TAB 5

CLASS EXERCISE INSTRUCTIONS

PLANNING PROCESS STEP(S):

4. Evaluate Effects of Alternative Plans

5. Comparison of Alternative Plans

6. Selection of Recommended Plan

INFORMATION PROVIDED: Excerpts of feasibility report describing the final array of plans and their economic, environmental, and social effects.

TASK(S):

1. Elect a different spokesperson.

2. Review the information provided.

3. Prepare an oral presentation for the class, to include the use of appropriate visual aids. The presentation should include the following:

- Briefly describe the features and effects of each plan.
- Compare, contrast, and identify the significant differences among the plans.
- Identify and explain the rationale for selection of the recommended plan. Justify any deviation from the NED plan.

NATIONAL ECONOMIC DEVELOPMENT PLAN ANALYSIS

The National Economic Development (NED) plan is determined by analyzing the increments of the project in order to evaluate alternative plans. Components of the project—individual construction features that improve the channel—are discussed in detail in the Main Report. Project increments are either individual components that generate benefits independently or inseparable groups of components that generate benefits interdependently. Alternative Plans are different combinations of project increments.

Three categories of potential transportation cost reduction benefits are attainable through improvements to the Port:

- The first benefit category is a reduction in the number of tug assists needed for Post-Panamax container vessels, as well as a reduction in the transit time for Post-Panamax container vessels, resulting from widening the channel (interdependent components 1C, 2A, and 5A).
- The second benefit category is a decrease in the time spent by vessels while navigating the channel because of the availability of an additional turning basin, resulting from extending the Fisher Island Turning Basin (independent component 3B).
- The third benefit category is a reduction in, or an elimination of, light loading, resulting from deepening the channel (independent component Deepening to Optimal NED depth).

Eight Alternative Plans can be formed from the three benefit categories:

- Alternative Plan A: No Action Plan
- Alternative Plan B: Widen the Channel (Components 1C, 2A, and 5A)
- Alternative Plan C: Extend the Fisher Island Turning Basin (Component 3B)
- Alternative Plan D: Widen the Channel (Components 1C, 2A, and 5A) and Extend the Fisher Island Turning Basin (Component 3B)
- Alternative Plan E: Deepen the Previously-Authorized Channel Configuration
- Alternative Plan F: Widen the Channel (Components 1C, 2A, and 5A) and Deepen the Resulting Channel Configuration
- Alternative Plan G: Extend the Fisher Island Turning Basin (Component 3B) and Deepen the Resulting Channel Configuration
- Alternative Plan H: Widen the Channel (Components 1C, 2A, and 5A), Extend the Fisher Island Turning Basin (Component 3B), and Deepen the Resulting Channel Configuration

An additional Alternative Plan, Alternative Plan I, comprises the extension of the Dodge Island Channel and the construction of the Dodge Island Turning Basin. These components were found to be unfeasible following a preliminary benefit/cost analysis and were not included in the final set of Alternative Plans.

Utilized to select the plan from the Alternative Plans A-H that provides the highest net NED benefits, the NED Plan Analysis process compares costs to NED benefits for each increment of the project. In order to be included in the NED plan, each increment must be justified (provide benefits that exceed costs) based on a comparison of its marginal costs and benefits. By including only those increments that have positive net benefits, the NED Plan maximizes the net benefits of the project. **Table A-90** provides AAEQ costs and benefits, and net benefits for each project increment, revealing those increments that have positive net benefits.

Table A-90: Costs and Benefits of Project Increments

Increment	Incremental AAEQ Cost	Incremental AAEQ Benefits	Net Incremental AAEQ Benefits
1C Widen Entrance Channel, 2A Widener between Buoys 13 and 15, 5A Widen Fishermans Channel	$1,455,400	$2,848,000	$1,392,600
3B Extend Fisher Island Turning Basin	$237,618	$1,292,000	$1,054,382
Deepen System from 42 Feet to 43 Feet	$4,421,039	$2,537,622	-$1,883,417
Deepen System from 43 Feet to 44 Feet	$843,405	$2,250,560	$1,407,155
Deepen System from 44 Feet to 45 Feet	$522,937	$2,073,194	$1,550,257
Deepen System from 45 Feet to 46 Feet	$458,967	$1,586,868	$1,127,900
Deepen System from 46 Feet to 47 Feet	$601,210	$1,291,179	$689,968
Deepen System from 47 Feet to 48 Feet	$704,446	$1,223,780	$519,334
Deepen System from 48 Feet to 49 Feet	$895,244	$1,128,384	$233,140
Deepen System from 49 Feet to 50 Feet	$648,329	$30,386	-$617,943

The first increment examined is channel widening. A comparison of the benefits and cost of Components 1C, 2A, and 5A shows that the benefits exceed the cost, so this increment has a positive net benefit and is part of the NED plan. This finding eliminates four of the alternative plans, leaving Alternative Plans B, D, F, and H.

The second increment examined is extending the Fisher Island Turning Basin. A comparison of the additional benefits and cost of the project resulting from adding Component 3B shows that the marginal benefits exceed the marginal cost, so this increment has a positive net benefit and is part of the NED plan. This finding eliminates two of the remaining alternative plans, leaving Alternative Plans D and H.

The final set of increments examined is deepening the newly configured channel from its current depth of 42 feet to depths up to 50 feet. [redacted]

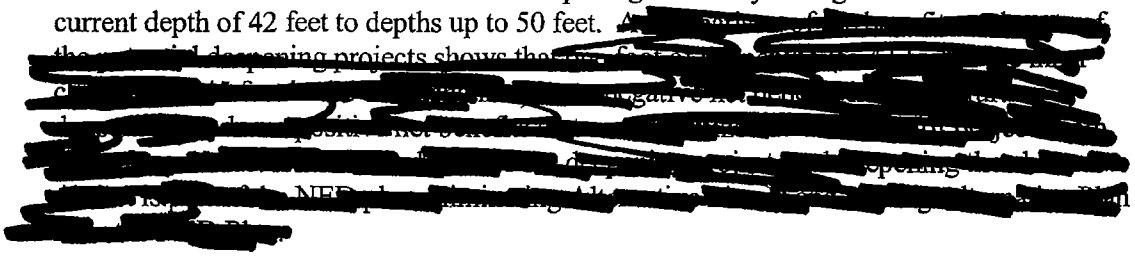


Table 1 Current Channel and Turning Basin Dimensions

Entrance Channel	500 feet wide and 44-foot depth
Government Cut	500 feet wide and 42-foot depth
Fisher Island Turning Basin	Triangular-shaped bottom with a 42-foot depth
Main Channel	400 feet wide and 36-foot depth
Fisherman's Channel and Lummus Island Turning Basin	The channel is 400 feet wide and 42-foot depth. The turning basin has a turning diameter of 1,500 feet and 42-foot depth.
Dodge Island Cut and Turning Basin	400 feet wide and 34-foot depth

2.2.2 Alternative 1

Alternative 1 consists of six components that will improve Port transit for the existing and future fleets (Figure 2). It represents a combination of Components 1 through 6.

Component 1C — Flare the existing 500-foot wide Entrance Channel to provide an 800-foot wide entrance at Buoy #1. The widener would extend from the beginning of the Entrance Channel approximately 150 feet parallel to both sides of the existing Entrance Channel for approximately 900 feet before tapering back to the existing channel edge over a total distance of approximately 2,000 feet. Deepen the Entrance Channel and proposed widener along Government Cut from an existing depth of 44 feet to a depth of [redacted] feet.

Component 2A — Widen the southern intersection of Government Cut near Buoy #15. The length of the widener would be approximately 700 feet with a maximum width of approximately 75 feet. Deepen from existing project depth of 42 feet to [redacted] feet.

Component 3B — Extend the existing Fisher Island Turning Basin 300 feet to the north of the existing channel edge near the west end of Government Cut. Widen the basin to 1,500 feet by 1,200 feet. Deepen channel below existing project depths of 42 feet to [redacted] feet.

Component 4 — Relocate the west end of the Main Channel approximately 250 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 this component since existing depths allow for continuation of the authorized depth of 36 feet.

Component 5A — Increase the width of the Fisherman's Channel approximately 100 feet to the south of the existing channel. This component also includes a 1,500-foot diameter turning basin, which would reduce the existing size of the Lummus Island Turning Basin. This widener at the northwest corner of the turning basin eases the turn to the Dodge Island Cut. Deepen channel and Gantry crane berthing areas 99-140 from the current authorized depth of 42 feet to [redacted] feet along the proposed widener of Fisherman's Channel from Station 0+00 to the Lummus Island Turning Basin.

Component 6 — Deepen Dodge Island Cut and the proposed 1,200-foot turning basin from 32 and 34 feet to 36 feet. Relocate the western end of the Dodge Island Cut to accommodate proposed Port expansion.

2.2.3 Alternative 2 (Recommended Plan)

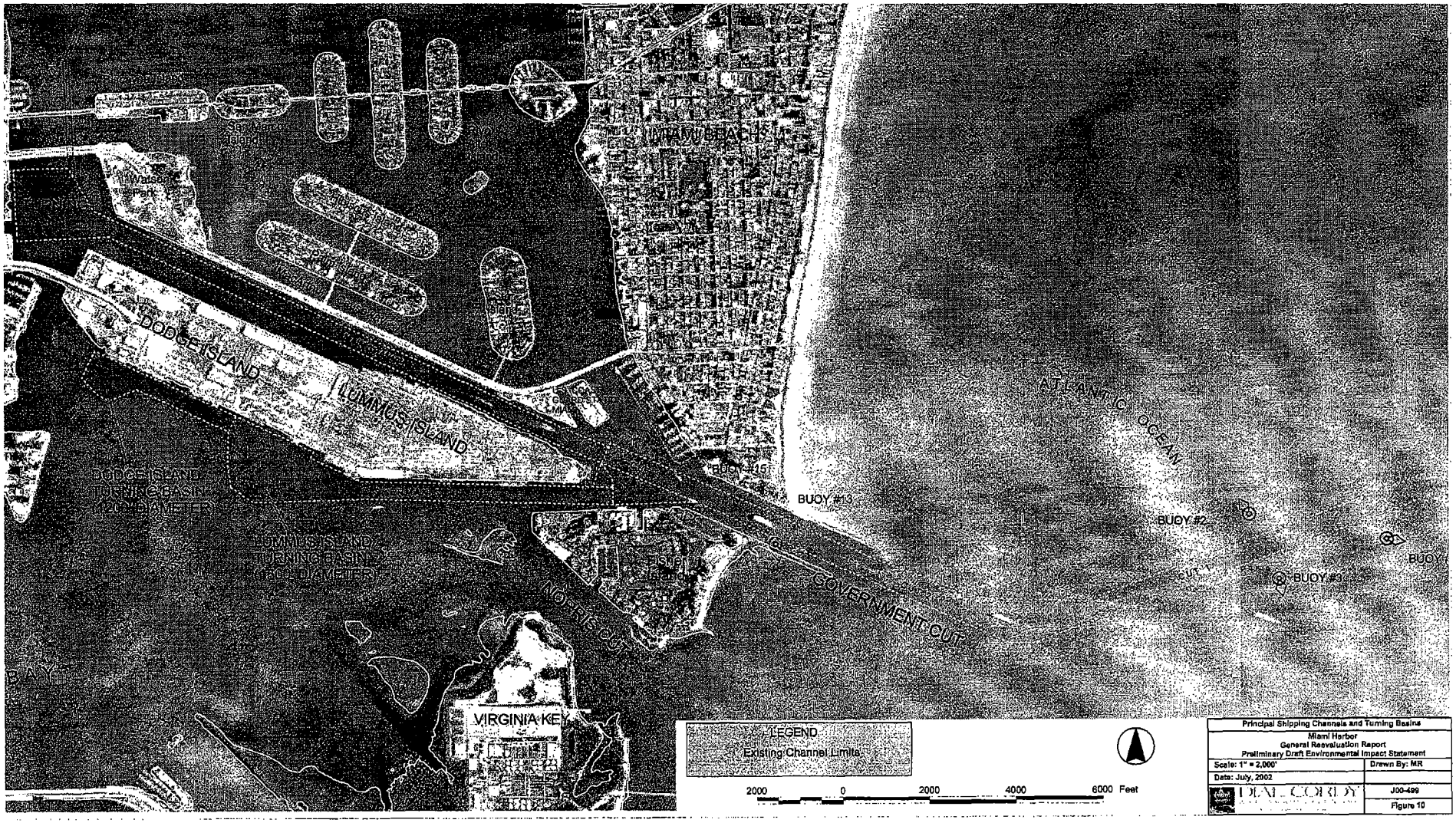
Alternative 2 is the Recommended Plan and the Locally Preferred Plan. It consists of five components that would improve Port transit for the existing and future fleets (Figure 3).

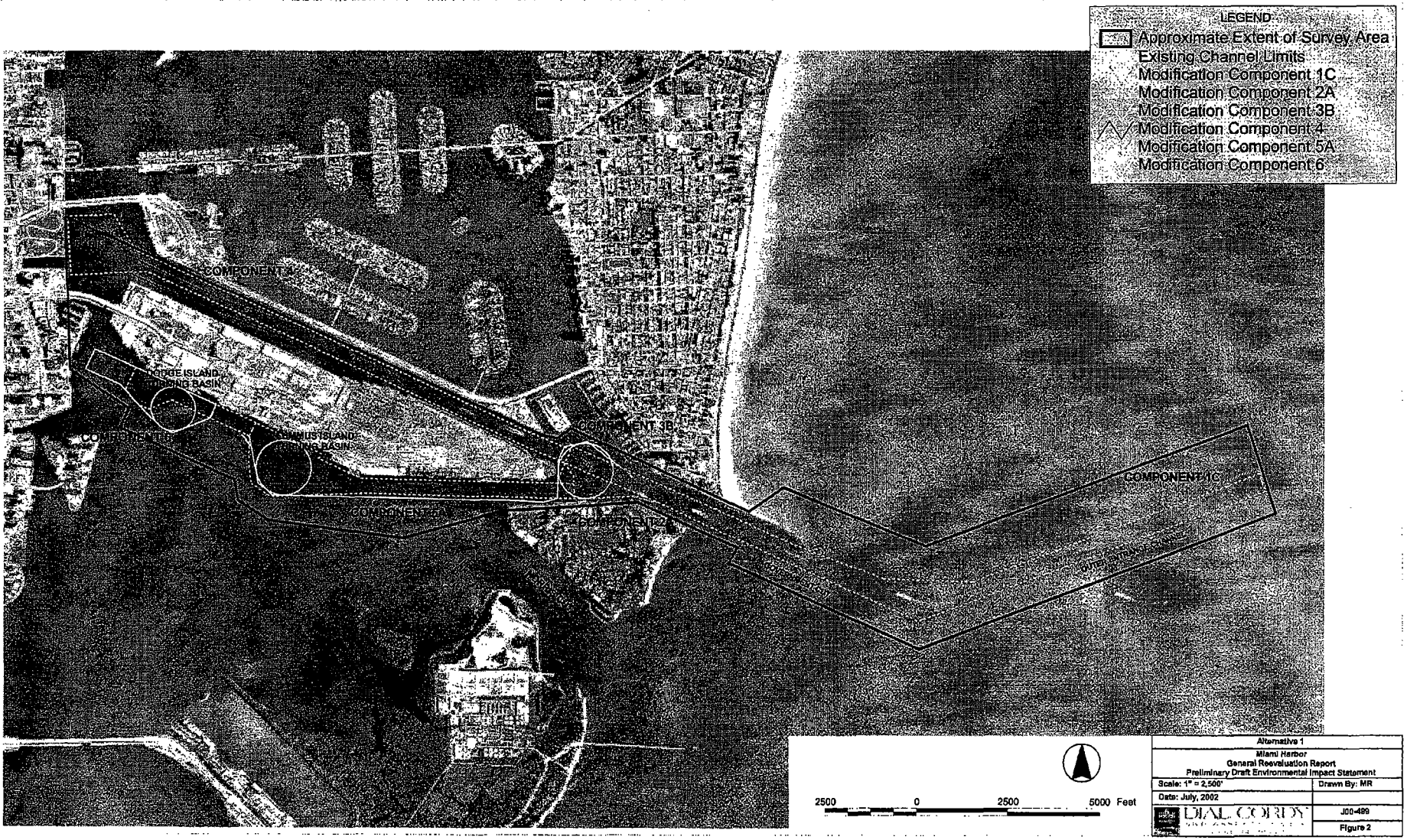
Component 1C — Flare the existing 500-foot wide Entrance Channel to provide an 800-foot wide entrance at Buoy #1. The widener would extend from the beginning of the Entrance Channel approximately 150 feet parallel to both sides of the existing Entrance Channel for approximately 900 feet before tapering back to the existing channel edge over a total distance of approximately 2,000 feet. Deepen the Entrance Channel and proposed widener along Government Cut from an existing depth of 44 feet to a depth of [redacted] feet.

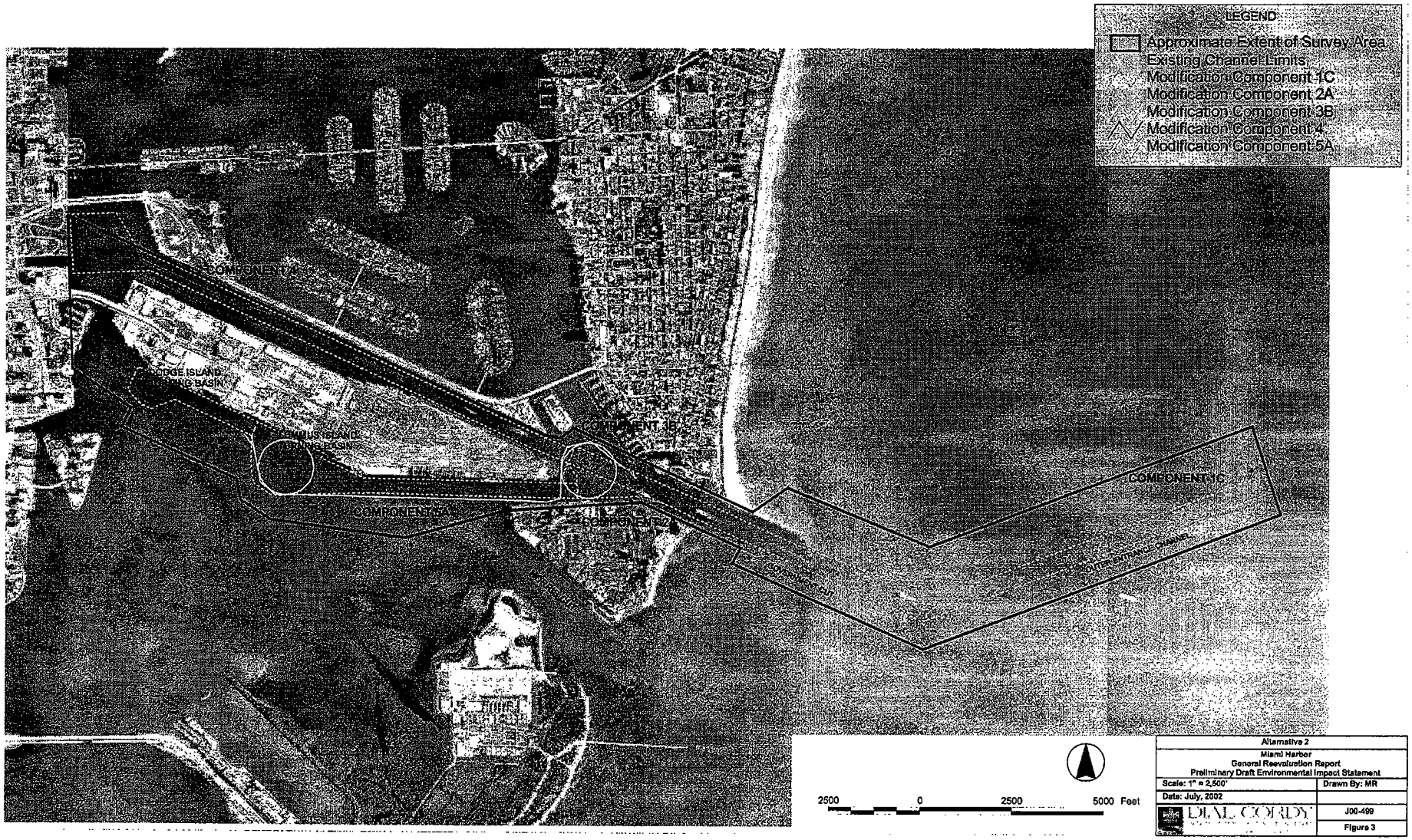
Component 2A — Widen the southern intersection of Government Cut near Buoy #15. The length of the widener would be approximately 700 feet with a maximum width of approximately 75 feet. Deepen from existing project depth of 42 feet to [redacted] feet.

Component 3B — Extend the existing Fisher Island Turning Basin 300 feet to the north of the existing channel edge near the west end of Government Cut. Widen the basin to 1,500 feet by 1,200 feet. Deepen channel below existing project depth of 42 feet to [redacted] feet.

Component 4 — Relocate the west end of the Main Channel approximately 250 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 this component since existing depths allow for continuation of the authorized depth of 36 feet.


MIAMI BEACH
DODGE ISLAND
LUMMUS ISLAND
DODGE ISLAND TURNING BASIN (1200' DIAMETER)
LUMMUS ISLAND TURNING BASIN (1200' DIAMETER)
FISHER ISLAND
VIRGINIA KEY
BAY
NORTH CUT
GOVERNMENT CUT
ATLANTIC OCEAN
BUOY #15
BUOY #13
BUOY #2
BUOY #1
LEGEND
Existing Channel Limits
2000 0 2000 4000 6000 Feet
Principal Shipping Channels and Turning Basins
Miami Harbor
General Reevaluation Report
Preliminary Draft Environmental Impact Statement
Scale: 1" = 2,000'
Drawn By: MR
Date: July, 2002
J00-499
Figure 10


LEGEND
Approximate Extent of Survey Area
Existing Channel Limits
Modification Component 1C
Modification Component 2A
Modification Component 3B
Modification Component 4
Modification Component 5A
Modification Component 6
COMPONENT 4
COMPONENT 3B
COMPONENT 1C
COMPONENT 2A
COMPONENT 2
2500 0 2500 5000 Feet
Alternative 1
Miami Harbor
General Reevaluation Report
Preliminary Draft Environmental Impact Statement
Scale: 1" = 2,500'
Drawn By: MR
Date: July, 2002
J00-499
Figure 2


LEGEND
Approximate Extent of Survey Area
Existing Channel Limits
Modification Component 1C
Modification Component 2A
Modification Component 3B
Modification Component 4
Modification Component 5A
COMPONENT 1A
COMPONENT 1B
COMPONENT 1C
COMPONENT 2A
COMPONENT 3B
COMPONENT 4
COMPONENT 5A
2500
0
2500
5000 Feet
Alternative 2
Miami Harbor
General Reevaluation Report
Preliminary Draft Environmental Impact Statement
Scale: 1" = 2,500'
Drawn By: MR
Date: July, 2002
J00-499
Figure 3

Component 5A — Increase the width of the Fisherman's Channel approximately 100 feet to the south of the existing channel. This component also includes a 1,500-foot diameter turning basin, which would reduce the existing size of the Lummus Island Turning Basin. This widener at the northwest corner of the turning basin eases the turn to the Dodge Island Cut. Deepen channel and Gantry crane berthing areas 99-140 from the current authorized depth of 42 feet to [redacted] feet along the proposed widener of Fisherman's Channel from Station 0+00 to the Lummus Island Turning Basin.

2.3 Alternatives Eliminated from Detailed Evaluation

The USACE developed preliminary designs to meet the goals of the study and needs of the Port. In accordance with NEPA procedures to avoid and minimize impacts to environmental resources, the various components of the preliminary designs considered for this project have been revised several times to minimize cost and reduce or eliminate impacts to the environment. The Plan Formulation Appendix of the GRR describes the complete evaluation process. Brief descriptions of the previous versions of each project component are listed below, and a comparison of the preliminary design with the current components evaluated in this document is included in Table 2.

Component 1

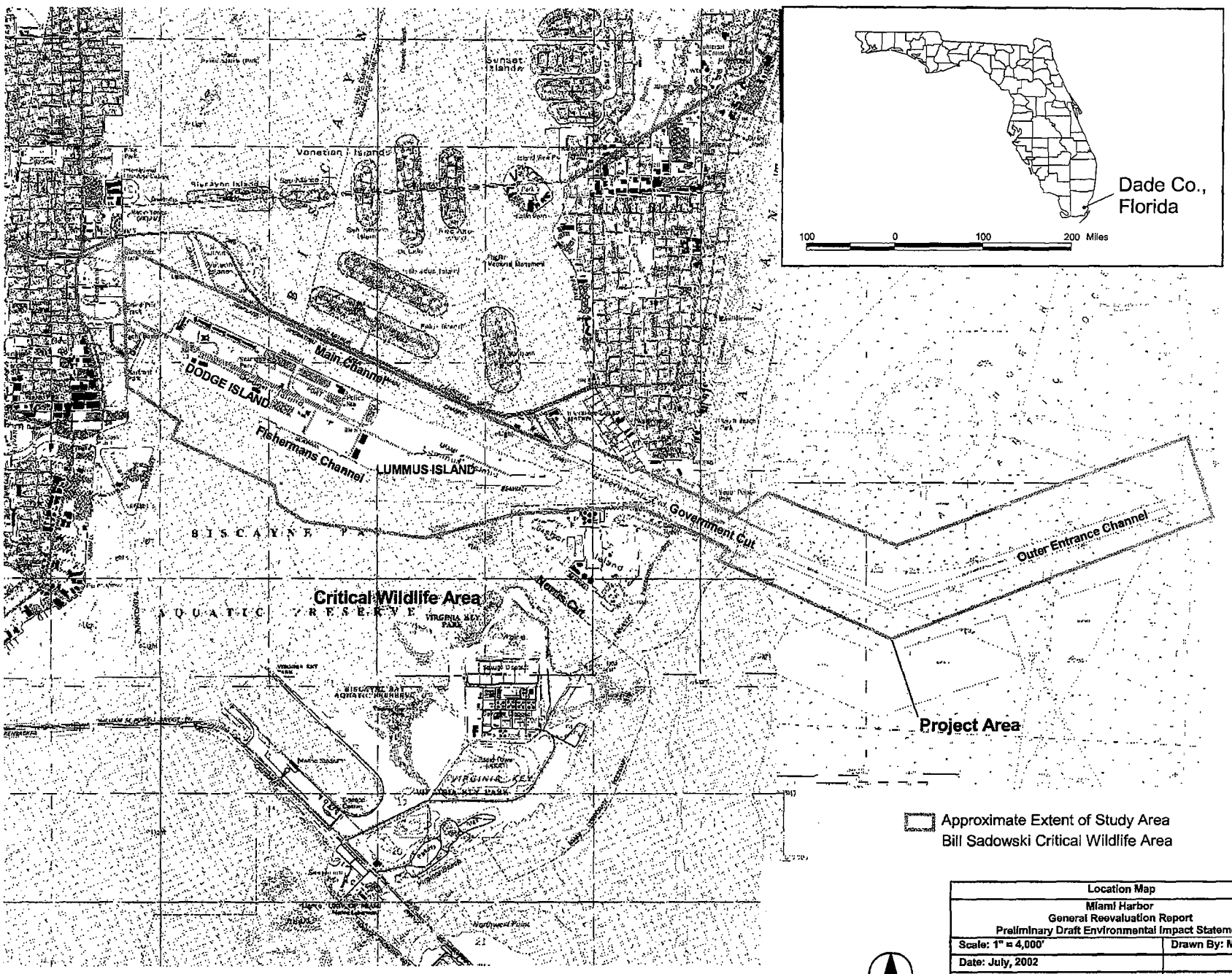
Four different versions of Component 1 received consideration during the plan formulation process. Receipt of the Environmental Baseline Resource Study and ship simulation results allowed additional evaluations of the Entrance Channel alternatives based on the location of environmental resources and ship transits.

Further discussions with the Pilots resulted in two additional modifications of Component 1, which completely avoids one reef area (Component 1C). Component 1A avoided one reef location, but did not provide sufficient widening in the area where currents impact vessel transits. Component 1B avoided both reef areas, but did not provide widening in the area of the difficult north and south currents.

Component 2

Two different orientations for the widener received consideration, which included Component 2 and Component 2A. The first recommended by the Pilots (Component 2) extended from the southern edge of Fisherman's Channel parallel to Government Cut between Buoys #13 and #15 over a distance of approximately 2,400 feet.

Ship simulation testing of Component 2 indicated the Pilots did not use the widener during any of the simulation exercises. Subsequent discussions on May 16, 2001 with the Pilots resulted in a reduction of the widener from 2,400 to 700 feet. During a later simulation of the revised Component 2A at the pilot station, a ship grounded at the location of the proposed widener.



Location Map	
Miami Harbor General Reevaluation Report Preliminary Draft Environmental Impact Statement	
Scale: 1" = 4,000'	Drawn By: MR
Date: July, 2002	
DAL COORDY	J00-499
	Figure 1

Table 2 Avoidance and Minimization of Impacts of the Preliminary Design Plan and Recommended Plan

Habitat Type	Component												
	1[1]	1C[2]	2[1]	2A[2]	3[1]	3B[2]	4[2]	5[1]	5A[2]	6[1]	6A[3]	Previous Total	Revised Total
Seagrass beds (ac)	0	0	0	0	0.7	0.1	0	1.7	7.8[4]	22.8	NA	25.2	7.9
Low relief hardbottom/reef (ac)	35.1	28.7	0	0	0	0	0	0	0	0	NA	35.1	28.7
High relief hardbottom/reef (ac)	21.1	20.7	0	0	0	0	0	0	0	0	NA	21.1	20.7
Rock/rubble w/ live bottom (ac)	51.7	51.7	0	0	0	0	0	0	0	0	NA	51.7	51.7
Rock/rubble w/ algae/sponges (ac)	41.3	41.3	3.9	0.6	5.4	26.1	0	59.4	3.8	0	NA	136.2	71.8
Unvegetated (ac)	70.1	68.2	1.7	0	9.4	24.4	0	166.8	143.8	55.4	NA	333.5	236.4
Total Project Footprint (ac)	227.8	210.6	5.6	0.6	15.5	50.5	0	228.9	147.8	78.2	0	612.3	409.5

[1]Original Proposed Impacts
[2]Recommended Plan Impacts
[3]Not Evaluated
[4]Includes 7.6 acres of impacts due to side slope equilibration

Component 3
Component 3 proposed a 1,600-foot diameter turning basin. Following review of the Environmental Baseline Survey and ship simulation tests, Component 3A was identified which reduced the turning basin to a turning notch of approximately 1,500 by 1,450 feet. Since ship simulation testing indicated the Pilots did not use the northernmost section of Component 3, Component 3A was identified since it avoided impacts to most of the seagrass beds to the north.

Later discussions on May 16, 2001 resulted in the Pilots' proposal to completely avoid the seagrass area to the north by truncating the northeast section of the turning basin (Component 3B).

Component 4
No alternative design was considered for Component 4.

Component 5
During the ship simulation exercise, Component 5 provided additional room for vessels passing berthed ships along the container terminals. The Pilots used the additional width during almost every proposed condition test in the Fisherman's Channel.

Component 5A resulted from coordination with Fisher Island's engineering representatives to improve clearance between the proposed widener and a proposed new bulkhead in that area.

Component 6
Component 6 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.

Component 6A proposed widening about 1,200 feet of the Dodge Island Cut an additional 50 feet to the south as a result of ship simulation testing. During the ship simulation testing a number of ships left the south side of the channel segment between Lummus Island Turning Basin and Dodge Island Turning Basin. The Engineering Research and Development Center (Waterways Experiment Station) of the USACE recommended Component 6 on the condition that the southern edge of that segment is widened 50 feet, which resulted in Component 6A.

2.4 Recommended Plan

The Recommended Plan (Alternative 2) consists of five components that are designed to improve the Port transit for the existing and future fleets.

Component 1C — Flare the existing 500-foot wide Entrance Channel to provide an 800-foot wide entrance at Buoy #1. The widener would extend from the beginning of the Entrance Channel approximately 150 feet parallel to both sides of the existing Entrance Channel for approximately 900 feet before tapering back to the existing channel edge over a total distance of approximately

2,000 feet. Deepen the Entrance Channel and proposed widener along Government Cut from an existing depth of 44 feet in one-foot increments to a depth of [redacted] feet.

Component 2A — Widen the southern intersection of Government Cut and Fisherman's Channel at Buoy #15. The length of the widener would be approximately 700 feet with a maximum width of approximately 75 feet. Deepen from existing project depth of 42 feet to [redacted] feet.

Component 3B — Extend the existing Fisher Island Turning Basin 300 feet to the north of the existing channel edge near the west end of Government Cut. This would widen the basin to 1,500 feet by 1,200. Deepen at one-foot increments below existing depths of 42 feet to [redacted] feet.

Component 4 — Relocate the west end of the Main Channel approximately 250 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 this component since existing depths allow for continuation of the authorized depth of 36 feet.

Component 5A — Increase the width of the Fisherman's Channel approximately 100 feet to the south of the existing channel. This component also includes a 1,500-foot diameter turning basin, which would reduce the existing size of the Lummus Island Turning Basin. This widener at the northwest corner of the turning basin would ease the turn to the Dodge Island Cut. Deepen at one-foot increments from the existing 42-foot depth to [redacted] feet along the proposed widened Government Cut channel from Station 0+00 to Station 42+00 and Gantry crane berthing areas 99-140.

2.5 Comparison of Alternatives

The following table (Table 3) provides a comparison of the No-Action Alternative, Alternative 1, and Alternative 2 (Recommended Plan) with regards to costs and potential impacts to natural resources and human environment. A more thorough analysis of potential impacts is included in Section 4.0, Environmental Consequences.

Table 3 Comparison of Alternatives

Resource	No-Action Alternative	Alternative 1	Alternative 2 (Recommended Plan)
Coastal Environment	No significant impact.	No significant impact.	No significant impact.
Geology and Sediments	No significant impact.	Additional sediment or material removal would occur.	Sediment or material removal would occur.
Water Quality	No significant impact.	Temporary increases in turbidity during dredging events may cause increased turbidity at the point of discharge from the disposal sites.	Temporary increases in turbidity during dredging events may cause increased turbidity at the point of discharge from the disposal sites.
Seagrass Communities	No significant impact.	Significant direct impacts would include the removal of seagrass habitat due to widening of the channel and equilibration of the channel side slopes once widening has been completed.	Impacts would include the removal of seagrass habitat due to widening of the channel and equilibration of the channel side slopes once widening has been completed.
Hardbottom and Reef Communities	No significant impact.	Widening and deepening would result in both direct and indirect impacts to hardbottom and reef communities within the Entrance Channel. Additional impacts could occur with cutterhead dredging is used for work on the Entrance Channel.	Widening and deepening would result in both direct and indirect impacts to hardbottom and reef communities within the Entrance Channel. Additional impacts could occur with cutterhead dredging is used for work on the Entrance Channel.
Rock/ Rubble Communities	No significant impact.	Proposed impacts to rock/rubble habitats are principally in areas that have already been dredged.	Proposed impacts to rock/rubble habitats are principally in areas that have already been dredged.
Unvegetated Bottom	No significant impact.	Direct impacts to unvegetated bottom communities would include the impacts to both benthic epifauna and infauna but other direct effects and indirect effects would differ based on the general location of the impacts.	Direct impacts to unvegetated bottom communities would include the impacts to both benthic epifauna and infauna but other direct effects and indirect effects would differ based on the general location of the impacts.
Essential Fish Habitat (EFH)	No significant impact.	EFH would be impacted.	EFH would be impacted.

Table 3 Continued

Resource	No-Action Alternative	Alternative 1	Alternative 2 (Recommended Plan)
Protected Species	No significant impact.	Potential impacts due to blasting and loss of habitat may occur during dredging and construction activities.	Potential impacts due to blasting and loss of habitat may occur during dredging and construction activities.
Other Areas of Special Concern	No significant impact.	No significant impacts.	No significant impacts.
Air Quality	No significant impact.	Short-term impacts from dredge emissions and other construction equipment would not significantly impact air quality.	Short-term impacts from dredge emissions and other construction equipment would not significantly impact air quality.
Noise	No significant impact.	None of the project components are expected to have a significant impact to noise levels.	None of the project components are expected to have a significant impact to noise levels.
Utilities	No significant impact.	Four utility crossings would be impacted.	Four utility crossings would be impacted.
Hazardous, Toxic, and Radioactive Waste (HTRW)	No significant impact.	No significant impacts to HTRW within the project area would occur.	No significant impacts to HTRW within the project area would occur.
Economic Factors	Significant loss of cargo business would occur at the Port due to the inability to handle new industry standard deep draft cargo vessels.	Cargo business would be retained and may increase.	Cargo business would be retained and may increase.
Land Use	No significant impacts.	No significant impacts.	No significant impacts
Recreation	No significant impacts.	No significant impacts.	No significant impacts.
Aesthetic Resources	No significant impacts.	No significant impacts.	No significant impacts.
Cultural Resources	No significant impacts.	No significant impacts.	No significant impacts.

2.6 Disposal Sites

Materials dredged from the above components would be deposited at up to four locations (Figure 4). Rock from the Entrance Channel (Component 1C), Government Cut (Component 2A) and Fisher Island Turning Basin (Component 3B) may be placed in the permitted artificial reef sites as mitigation for impacts to hardbottom and reef communities. Materials that cannot be utilized for artificial reef site placement would be transported to the Offshore Dredged Materials

Disposal Site (ODMDS), the seagrass mitigation site in North Biscayne Bay, or an approved upland disposal area.

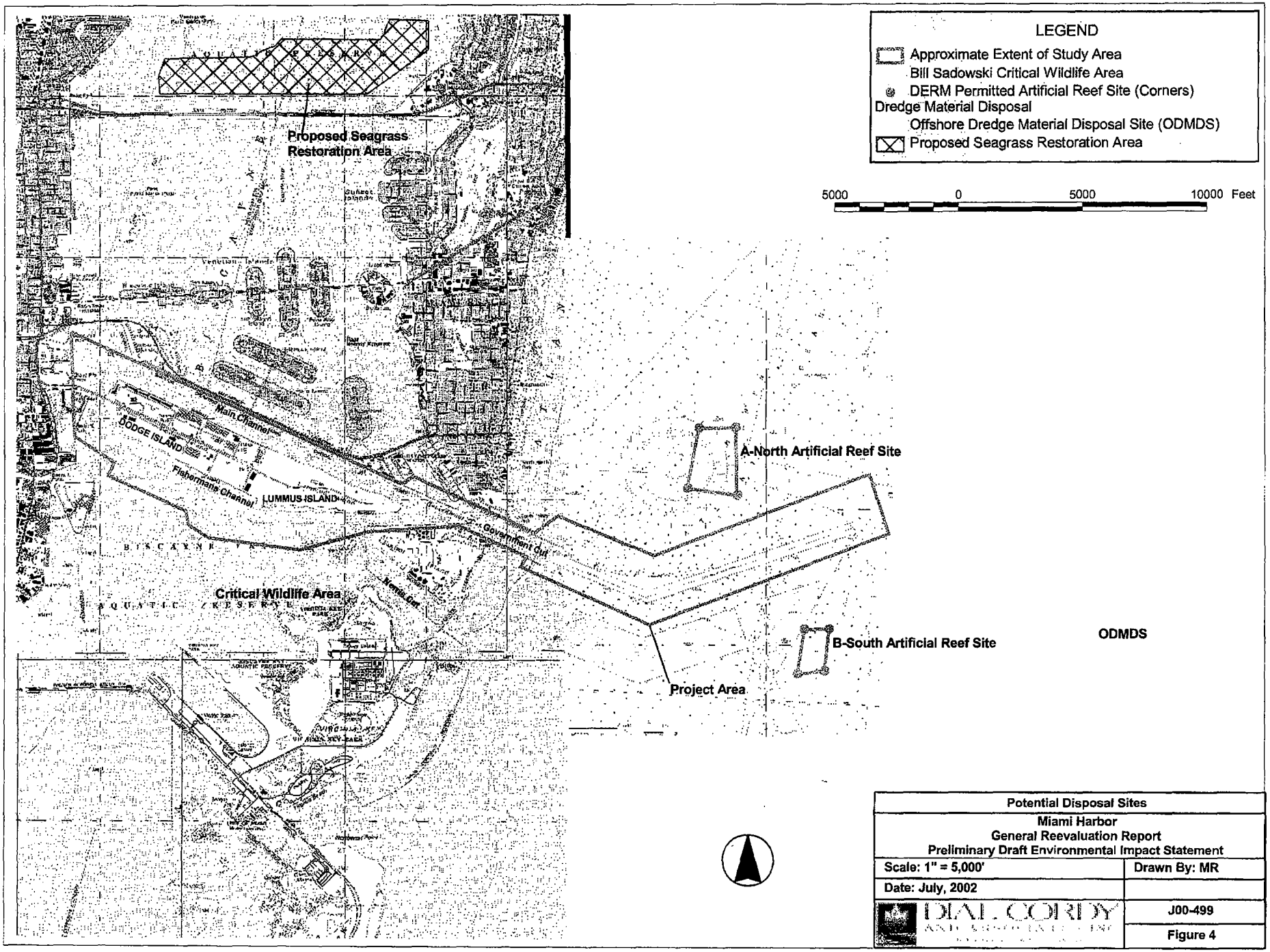
2.7 Construction Techniques

Construction methodology of the project would be determined by the contractor selected by the USACE during the bid process. However, certain assumptions can be made regarding various techniques that may be needed to complete construction. Dredged material would most likely be excavated using either a hydraulic cutterhead dredge or mechanical excavator with some or all of the material pretreated using blasting or some other method to break the rock prior to dredging. If a mechanical dredge is used, the larger dredged material may be removed and segregated at the construction site for use in constructing the mitigation sites. Larger rock material would be placed on one barge to be transported to the artificial reef site, while other materials would be placed on a separate barge for placement at either the seagrass mitigation site or the offshore disposal site. In any event, disposal of all dredged material would be at the proposed mitigation sites, the offshore disposal site, or an approved upland disposal site.

2.7.1 Dredging

Dredging equipment is classified as either hydraulic or mechanical based upon the means of transporting the dredged material from the bottom surface. Hydraulic dredges use water to pump the dredged material as slurry to the surface and mechanical dredges use some form of bucket to excavate and raise the material from the channel bottom. The most common hydraulic dredges include suction, cutter-suction, and hopper dredges and the most common mechanical dredges in the United States (U.S.) include clamshells, backhoes, and marine excavator dredges. U.S. law requires that dredges working on U.S. projects have U.S. built hulls and no large scale dipper or bucket ladder dredges are currently available for U.S. work.

Various project elements influence the selection of the dredge type and size. These factors include the type of material (rock, clay, sand, silt, or combination); the water depth; the dredge cut thickness, length, and width; the sea or wave conditions, vessel traffic conditions, environmental restrictions, other operating restrictions; and the required completion time. All of these factors impact dredge production and as a result costs. Multiple dredges of the same or different types may be used on projects where conditions vary between dredging locations or to expedite the work.



Potential Disposal Sites	
Miami Harbor General Reevaluation Report Preliminary Draft Environmental Impact Statement	
Scale: 1" = 5,000'	Drawn By: MR
Date: July, 2002	
DAL COREY AND ASSOCIATES, INC.	J00-499
	Figure 4