12
(ii) Quarry Rock 12
(c) Alternative Plans *12*
SECTION 2.03 EXPECTED COSTS OF ALTERNATIVE ARTIFICIAL REEF MITIGATION PLANS 13
(a) Cost of Placement *13*
(b) Cost of Material *13*
(c) Estimated Cost of Each Artificial Reef Mitigation Alternative *13*
SECTION 2.04 ARTIFICIAL REEF MITIGATION BENEFITS 13
(a) Effective Acreage *13*
(b) Average Annual Equivalent AAE Acreage *15*
SECTION 2.05 COST-EFFECTIVE PLAN 15
(a) AAE Cost per AAE Acre *15*
(b) Cost-Effective Artificial Reef Mitigation Plan *15*
SECTION 2.06 ESTIMATION OF ARTIFICIAL REEF MITIGATION COSTS FOR ALTERNATIVE PROJECT PLANS 15
(a) Incremental Artificial Reef Mitigation Costs by Project Increment *15*
(b) Artificial Reef Mitigation Costs by Alternative Plan *16*

LIST OF TABLES

TABLE 1: ALTERNATIVE SEAGRASS MITIGATION PLANS 4
TABLE 2: ESTIMATED COSTS OF SEAGRASS MITIGATION COMPONENTS 5
TABLE 3: ESTIMATED EXPECTED COST OF SEAGRASS MITIGATION BY SEAGRASS MITIGATION ALTERNATIVE PLAN 5
TABLE 4: AAE SEAGRASS BENEFITS BY PLACEMENT METHOD 7
TABLE 5: AAE COST PER ACRE OF SEAGRASS MITIGATION BY SEAGRASS MITIGATION ALTERNATIVE PLAN 7
TABLE 6: INCREMENTAL SEAGRASS MITIGATION COSTS 8
TABLE 7: SEAGRASS MITIGATION COSTS BY ALTERNATIVE PROJECT PLAN 9
TABLE 8: ALTERNATIVE ARTIFICIAL REEF MITIGATION PLANS 12
TABLE 9: ESTIMATED COSTS OF ARTIFICIAL REEF MITIGATION COMPONENTS 13
TABLE 10: ESTIMATED MITIGATION EXPENSE BY ALTERNATIVE ARTIFICIAL REEF MITIGATION PLAN 13
TABLE 11: EFFECTIVE ACREAGE OF LOW- AND HIGH-RELIEF MITIGATION 14
TABLE 12: TOTAL EFFECTIVE AAE ARTIFICIAL REEF ACREAGE 15
TABLE 13: AAE COST PER ACRE OF ARTIFICIAL REEF MITIGATION BY ARTIFICIAL REEF MITIGATION ALTERNATIVE PLAN 15
TABLE 14: INCREMENTAL ARTIFICIAL REEF MITIGATION COSTS 16
TABLE 15: ARTIFICIAL REEF MITIGATION COSTS BY ALTERNATIVE PROJECT PLAN 16

Article I. Seagrass Mitigation

Section 1.01 Introduction

Restoring seagrass beds, if successful, can be an appropriate mitigation strategy due to its high ecological value and declining abundance. Seagrass restoration adds habitat value to unvegetated sand or mud substrates. The addition of seagrass beds increases the productivity and diversity of the unvegetated bottom, which can directly compensate for the historic loss in productivity and diversity.

Fonseca et al. (1996a, 1996b) found that within three years, restored seagrass beds (*H. wrightii*) planted on 0.5-m centers reach the same areal density and support animal densities, number of taxa, and species composition equivalent to natural beds. Some restored seagrass beds support invertebrate populations that are as or more abundant than those in natural grassbeds (Bell et al. 1993). Restored seagrass beds appear to be as suitable as natural seagrass beds for juvenile and small adult fish (Brown-Peterson et al. 1993).

Restored seagrass beds support animal densities similar to natural seagrass beds when shoot density is only one-third that of a natural seagrass bed (Fonseca et al. 1996). Thus, the habitat value of a restored seagrass bed is maximized relatively quickly, prior to the restored bed reaching the same vegetative density as a natural seagrass bed. In addition to providing habitat itself, seagrass beds increase the productivity of adjacent habitats. Irandi and Crawford (1997) found that the presence of seagrass beds adjacent to tidal marshes increased the abundance and growth rates of fish in the tidal marsh.

Research has identified that seagrass beds are more diverse and productive than unvegetated substrate. Average fish densities in natural seagrass beds were ten times greater than those on unvegetated areas (~20 individuals/m^2 versus 1.74 individuals/m^2). Shrimp densities in natural shoal grass beds averaged 151 individuals/m^2 compared to 3.02 individuals/m^2 in unvegetated areas. Crab densities in natural seagrass beds were 20 to 50 individuals/m^2 compared to an average of 1.91 individuals/m^2 on unvegetated areas (Fonseca et al. 1996). Within 1.5 years of planting, restored seagrass beds support shrimp, fish, and crab densities similar to natural seagrass beds (Fonseca et al. 1996). Thus, restored seagrass beds can increase the density of shrimp, fish, and crabs by 10 to 50 times compared to unvegetated substrates.

Although research has identified that seagrass beds are more diverse and productive than unvegetated substrates, relatively few studies compare secondary productivity between seagrass beds and other habitats. Heck et al. (1995) determined that eelgrass beds in the northeastern United States had macroinvertebrate production 5 to 15 times higher than adjacent unvegetated habitats. At least a similar increase in productivity is expected for *H. wrightii* and *T. testudium*, which have a higher primary productivity than eelgrass. Also, a similar increase in abundance, diversity, and productivity of fish species may also be expected.

Restoration of seagrass communities, while still considered experimental and not highly successful by resource agencies, can enhance habitat heterogeneity and the diversity of invertebrate and fish communities, if carefully implemented. The recent treatise on seagrass restoration entitled "Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters" by Fonseca et al. (1998) discusses the benefits and risks associated with seagrass restoration. Given the documented success of more recent efforts to restore seagrass communities, including those in South Florida, restoration is quickly becoming a proven resource management tool in some areas where conditions are appropriate.

(a) Impacted Acreage and Associated Mitigation Requirements

Impacted seagrass acreage for the recommended plan is 7.9. Mitigation will be performed by filling sections of a borrow site which provided construction material for the Julia Tuttle Causeway; however, the hole we propose to fill has a surface area of 24 acres. To ensure success of the mitigation for the 7.9 acres of seagrass impacts, the Corps must fill the entire 24-acre hole.

(b) Potential Mitigation Sites

Over 25 mitigation options ranging from significant tidal and mangrove habitat restoration in south Biscayne Bay to restoring seagrass habitat in north Biscayne Bay were considered for mitigating seagrass impacts. Based on detailed analysis and significant agency coordination, restoring seagrass habitat in north Biscayne Bay was the preferred option. Evaluation of eight borrow areas resulted in the selection of one site that will provide approximately 24-acres. The additional acreage provided would be banked for future Port use. A table of the different mitigation options considered by the Corps in developing the mitigation plan is included in the mitigation plan, Appendix J of the EIS.

Section 1.02 Alternative Seagrass Mitigation Plans

(a) Placement Method

Two alternatives for placement of the seagrass were considered: planting the seagrass and allowing the seagrass to naturally recolonize.

(i) Plant

Planting of the proposed 24-acre mitigation site is expected to follow a pattern demonstrated by a three-acre restoration site in North Biscayne Bay that was prepared by Miami-Dade County DERM. Restoration of three-acre borrow area in North Biscayne Bay was completed in the late 1990s. Although no monitoring has been done by DERM since planting of the site, a visual inspection by an agency team in 2002 revealed that seagrass occurs throughout the site and was dominated by *H. wrightii* and *T. testudinum*. Discussions with DERM staff indicate the old borrow area was filled with rubble and sand and planting units of both *H. wrightii* and *T. testudinum* installed. Based on this evidence of success, it is agreed that seagrass restoration in deep dredge holes was a viable option for mitigating seagrass loss in Biscayne Bay.

(ii) Recolonize

Another example of successful seagrass restoration is the Miami-Dade sewage cross-bay force main installed by the Miami-Dade Water and Sewer Authority Department in the mid-1990s. The project required trenching of over one mile of Miami Harbor baybottom for pipeline installation, including excavation of 1.80 acres of seagrass beds. Once the pipeline was installed the 22-foot wide trench path was refilled and allowed to recruit with seagrasses. Recruitment had begun within one-year and after two years seagrasses and macroalgaes covered the trench pathway so that it was no longer visible on aerial photography.

(b) Construction Method

Three construction methods for containing the material within the boundaries of the hole were considered: use of sheet pile, use of rock, and use of a combination of sheet pile and rock.

(i) Sheet Pile

Cantilever sheet pile driven or jetted into the sandy bottom material around the borrow site to provide containment would only receive tentative support at the end driven into the bottom material. Additional tiebacks or other methods of lateral support would be required which complicate the construction method before fill material could be added. Dense areas of seagrass surround the borrow site on three sides leaving access for construction equipment from only one side. Construction of the cantilever sheet pile requires careful sequencing to allow shallow draft construction barges and cranes room to exit the borrow site from the one available entry area that has sufficient depths. Filling of the construction site also requires careful sequencing so as to not box-in the construction equipment or limit its access to the borrow site. Construction of the cantilever sheet pile containment system with lateral support and filling of the site would have to occur concurrently from one end or the borrow site and work back to the available access corridor before completion or closing of the access corridor could occur.

(ii) Rock

Rock from the blasting and dredging of the Lummus Island (Fisherman's) channel about two to six miles away provides a good source of fill material for the borrow site. Transportation of rock material from the dredging project along the Intracoastal Waterway to the borrow site requires the use of small shallow draft barges. A crane barge will transfer rock material from the shallow draft barges for placement in the borrow site. Rock placement will occur to within two feet of the optimum level for seagrass development as shown on plate B-17 of Engineering Appendix B. The crane barge will place a 2-foot sand cap on the rock to complete filling of the borrow site to match the depth of the adjacent seagrass areas. Rock provides a stable foundation for capping and seagrass development. Filling of the borrow site with rock followed by a sand cap would occur sequentially from one end of the borrow site and work back to the available access corridor. Sand material for capping would come from the confined upland disposal site on Virginia Key by small shallow draft barge.

(iii) Combination Sheet Pile and Rock

Combining sheet pile with rock involves use of elements from both of the above methods. Driving or jetting the sheet pile into the sandy bottom material would occur as described above under the sheet pile discussion. Rock material would be used to replace the tieback or lateral restrain system required by the sheet pile method. The construction sequence would also be similar to the sheet pile method.

(c) Alternative Plans

The combination of the two placement methods and the three construction methods leads to six alternative seagrass mitigation plans, as shown in Table 1.

Table 1: Alternative Seagrass Mitigation Plans

	Seagrass Placement Method	
Construction Method	*Plant*	*Recolonize*
Sheet Pile	Seagrass Mitigation Alternative 1	Seagrass Mitigation Alternative 2
Rock	Seagrass Mitigation Alternative 3	Seagrass Mitigation Alternative 4
Rock and Sheet Pile	Seagrass Mitigation Alternative 5	Seagrass Mitigation Alternative 6

Section 1.03 Expected Costs of Alternative Seagrass Mitigation Plans

(a) Initial Cost

(i) Construction of Site Cost

Estimated site construction costs vary according to the method employed to contain the material in the hole. See Table 2 for the estimated costs associated with the use of sheet pile, rock, and a combination of sheet pile and rock. There is no cost associated with the use of dredged material for retaining the material within the hole. This is because an analysis of the costs of transporting the dredged material to the mitigation site and the costs of transporting the dredged material to the disposal site showed that there is no marginal (extra) expense associated with using the material for mitigation.

(ii) Planting Cost

As shown in Table 2, the estimated cost to plant seagrass is $45,000 per acre, or $1,080,000 for the entire 24-acre site. Planting costs are only included as initial costs for Alternative Seagrass Mitigation Plans 1, 3, and 5. Initial costs for Alternative Seagrass

Mitigation Plans 2, 4, and 6 do not include planting costs because these plans call for allowing natural colonization to occur.

Table 2: Estimated Costs of Seagrass Mitigation Components

Expense	Cost/Acre	Cost/Project
Planting	$45,000	$1,080,000
Sheet Pile		$30,000
Sheet Pile/Rock		$15,000
Rock		$0
Transportation/Other		$3,836,814

(b) Chance of Success

The chance of successful recolonization of the seagrass in Alternative Seagrass Mitigation Plans 2, 4, and 6 is 95 percent, as shown in Table 3.

(c) Secondary Cost

Secondary costs are incurred under Seagrass Mitigation Alternatives 2, 4, and 6 if recolonization does not occur within two years and planting is performed as a result.

(i) Planting Cost

In the event recolonization does not occur after two years, there would be an additional cost to plant the site at that time.

(ii) Discounted Planting Cost

The secondary cost is discounted from t=2 years to the base year to account for its value at that time.

(d) Estimated Expected Cost of Each Seagrass Mitigation Alternative

Table 3 displays the expected cost of each seagrass mitigation alternative. The expected cost equals the initial cost, plus, if applicable, the discounted secondary cost multiplied by the probability of the secondary cost occurring.

Table 3: Estimated Expected Cost of Seagrass Mitigation by Seagrass Mitigation Alternative Plan

Seagrass Mitigation Alternative	Initial Cost	% Chance Initial Success	Secondary Cost	Discounted Secondary Cost	Expected Secondary Cost	Expected Total Cost
1	$4,946,814	99%	n/a	n/a	n/a	$4,946,814
2	$3,866,814	95%	$1,080,000	$994,887	$49,744	$3,916,558
3	$4,916,814	99%	n/a	n/a	n/a	$4,916,814
4	$3,836,814	95%	$1,080,000	$994,887	$49,744	$3,886,558
5	$4,931,814	99%	n/a	n/a	n/a	$4,931,814
6	$3,851,814	95%	$1,080,000	$994,887	$49,744	$3,901,558

Section 1.04 Seagrass Mitigation Benefits

(a) Coverage

Coverage for seagrass is defined by a real coverage – how much area of the substrate is covered by all of the individuals of a selected species within a defined area.

(i) Plant

Coverage of planted areas would be 100% over the mitigation site right after construction was complete on .5m centers using transplanted species of seagrasses from nearby donor beds to the restoration site. Based on other seagrass restoration sites located in Northern Biscayne Bay, we expect good success with high survivability of all species planted.

(ii) Recolonize

Natural recolonization or recruitment from seagrass beds surrounding the mitigation site is expected to occur rather rapidly. Seagrasses in South Florida demonstrate a sequential hierarchy as they colonize new substrates. It is anticipated that ambient depths will range from -2 feet to -6 feet MSL in the restored areas following restoration and that seagrass recruitment will occur rapidly by *H. wrightii* and *H. decipiens,* both of which likely occur within the shallow flats adjacent to the proposed site. Other species including *T. testudinum* and *S. filiforme* will also colonize the site, but generally only after occupation by the early colonizing species previously cited.

(b) Density

Density of seagrass is defined as the number of individual seagrass shoots of a selected species within a defined area.

(i) Plant

Restored seagrass beds support animal densities similar to natural seagrass beds when shoot density is only one-third that of a natural seagrass bed (Fonseca et al. 1996). Thus, the habitat value of a restored seagrass bed is maximized relatively quickly, prior to the restored bed reaching the same vegetative density as a natural seagrass bed. Since planting will likely occur on .5m centers we can expect the density of each species to be low in the first year and increase as the plant shoots mature and grow.

(ii) Recolonize

Density of naturally recolonized or recruited beds onto the new substrate will likely be higher on the edges of the project site and lower in the middle during the first year post construction – filling from the outside of the project boundaries in toward the middle. We expect that the dominant grass in the area will colonize the site only after pioneering grass species previously discussed colonizes it.

(c) Total Expected Acreage by Half Year

Total expected seagrass acreage for each half year of the project is calculated using the expected density and coverage for that time period. By the end of year two of the project,

coverage and density are at their highest potential level regardless of the placement method employed.

(d) Average Annual Equivalent (AAE) Acreage

AAE acreage refers to the average yearly acreage of seagrass expected to exist over the fifty years of the project. AAE acreages for the plant and recolonize options are calculated from the information shown in Table 4. Although after year 2 of the project the acreage is equal for both placement options, AAE acreage is higher for the alternatives that employ planting as a placement method because of the higher acreage experienced in the first two years of the project.

Table 4: AAE Seagrass Benefits by Placement Method

Plant				
Year	0.5	1	1.5	2-50
Coverage	100%	100%	100%	100%
Density	20%	65%	85%	90%
Expected Acreage	4.8	15.6	20.4	21.6
AAE Acreage - Plant		21.14		
Recolonize				
Year	0.5	1	1.5	2-50
Coverage	20%	40%	70%	100%
Density	65%	70%	85%	90%
Expected Acreage	3.1	6.7	14.3	21.6
AAE Acreage - Recolonize		20.98		

Section 1.05 Cost-Effective Plan

(a) AAE Cost per AAE Acre

Base year (discounted) costs of each alternative mitigation plan are annualized and compared to the respective AAE benefits (see Table 5). Alternative plans are compared by calculating their AAE cost per AAE benefit (acreage).

Table 5: AAE Cost per Acre of Seagrass Mitigation by Seagrass Mitigation Alternative Plan

Seagrass Mitigation Alternative	AAE Cost of Mitigation	AAE Benefits of Mitigation (acres)	AAE Cost/Acre
1	$297,543	21.14	$14,072
2	$235,575	20.98	$11,230
3	$295,739	21.14	$13,987
4	$233,770	20.98	$11,144
5	$296,641	21.14	$14,030
6	$234,673	20.98	$11,187

(b) Cost-Effective Seagrass Mitigation Plan

Table 5 shows the process of comparing alternative seagrass mitigation plans and reveals that Seagrass Mitigation Alternative 4 provides the needed acreage at the lowest cost per acre; therefore, Alternative 4 is the Cost-Effective seagrass mitigation plan.

Section 1.06 Estimation of Seagrass Mitigation Costs for Alternative Project Plans

(a) Implemented Plan and Costs Employed for Comparison of Alternative Project Plans

Seagrass mitigation costs were estimated for each project increment. Although the cost-effective mitigation plan, Seagrass Alternative Mitigation Plan 4, is chosen for implementation, the highest possible cost of that plan, rather than the expected cost of the plan, was used for project cost estimation purposes. This means that the costs shown in Table 6 and Table 7 assume that recolonization does not occur and planting is necessary after two years.

(b) Incremental Seagrass Mitigation Costs by Project Increment

Table 6 displays the estimated seagrass mitigation cost by project increment (see Economics Appendix and Main Report for a discussion of project increments and alternative project plans).

Table 6: Incremental Seagrass Mitigation Costs

Increment	Seagrass Mitigation Cost
1C, 2A, 5A	$3,305,756
3B	$531,058
Deepen System from 42 Feet to 43 Feet	$0
Deepen System from 43 Feet to 44 Feet	$0
Deepen System from 44 Feet to 45 Feet	$0
Deepen System from 45 Feet to 46 Feet	$0
Deepen System from 46 Feet to 47 Feet	$0
Deepen System from 47 Feet to 48 Feet	$0
Deepen System from 48 Feet to 49 Feet	$0
Deepen System from 49 Feet to 50 Feet	$0

(c) Seagrass Mitigation Costs by Alternative Plan

Table 7 displays the total estimated seagrass mitigation costs for each alternative project plan.

Table 7: Seagrass Mitigation Costs by Alternative Project Plan

Project	Seagrass Mitigation Cost
Alternative Plan A: No Action	$0
Alternative Plan B: 1C, 2A, 5A	$3,305,756
Alternative Plan C: 3B	$531,058
Alternative Plan D: 1C, 2A, 5A and 3B	$3,836,814
Alternative Plan H: 1C, 2A, 5A and 3B, and Deepen Channel (Any Depth)	$3,836,814

Article II. Artificial Reef Mitigation

Artificial reefs are often proposed for mitigating impacts to natural hardbottom habitats as a result of beach restoration (Lutz 1998). Mitigation reefs differ in several ways from traditional artificial reefs for fishing enhancement. Traditional artificial reefs are usually constructed offshore, are generally of high relief, are promoted as fishing destinations, and often utilize vessels or other non-natural substrate to offer divers an interesting alternative to natural reefs. In contrast, mitigation reefs should be designed to mimic the lost habitat as closely as possible in terms of relief and structural complexity. They should be placed in the same habitat depth zones as the impacted natural hardbottom/reef, and consumptive use of the reefs should be discouraged.

Artificial reefs have been used successfully for many years to mitigate impacts in sheltered waters (Duffy 1985) (Davis 1985) or in relatively deep water offshore (Mostkoff 1993). Reef deployments in shallow, open coastal areas present special challenges in the wave stability of materials and burial by sand movements in this very dynamic habitat. Palm Beach County has had considerable success with deploying shallow water artificial reefs as mitigation measures. The proposed design reflects the limitations on design and placement imposed by navigation regulations, liability issues, construction limitations, and stability concerns.

Section 2.01 Introduction

(a) Impacted Acreage and Associated Mitigation Requirements

Impacted artificial reef acreage for the recommended plan is 0.6 acres of low relief hardbottom and 2.7 acres of high relief hardbottom. Mitigation will be performed at a 2:1 ratio for the high relief hardbottom, resulting in 5.4 acres of mitigation and 1.3:1 ratio for low relief hardbottom, resulting in 0.8 acres of mitigation; therefore, a total of 6.2 acres of artificial reef is required.

(i) Request For Proposal (RFP) Process to Avoid Impacts

The Request for Proposal (RFP) process conducted prior to award of a construction contract will allow for an in-depth evaluation of a potential contractor's proposal. The RFP process as currently planned for this proposed project would rate the technical portion of a contractor's proposal as the most significant. This results in an incentive approach, which will encourage the contractor to avoid impacts to reef areas. As a result, the vessel operational and anchoring plan that best avoids or reduces impacts to reefs would receive the highest evaluation and the incentives that follow. Measures such as the use of surge buoys to lift anchor cables and restricted anchor placement to minimize impacts would be important factors in determining the best construction methodology to avoid reef impacts.

(ii) Worst Case Impacts

If cutterhead dredging is used as the construction method to deepen the Entrance Channel, additional direct impacts to both low relief and high relief hardbottom reefs would occur due to anchoring and cable systems for the cutterhead vessel. Assuming an unrealistic worse case scenario in which the contractor refuses incentives and does nothing to avoid reef impacts the potential exists for up to 26.9 acres of low relief and 10.0 acres of high relief hardbottom reefs to be impacted based on a maximum number of anchor positions and total cable contact with the footprint area. Since the construction method depends on the results of the RFP process, the actual impacts using a cutterhead dredge are unknown. The USACE would conduct pre-construction and post-construction surveys to determine actual impacts and then coordinate with the resource agencies on appropriate mitigation. Costs used in this analysis represent the worst case scenario.

(b) Possible Mitigation Sites

Mitigation reefs will be required in two different designs, to reflect the differences in the habitat structure of the two types of hardbottom/reef habitat to be impacted. The Corps reviewed four potential placement mitigation sites for hardbottom mitigation, two sites that are managed by Miami-Dade County and two sites that are currently unpermitted to receive mitigation reef materials.

Two types of mitigation reefs will be constructed; HRHC reefs and LRLC reefs. The HRHC reefs are intended to mitigate for impacts to high relief habitat and the LRLC reefs are intended to mitigate for impacts to lower relief reef. LRLC reefs will have a vertical relief of 1 to 2 feet and will be placed inshore of, and shallower than, HRHC reefs.

After reviewing the Miami-Dade county permitted sites, it was determined that one of the sites (DERM reef site A – north of the entrance channel) is too shallow to mimic the reef that is being impacted and has very little available space for reef construction. DERM reef site B – located to the south of the entrance channel has 58.3-acres of available space for reef creation. It already has some artificial reef located within the boundaries, which would allow for quicker colonization of artificial reef material, as well as allowing for easier monitoring since it is adjacent to a county mitigation site that is currently monitored. Water depths of this site are similar to the depths of high relief reefs being

impacted by the proposed project (40 to 45 feet). The County has already completed the permitting process with the State of Florida for this artificial reef site.

Mitigation reefs will be required in two different designs, to reflect the differences in the habitat structure of the two types of hardbottom/reef habitat to be impacted. The Corps reviewed four potential placement mitigation sites for hardbottom mitigation, two sites that are managed by Miami-Dade County and two sites that are currently unpermitted to receive mitigation reef materials.

Two types of mitigation reefs will be constructed; HRHC reefs and LRLC reefs. The HRHC reefs are intended to mitigate for impacts to high relief habitat and the LRLC reefs are intended to mitigate for impacts to lower relief reef. LRLC reefs will have a vertical relief of 1 to 2 feet and will be placed inshore of, and shallower than, HRHC reefs.

After reviewing the Miami-Dade county permitted sites, it was determined that one of the sites (DERM reef site A – north of the entrance channel) is too shallow to mimic the reef that is being impacted and has very little available space for reef construction. DERM reef site B – located to the south of the entrance channel has 58.3-acres of available space for reef creation. It already has some artificial reef located within the boundaries, which would allow for quicker colonization of artificial reef material, as well as allowing for easier monitoring since it is adjacent to a county mitigation site that is currently monitored. Water depths of this site are similar to the depths of high relief reefs being impacted by the proposed project (40 to 45 feet). The County has already completed the permitting process with the State of Florida for this artificial reef site.

The Corps reviewed two additional sites for placement of reef mitigation material. Both sites are located south of the entrance channel. The northernmost site is located north of DERM reef site B, and has shallower water depths (35 to 40 feet). The southern "L"-shaped site is directly adjacent to the DERM reef site B. However, it was determined that hardbottom communities are located within the proposed site, which would make using the site for mitigation construction difficult due to the requirement to avoid impacts to the existing resources within the site while constructing mitigation reefs.

Section 2.02 Alternative Artificial Reef Mitigation Plans

(a) Placement Method

Two alternatives for placement of the artificial reef were considered. One placement method would involve the use of divers to place the material. The second placement method would be to use a crane barge to place the material.

(i) Divers

Rock would be transferred from the port deepening location to the selected mitigation site on barges. Each rock would be lowered from the barge to the selected site below. A diver (or more than one diver) would be on the bottom and provide guidance for the rock

placement, stacking the rock and ensuring that the rocks were securely placed on the bottom and stacked to a height necessary to properly mimic the functions of the impacted reef. While more successful at placing rock and guaranteeing the artificial reef is built to mimic the impacted reef, it is less efficient since it is limited by sea conditions, conditions on the bottom at the construction site (currents, visibility, water temperature) and the amount of time that an individual diver can spend on the bottom. Construction with Divers is typically more expensive than construction without divers.

(ii) Crane Barge

This construction technique is much the same as the with diver option, however, the reef is constructed only with the crane without diver involvement, which may prove more efficient due to not being limited by human SCUBA divers and the associated limitations.

(b) Construction Material

Both dredged rock and purchased quarry rock were considered for use as construction material.

(i) Dredged Rock

Rock blasted from the Harbor Deepening project is proposed to be used for construction of the mitigation reefs because the rock is native limestone, fossilized coral reef material and will quickly colonize with infaunal reef species who live within the rock structure of a coral reef.

(ii) Quarry Rock

Rock quarried from offsite must be of a material that can be utilized by infaunal reef species – so it must match the composition of the native reef material – which limits what rock can be used as a substrate. In south Florida reef environments the rock must be limestone. The rock must be of a large enough size and heavy enough to prevent movement of the reefs during storm events such as hurricanes.

(c) Alternative Plans

The combination of the two placement methods and the two construction materials leads to four alternative artificial reef mitigation Plans, as shown in Table 8.

Table 8: Alternative Artificial Reef Mitigation Plans

	Artifical Reef Placement Method	
Construction Material	*Diver*	*Crane Barge*
Dredged Material	Artifical Reef Mitigation Alternative 1	Artifical Reef Mitigation Alternative 2
Quarry Rock	Artifical Reef Mitigation Alternative 3	Artifical Reef Mitigation Alternative 4

Section 2.03 Expected Costs of Alternative Artificial Reef Mitigation Plans

(a) Cost of Placement

Costs for artificial reef mitigation were calculated based on crane barge placement. Alternatives that include placement by diver are associated with an additional cost that represents the amount by which diver placement is more costly than crane barge placement. See Table 9 for the estimated additional cost associated with the use of diver for placement.

(b) Cost of Material

As shown in Table 9, there is no cost associated with the use of dredged material for artificial reef mitigation. This is because an analysis of the costs of transporting the dredged material to the mitigation site and the costs of transporting the dredged material to the disposal site showed that there is no marginal (extra) expense associated with using the material for mitigation.

Table 9: Estimated Costs of Artificial Reef Mitigation Components

Expense	Cost/Acre	Cost/Project
Diver Placement (Additional Cost)		$692,385
Dredged Material	$0	$0
Quarry Rock	$600,000	$3,720,000
Transportation/Other (Includes Crane Barge Placement)		$3,954,342

(c) Estimated Cost of Each Artificial Reef Mitigation Alternative

Combining the component costs leads to an estimated cost for each Artificial Reef Mitigation Plan, shown in Table 10.

Table 10: Estimated Mitigation Expense by Alternative Artificial Reef Mitigation Plan

Artifical Reef Mitigation Alternative	Estimated Cost
1	$4,646,727
2	$3,954,342
3	$8,366,727
4	$7,674,342

Section 2.04 Artificial Reef Mitigation Benefits

(a) Effective Acreage

The immediate benefits of the newly constructed artificial reefs will be an estimated 20 percent of established reefs and will provide increasing benefits over time. The rate at which the benefits increase varies between low-relief and high-relief reefs, as shown in Table 11.

Table 11: Effective Acreage of Low- and High-Relief Mitigation

Effective Acreage Gained from Recovery of Low-Relief Artificial Reefs		
Project Year	**% Service Level***	**Effective Acreage**
1	20.00%	0.23
2	26.67%	0.30
3	33.33%	0.38
4	40.00%	0.45
5	46.67%	0.53
6	53.33%	0.60
7	60.00%	0.68
8	66.67%	0.75
9	73.33%	0.83
10	80.00%	0.90
11	86.67%	0.98
12	93.33%	1.05
13-50	100.00%	1.13
Effective Acreage Gained from Recovery of High-Relief Artificial Reefs		
Project Year	**% Service Level***	**Effective Acreage**
1	20.00%	1.01
2	22.67%	1.15
3	25.33%	1.28
4	28.00%	1.42
5	30.67%	1.56
6	33.33%	1.69
7	36.00%	1.83
8	38.67%	1.96
9	41.33%	2.10
10	44.00%	2.23
11	46.67%	2.37
12	49.33%	2.50
13	52.00%	2.64
14	54.67%	2.77
15	57.33%	2.91
16	60.00%	3.04
17	62.67%	3.18
18	65.33%	3.31
19	68.00%	3.45
20	70.67%	3.58
21	73.33%	3.72
22	76.00%	3.86
23	78.67%	3.99
24	81.33%	4.13
25	84.00%	4.26
26	86.67%	4.40
27	89.33%	4.53
28	92.00%	4.67
29	94.67%	4.80
30	97.33%	4.94
31-50	100.00%	5.07
*Source: Habitat Equivalency Analysis, Mitigation Plan, Appendix J - DEIS		

(b) Average Annual Equivalent AAE Acreage

AAE acreage refers to the average acreage of Artificial Reef expected to exist over the fifty years of the project. Because the reefs will not be immediately fully beneficial, AAE acreage is less than the total acreage experienced once the reefs are established. AAE for the Artificial Reef Mitigation is shown in Table 12.

Table 12: Total Effective AAE Artificial Reef Acreage

Total Effective AAE Low-Relief Acreage	1.01
Total Effective AAE High-Relief Acreage	3.81
Tota Effective AAE Acreage	4.82

Section 2.05 Cost-Effective Plan

(a) AAE Cost per AAE Acre

Base year (discounted) costs of each alternative mitigation plan are annualized and compared to the respective AAE benefits (see Table 13). Alternative mitigation plans are compared by calculating their AAE Cost per AAE benefit (acreage).

(b) Cost-Effective Artificial Reef Mitigation Plan

Table 13 shows the process of comparing alternative artificial reef mitigation plans and reveals that Artificial Reef Mitigation Alternative 2 provides the needed acreage at the lowest cost per acre; therefore, Alternative 2 is the Cost-Effective Artificial Reef Mitigation Plan.

Table 13: AAE Cost per Acre of Artificial Reef Mitigation by Artificial Reef Mitigation Alternative Plan

Artifical Reef Mitigation Alternative	AAE Cost of Mitigation	AAE Benefits of Mitigation (acres)	AAE Cost/Acre
1	$279,493	4.82	$57,929
2	$237,847	4.82	$49,298
3	$503,245	4.82	$104,305
4	$461,600	4.82	$95,674

Section 2.06 Estimation of Artificial Reef Mitigation Costs for Alternative Project Plans

(a) Incremental Artificial Reef Mitigation Costs by Project Increment

Table 14 displays the estimated artificial reef mitigation cost by project increment (see Economics Appendix and Main Report for a discussion of project increments and alternative plans).

Table 14: Incremental Artificial Reef Mitigation Costs

Increment	Artificial Reef Mitigation Cost
1C, 2A, 5A	$3,954,342
3B	$0
Deepen System from 42 Feet to 43 Feet	$0
Deepen System from 43 Feet to 44 Feet	$0
Deepen System from 44 Feet to 45 Feet	$0
Deepen System from 45 Feet to 46 Feet	$0
Deepen System from 46 Feet to 47 Feet	$0
Deepen System from 47 Feet to 48 Feet	$0
Deepen System from 48 Feet to 49 Feet	$0
Deepen System from 49 Feet to 50 Feet	$0

(b) Artificial Reef Mitigation Costs by Alternative Plan

Table 15 displays the total estimated artificial reef mitigation costs for each alternative project plan.

Table 15: Artificial Reef Mitigation Costs by Alternative Project Plan

Project	Artificial Reef Mitigation Cost
Alternative Plan A: No Action	$0
Alternative Plan B: 1C, 2A, 5A	$3,954,342
Alternative Plan C: 3B	$0
Alternative Plan D: 1C, 2A, 5A and 3B	$3,954,342
Alternative Plan H: 1C, 2A, 5A and 3B, and Deepen Channel (Any Depth)	$3,954,342

REFERENCES

Bell, S.S., L.A.J. Clements, and J. Kurdziel. 1993. Production in Natural and Restored Seagrasses: A Case Study of a Macrobenthic Polycheate. Ecological Monographs 3(4): 610-621.

Brown-Peterson, N.J., M.S. Peterson, D.A. Rydene, and R.W. Eames. 1993. Fish Assemblages in Natural versus Well-Established Recolonized Seagrass Meadows. Estuaries 16(2): 177-189.

Davis, G.E. 1985. Artificial structures to mitigate construction impacts to spiny lobster, *Panulirus argus*. Bulletin of Marine Science 37(1) 151-156.

Duffy, J.M. 1985. Artificial reefs as mitigation. A small scale case history. Bulletin of Marine Science 37(1) 397.

Fonseca, M.S., D.L. Meyer, and M.O. Hall. 1996b. Development of planted seagrass beds in Tampa Bay, Florida, U.S.A: II. Faunal components. Mar. Ecol. Prog. Ser. 132:141-156.

Fonseca, M.S., J.W. Kenworthy, and G.W. Thayer. 1998. Guidelines for the Conservation and Restoration of Seagrasses in the United States and Adjacent Waters. NOAA Coastal Ocean Program Decision Analysis Series, No. 12. NOAA Coastal Ocean Office, Silver Spring, MD.

Irandi, E.A., and M.K. Crawford. 1997. Habitat Linkages: the effects of intertidal saltmarshes and adjacent subtidal habitat on abundance, movement and growth of an estuarine fish. Oecologia 110:222-230.

Lutz, R.V. 1998. The use of artificial reefs as mitigation for impacts to nearshore hardbottom habitat caused by beach nourishment. Pages 50-51 in: William Horn, ed. Florida Artificial Reef Summit '98. Florida Department of Environmental Protection. Tallahassee, FL.

Mostkoff, B.J. 1993. The development and application of modular artificial reefs for use in habitat mitigation as part of the Dade County artificial reef program. Pages 123-130 in: William Horn, ed. Florida Artificial Reef Summit '93. Florida Department of Environmental Protection. Tallahassee, FL.