

APPENDIX D2

Other Reports and Related Documents

Environmental Assessment Operation and Maintenance Dredging and Dredged Material Placement for Miami Harbor Navigation Project in Miami-Dade County, Florida



U.S. Army Corps of Engineers
JACKSONVILLE DISTRICT

This page intentionally left blank.

**Operation and Maintenance Dredging and Dredged Material Placement for
Miami Harbor Navigation Project in
Miami-Dade County, Florida**

OTHER REPORTS AND RELATED DOCUMENTS LIST

The following items are provided in Appendix D. These items may also be viewed and/or downloaded from the U.S. Army Corps of Engineers, Jacksonville District's (Corps) Environmental planning website, under "Dade", which can be accessed by visiting the link:

<http://www.saj.usace.army.mil/About/Divisions-Offices/Planning/Environmental-Branch/Environmental-Documents/>

- Corps. 2004. Miami Harbor General Reevaluation Report (GRR) Study and Final Environmental Impact Statement (EIS).
- Corps. 2018. Miami Harbor O&M Spillage Analysis.
- Corps. 2018. Initial Appraisal Report, Miami Harbor Navigation Improvement Project, Miami-Dade County, Florida.
- Water and Air Research, Inc. 2017-2018. Task 1 of the Miami Harbor Sediment Transport, Dispersal and Deposition Study – Outer Entrance Channel of Miami Harbor – Lessons Learned from the recent construction of the Miami Harbor Navigation Project.
- Water and Air Research, Inc. 2017-2018. Task 2 of the Miami Harbor Sediment Transport, Dispersal and Deposition Study – Outer Entrance Channel of Miami Harbor – Miami Harbor Sediment Tracer Study.

The following items are available for download via the provided link:

- National Marine Fisheries Service (NMFS). 1997. Amendment to SARBO
<https://www.fisheries.noaa.gov/webdam/download/91875716>
- NMFS. 1995. Regional Biological Opinion on Hopper Dredging of Navigational Channels and Borrow Areas Along the Southeast U.S. Atlantic Coast (SARBO)
<https://www.fisheries.noaa.gov/webdam/download/91825981>
- U.S. Environmental Protection Agency (USEPA). 2008. Miami ODMDs, SMMP
<https://www.epa.gov/ocean-dumping/site-management-and-monitoring-plan-smmp-miami-ocean-dredged-material-disposal-site-fl>

- USEPA. 2011. Revisions to the Miami Ocean Dredged Material Disposal Site (ODMDS) Site Management and Monitoring Plan (SMMP)
<https://www.epa.gov/ocean-dumping/site-management-and-monitoring-plan-smmp-miami-ocean-dredged-material-disposal-site-fl>

Other reports and related documents listed in the EA are available by request.

INITIAL APPRAISAL REPORT
MIAMI HARBOR NAVIGATION IMPROVEMENT PROJECT
MIAMI-DADE COUNTY, FLORIDA

Conducted under Section 216 of the Flood Control Act of 1970, as amended



April 2018

TABLE OF CONTENTS
INITIAL APPRAISAL

1 STUDY OVERVIEW 1

1.1 EXISTING AUTHORIZED PROJECT 1

1.2 STUDY LOCATION, PURPOSE AND NEED 3

2 REVIEW OF ECONOMIC CONDITIONS..... 5

2.1 OVERVIEW OF EXISTING CONDITIONS 5

2.1.1 Demand for Freight 5

2.1.2 Container Cargo Vessel Fleet 6

2.1.3 Cargo Movements 9

2.1.4 Demand for Cruises..... 9

2.1.5 Miami Harbor Transiting Constraints & Sailing Draft Distribution 10

2.2 ASSUMPTIONS FOR FUTURE CONDITIONS 13

2.2.1 Future Demand for Freight Transport at Miami Harbor..... 13

2.2.2 Future Composition of the Miami Harbor Container Ship Fleet 13

2.2.3 Container Vessel Loading 13

2.2.4 Future Demand for Cruises at Miami Harbor..... 13

2.2.5 Future Transiting Constraints at Miami Harbor..... 13

2.3 ECONOMIC CONCLUSIONS 13

3 PLAN FORMULATION..... 14

3.1 PROBLEMS & OPPORTUNITIES 14

3.2 OBJECTIVES & CONSTRAINTS..... 15

3.3 POTENTIAL ALTERNATIVES 15

3.4 ENVIRONMENTAL CONSIDERATIONS 16

3.5 RISK AND UNCERTAINTY 16

4 FEDERAL INTEREST 16

5 PRELIMINARY FINANCIAL ANALYSIS 17

6 SUMMARY OF FEASIBILITY STUDY REQUIREMENTS 17

7 RECOMMENDATIONS 17

MAIN REPORT INITIAL APPRAISAL

1 STUDY OVERVIEW

The non-federal sponsor, PortMiami, Miami-Dade County, initiated the request for navigational and safety harbor improvements in Miami Harbor in a letter dated March 16, 2018 (**Figure 8**). This Initial Appraisal is authorized by Section 216 of the Flood Control Act of 1970 (33 USC 426 et seq) as amended, which reads:

"The Secretary of the Army, acting through the Chief of Engineers, is authorized to review the operation of projects the construction of which has been completed and which were constructed by the Corps of Engineers in the interest of navigation, flood control, water supply, and related purposes, when found advisable due to significantly changed physical or economic conditions, and to report thereon to Congress with recommendations on the advisability of modifying the structures or their operation, and for improving the quality of the environment in the overall public interest."

1.1 EXISTING AUTHORIZED PROJECT

Section 101(a)(9) of the Water Resources Development Act (WRDA) of 1990 originally authorized the Federal navigation project for Miami Harbor, Miami-Dade County, Florida, which was constructed prior to 2003¹. A resolution from the Committee on Transportation and Infrastructure, United States House of Representatives, adopted October 29, 1997 requested a review of the project to determine the feasibility of providing further deep draft channel improvements in Miami Harbor and channels, as Senate Document 90-93, 90th Congress, 2nd Session. As a result of that resolution, a General Reevaluation Report (GRR) was completed in 2004². The report offered solutions to problems with the existing channel: the groundings of container ships at the entrance channel; difficulty in turning and handling of larger vessels in the inner harbor due to difficult currents; surge effects on docked ships; and transportation inefficiencies due to existing and future container ships not being able to fully load as a result of current channel depths. A Chief's report was approved on April 25, 2005 and construction of the locally preferred plan (LPP) has been completed. Both the original authorized project and existing completed features within Miami Harbor are shown in **Table 1** and **Figure 7**.

¹ This effort is sometimes referred to informally as "Phase II".

² This effort is sometimes referred to informally as "Phase III".

MAIN REPORT
INITIAL APPRAISAL

Table 1. Federally Authorized Features within Miami Harbor.

FEDERALLY AUTHORIZED PROJECT		
LOCATION	PREVIOUSLY AUTHORIZED FEATURES	EXISTING AUTHORIZED FEATURES
	House Document 101-205, June 21, 1990	2004 GRR
	Constructed 2003	Constructed as of 2018
Cut 1	Width =500 feet	Width = 800 feet (flare)
	Depth =44 feet MLLW	Depth =52 feet MLLW + 1 foot allowable overdepth
Cut 2	Width = 500 feet	Width = 500 feet
	Depth = 44 feet MLLW	Depth = 52 feet MLLW + 1 foot allowable overdepth
		Widener added at intersection to Fisherman Island Turning Basin
Cut 3	Width = 500 feet	Width = 500 feet
	Depth = 42 feet MLLW	Depth = 50 feet MLLW + 1 foot allowable overdepth
Fisherman's Channel - South Channel	Width = 400 feet	Width = 440 feet
	Depth = 42 feet MLLW	Depth =50 feet MLLW + 1 foot allowable overdepth
Main Channel - North Channel	Width = 400 feet	No change - authorized shift of 250 feet south did not occur
	Depth = 36 feet MLLW	No change
Fisher Island Turning Basin	Width =1200 feet radius	Width =1500 feet radius
	Depth = 42 feet MLLW	Depth = 50 feet MLLW + 1 foot allowable overdepth
Lummus Island Turning Basin	Width =1,600 feet radius	Width =1,500 feet radius
	Depth = 42 feet MLLW	Depth = 50 feet MLLW + 1 foot allowable overdepth
Main Turning Basin	Width =1600 feet radius	No change
	Depth = 36 feet MLLW	No change
NOT CURRENTLY FEDERALLY AUTHORIZED - LOCAL SPONSOR OWNED & MAINTAINED		
Dodge Island Turning Basin	Width =900 feet radius	No change
	Depth = 34 feet MLLW	No change
Dodge Cut	Width = 400 feet	No change
	Depth = 34 feet MLLW	No change
Fisherman's Channel Container Berths	Local Service Facility	Shift 60 feet south into Federal Channel Depth = 50 feet MLLW + 1 foot allowable overdepth

MAIN REPORT INITIAL APPRAISAL

Table 2. Prior Reports and Authorizations for Miami Harbor.

STUDY 1	ACTS	Chief of Engineers	Published Documents			
		RECOMMENDATIONS	TYPE ² /NO./	CONGRESS/ SESSION		
S	06/13/1902	Channel (Government Cut) 18 feet deep across peninsula and north jetty	H	662	56	18
	03/02/1907	South jetty and channel 100 feet wide				
S	07/25/1912	Channel 20 X 300 feet and extension of jetties	H	554	62	2
S	03/03/1925	Channel 25 feet deep at entrance and 25 X 200 across Biscayne Bay	H	516	67	4
S	07/03/1930	Channel 300 feet wide across Biscayne Bay and enlarging municipal turning basin	R&H	15	71	2
PE	08/30/1935	Depth of 30 feet to and in turning basin	S	73	2	
S	08/26/1937	Widen turning basin 200 feet on south side	R&H	86	74	2
S	03/02/1945	Virginia Key improvement	S	251	79	2
S	03/02/1945	Consolidation of Miami River and Miami Harbor projects: widening at mouth of Miami River to turning basin and Government Cut; and channel from Miami River to the Harbor of Refuge	H	91	79	1
S	07/14/1960	Channel 400 feet wide across Biscayne Bay; enlarge turning basin 300 feet on south and northeasterly sides; dredge turning basin on north side of Fisher Island; delete Virginia Key development and Dinner Key approach channel	S	71	85	2
S	08/13/1968	Enlarging the existing entrance channel to 38- foot depth and 500-foot width from the ocean to the existing beach line; deepening the existing 400-foot wide channel across Biscayne Bay to 36 feet; and deepening the existing turning basins at Biscayne Boulevard terminal and Fisher Island to 36 feet	S	93	90	2
FR	11/28/1990	Include Federal maintenance of the South Fisherman's channel for 9,200 feet westward of the Fisher Island turning basin; provide a channel 44 feet deep and 500 feet wide from the open ocean to the existing beach line; 42 feet deep and 500 feet wide from the beach line Cut 3 station 33+00 (near Fisher Island turning basin); and 42 feet deep and 400 feet wide from Fisher Island turning basin to the west end of the container berths located on Lummus/Dodge Island. The channel would terminate in turning basin with a depth of 42 feet and a diameter of 1600 feet.	H	205	101	2
GRR	10/12/1996 Public Law 104-303	10/12/1996 Provide a 34-foot deep channel over a 400-foot bottom width from the Lummus Island basin west about 1,200 feet.				

1 Abbreviations are PE = Preliminary Evaluations; R= Reconnaissance Report; FR = Feasibility Report; S = Surveys; GRR = General Reevaluation Report

2 Symbols are: H = U.S. House of Representatives Document S = U.S. Senate Document

1.2 STUDY LOCATION, PURPOSE AND NEED

PortMiami is Miami-Dade County's second most important economic engine contributing \$41.4 billion annually to the local economy and supporting more than 324,352 jobs in South Florida. It is recognized as the Cruise Capital of the World and Cargo Gateway of the Americas.³ Miami Harbor has two main types of vessels container ships and passenger (cruise) ships⁴. This study focuses on the present needs for both vessels.

³ <http://www.miamidade.gov/portmiami/> (Current as of March 28, 2018)

⁴ Miami Harbor is considered a "clean port", meaning that it does not handle bulk cargoes or potentially dangerous or hazardous cargoes such as fuel oil.

MAIN REPORT INITIAL APPRAISAL

CONTAINER SHIP NEEDS

2004 GRR: The 2004 GRR used the Susan Maersk 6,600-TEU⁵ S-Class (Post-Panamax) as the design vessel, which had a length of 1,140 feet, a beam of 141 feet, and a design draft of 47.6 feet, which were the largest vessels proposed to call on PortMiami in 1999. The underkeel at the time of the report was set at 3 feet, which was based on the historical minimum underkeel clearance for Panamax container ships, and the Corps of Engineers design standard of 3 feet for hardbottom channels. The project recommended in the 2004 GRR for Miami Harbor is now constructed.

Existing: With vessels of 11,000 TEUs (much greater than the 6,000 TEU design vessel) now calling on Miami Harbor, the Biscayne Bay Pilots who travel these channels are facing difficulties in maneuvering when entering the outer entrance channel from the ocean, translating to delays in vessel transportation while pilot's wait on optimal conditions in specific areas of the channels in order to transit safely. According to PortMiami, vessels calling now are demanding to schedule their calls weeks in advance and need to know they can arrive under normal but variable physical conditions. They require 46 feet of draft, plus 3.3 feet of underkeel, plus 3.3 feet of squat, plus 3.3 feet for list, wave, heel, rudder, pitch, and yaw, equaling a need for 56 feet plus 2 feet of overdepth in the outer entrance channel. This has resulted in the request for additional improvements in the Federal project to address their current needs, and to continue economic cargo growth in the United States.

Additional needs consist of widening Lummus Turning Basin to allow a larger turning radius for larger Post-Panamax vessels, and possible widening in Fisherman's Channel to allow larger Post-Panamax vessels and cruise ships to pass while other containerships are being loaded by the gantry cranes to avoid transit delays.

Potential: Since 2004 when the GRR was authorized, a larger class of Post-Panamax containerships have joined the world fleet and are comprised of Post-Panamax size container ships with capacities of up to 14,000 TEUs. These vessels have a length of 1205 feet, a beam of 161 feet, and a design draft of up to 52.5 feet. The underkeel for these vessels is highly variable (reference to MITAGS/BAIRD simulation report) and the problems currently experienced will increase.⁶

CRUISE VESSEL NEEDS

Both cruise vessels and containerships transit Fisherman's Channel, or South Channel. At present, cruise vessels are width constrained in Lummus Island Turning Basin and width constrained in a bend leading from Fisherman's Channel to Dodge Island Channel. Additionally, cruise ships are restricted from passing containerships docked at berths when they are being loaded, created delays for vessels as they wait to transit.

Additionally, the Dodge Island Channel is currently not part of the Federal project. Making this channel part

⁵ TEU – Twenty foot equivalent.

⁶ Reference Biscayne Bay Pilots Association Letter at the end of this report.

MAIN REPORT
INITIAL APPRAISAL

of the Federal project would allow improvements for efficient transit of cruise vessels to accommodate the economic cruise industry growth that will allow the creation of more large cruise vessel berths to allow home port status in the United States.

2 REVIEW OF ECONOMIC CONDITIONS

For the purpose of the Miami Harbor Initial Appraisal Report, the Federal interest determination is based on a reasonable likelihood that achieving study objectives will result in National Economic Development (NED) benefits. Evaluation of PortMiami’s needs with respect to container ship and cruise vessel operations suggest the potential for NED benefits in the following categories:

- Category-1: Alleviation of sailing draft and cargo deadweight utilization constraints on the containership fleet.
- Category-2: Alleviation of vessel passing restrictions in the federally authorized portion of Fisherman’s Channel.

Section 2 of this report provides pertinent data and information on the economic conditions relevant to the two categories.

2.1 OVERVIEW OF EXISTING CONDITIONS

2.1.1 Demand for Freight

Demand for freight transport increased at Miami Harbor between 2012 and 2016. **Table 3** provides supporting evidence of demand for freight transport at Miami Harbor. The population of Miami Dade County has increased at a compound average growth rate (CAGR) of just over 1% and had a median household income of \$44,224 according to Census Bureau estimates. TEU throughput at Miami Harbor has grown at a CAGR of under 2.5% despite year to year fluctuations which are expected. Freight based revenue to the port of Miami has also increased at almost 1.7% per year on average between 2012 and 2016.

Table 3. Freight Demand Supporting Evidence.

Evidence of increasing Demand for Freight at Miami Harbor					
Years	Population	TEUS	% Imports	% Exports	Freight Revenue
2012	2,551,255	909,917	48%	52%	\$30,696,000
2013	2,565,685	901,454	50%	50%	\$30,551,000
2014	2,586,290	876,708	50%	50%	\$31,052,000
2015	2,653,934	1,007,782	53%	47%	\$32,744,000
2016	2,696,353	1,028,156	54%	46%	\$33,332,000
CAGR 2012 - 2016	1.11%	2.47%	2.45%	-2.49%	1.66%

Imports account for an increasing proportion of the container cargo trade at Miami Harbor. **Figure 1** provides greater detail on the distribution of commodity imports and exports by TEU. Import commodities tend to be consumer goods for the South Florida hinterland population like furniture, clothing, fruits & vegetables, and beverages. Exports consist primarily of recyclables, machinery, textiles, and vehicles. The implications of the data in Table 3 and Figure 1 is that the population of the South Florida hinterland has

MAIN REPORT
INITIAL APPRAISAL

been increasing, is likely positively correlated with imports of consumer goods, and demand for freight transport is likely to continue to increase.

Figure 1. Import & Export Commodities by TEU.

COMMODITIES								
OVERALL COMMODITIES BY TEU		TOTAL	IMPORT COMMODITIES BY TEU		TOTAL	EXPORT COMMODITIES BY TEU		TOTAL
1	Furniture	54,557	1	Furniture	42,007	1	Waste/Recyclables	54,120
2	Waste/Recyclables	54,375	2	Apparel	36,086	2	Machinery	27,452
3	Machinery	53,152	3	Fruits and Vegetables	34,066	3	Textiles	23,063
4	Apparel	40,772	4	Beverages	31,388	4	Food Products, Other	21,556
5	Beverages	38,235	5	Machinery	25,701	5	Motor Vehicles	17,253
6	Fruits and Vegetables	37,287	6	Glass/Ceramic	20,267	6	Furniture	12,551
7	Textiles	31,941	7	Plastic, Manufactured	18,594	7	Vehicle Parts	12,188
8	Plastic, Manufactured	26,988	8	Vehicle Parts	12,889	8	Paper	9,150
9	Food Products, Other	26,611	9	Aluminum & Non Ferrous	12,078	9	Industrial Chemicals	8,736
10	Vehicle Parts	25,077	10	Fish/Seafood	10,455	10	Plastic, Manufactured	8,394

Source: PortMiami

2.1.2 Container Cargo Vessel Fleet

The size of the vessels in the container fleet calling on Miami Harbor has increased between 2012 and 2016. **Figure 2** is based on data provided by PortMiami between 2015 and March of 2018 on the TEU capacity by vessel class (Nominal TEU Intake multiplied by the number of calls). The graph illustrates an ongoing shift to larger container vessels at Miami Harbor.

MAIN REPORT
INITIAL APPRAISAL

Figure 2. Miami Harbor Container Cargo Fleet.

% of TEU Capacity Calling by Vessel Class				
TEU Class	2015	2016	2017	2018*
1K TEU	11%	13%	16%	15%
2K TEU	5%	5%	3%	4%
3K TEU	6%	2%	1%	2%
4K TEU	25%	20%	5%	3%
5K TEU	23%	22%	16%	11%
6K TEU	8%	10%	22%	26%
7K TEU	10%	15%	13%	6%
8K TEU	11%	11%	15%	14%
9K TEU	1%	2%	5%	11%
10K TEU	0%	0%	3%	6%
11K TEU	0%	0%	0%	3%
TEU Capacity	3,117,356	3,256,742	3,078,611	673,303

*Note 2018 has only January through March, and not a full year of data like 2015 - 2017

*Source: PortMiami

Table 4. Existing World Container Fleet.

World Container Fleet Average Vessel Dimensions & Capacities						
Vessel Class	Frequency	TEU	DWT (metric tonnes)	LOA (ft.)	Beam (ft.)	Design Draft (ft.)
1K TEU	1,720	833	11,217	442	70	24.64
2K TEU	920	1,907	26,027	601	93	33.61
3K TEU	563	2,812	38,146	703	103	37.99
4K TEU	484	4,111	51,533	837	109	41.15
5K TEU	345	4,903	62,048	910	112	42.05
6K TEU	242	5,900	71,518	932	131	45.65
7K TEU	178	6,789	83,714	984	135	46.91
8K TEU	152	8,215	102,997	1,079	143	47.62
9K TEU	273	8,910	107,242	1,046	150	47.39
10K TEU	124	9,892	115,807	1,100	152	49.03
11K TEU	75	10,999	124,749	1,115	152	50.20
12K TEU	57	11,858	131,970	1,024	147	47.36
13K TEU	96	13,128	145,923	1,201	159	51.33
14K TEU	129	13,981	151,578	1,202	166	51.76
15K TEU	37	14,949	155,571	1,190	169	50.73
16K TEU	5	15,833	175,393	1,301	180	52.49
17K TEU	6	16,652	186,657	1,309	177	52.56
18K TEU	32	18,139	185,855	1,309	189	52.50
19K TEU	31	19,125	196,805	1,308	193	52.50
20K TEU	33	20,117	207,031	1,312	193	52.50
21K TEU	26	20,887	193,798	1,311	193	53.19
22K TEU	20	22,000	206,230	1,312	201	52.49

MIAMI HARBOR INITIAL APPRAISAL REPORT
MIAMI-DADE COUNTY, FLORIDA

MAIN REPORT
INITIAL APPRAISAL

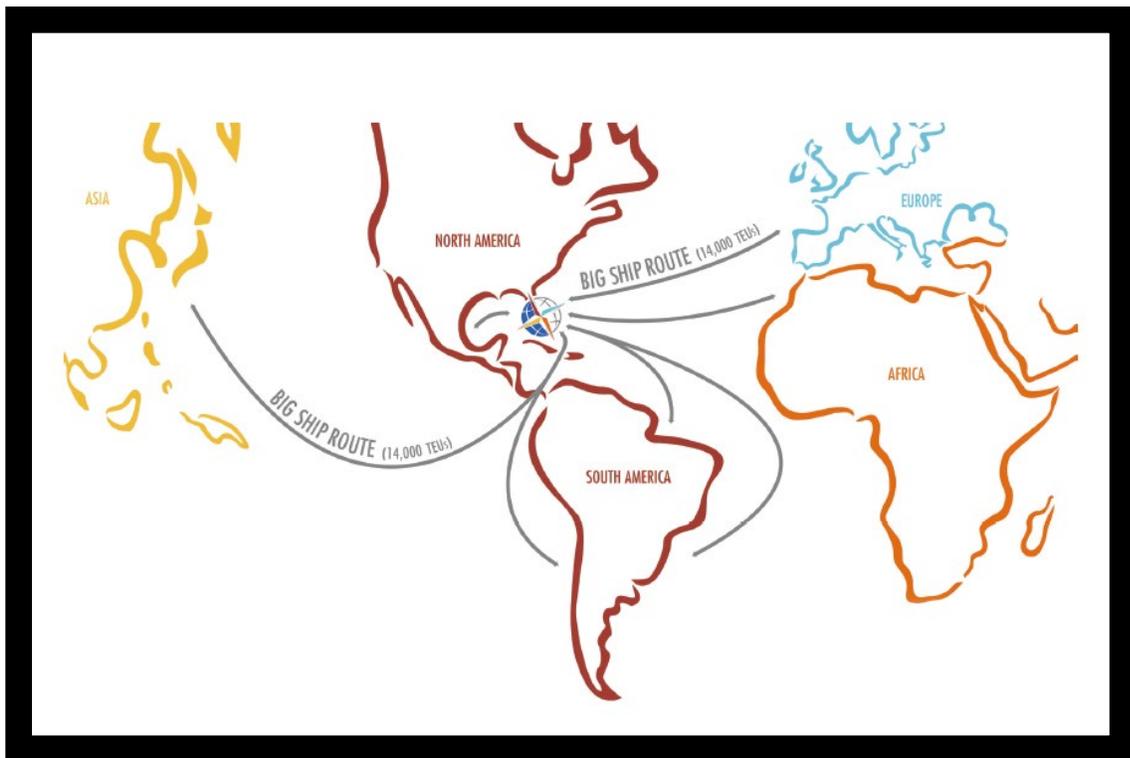
Table 4 provides additional detail on the world container fleet capacities and dimensions as classified by TEU intake. Nominal TEU intake tends to be positively correlated with dead weight tonnes (DWT), LOA (length overall), beam, and design draft.

Figure 3 provides an illustration of the trade routes that are anticipated to service Miami Harbor in the future. Vessel sizes in the range of 14,000 TEU are anticipated to be deployed on transpacific routes through the Panama and Suez Canals. The current distribution of trade by World Region is shown in **Table 5** (based on data from *PortMiami*).

Table 5. Cargo by World Region.

Region	%
Americas & Caribbean	49%
Asia	34%
Middle East / India / Africa	3%
Europe / Med	13%

Figure 3. PortMiami Trade Routes.



*Source *PortMiami*

MAIN REPORT
INITIAL APPRAISAL

2.1.3 Cargo Movements

TEUs moved per vessel call increased at Miami Harbor between 2012 and 2016.

Table 6 provides a breakdown of the number of cargo ships moved relative to TEUs loaded and discharged. TEUs moved per ship call increased by over 11% per year.

Table 6. TEU/ Vessel Docked.

Year	Cargo Ships Docked	TEUs	TEUs/ Ship Docked
2012	1,649	909,917	552
2013	1,348	901,454	669
2014	1,231	876,708	712
2015	1,422	1,007,782	709
2016	1,081	1,028,156	951
CAAGR 2012 - 2016	-8.10%	2.47%	11.50%

2.1.4 Demand for Cruises

Demand for cruises at Miami Harbor has increased between 2012 and 2016. The number of cruise ship calls increased at an average annual rate of 5.9% per year according to Waterborne Commerce Statistics Entrances data. Cruise ship passenger transits and PortMiami cruise revenue increased at an average annual rate of 5.7% and 8.9% respectively between 2012 and 2016 based on data obtained from PortMiami. PortMiami has begun to increase the number of cruise ship berthing spaces to accommodate the growing cruise demand. **Table 7** provides additional detail on cruise demand at Miami Harbor. **Figure 4** provides an illustration of cruise terminal facilities operating at full capacity.

Table 7. Demand for Cruises at Miami Harbor.

Evidence of Demand for Cruises at Miami Harbor			
Years	# Cruise Calls	Passengers	Revenue
2012	726	3,774,000	\$45,192,000.00
2013	759	4,079,000	\$50,528,000.00
2014	881	4,939,000	\$60,295,000.00
2015	847	4,916,000	\$63,659,000.00
2016	967	4,980,000	\$69,199,000.00
CAAGR 2012 - 2016	5.90%	5.70%	8.89%

MAIN REPORT
INITIAL APPRAISAL

Figure 4. Cruise Vessels at Near Capacity in the Main Channel (Northern Channel) – looking south Main Channel Fisherman’s Channel.



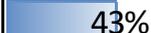
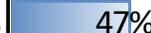
2.1.5 Miami Harbor Transiting Constraints & Sailing Draft Distribution

Container vessel transits through Government Cut at Miami Harbor must be less than 45.3' + Tide based on information provided by the Biscayne Bay Pilots Association. According to information obtained from the Biscayne Bay Pilot's Association, vessels are not allowed to transit the 50-foot deep section of Fisherman's Channel while Post-Panamax vessels are being loaded and unloaded due to insufficient channel width. In addition, there are also restrictions on vessel transit draft in the entrance channel, Cut 1 and Cut2 (see Figure 6).

Based on data obtained from the Biscayne Bay Pilots Association, 44.2 feet was the maximum transit draft for container vessels between 2015 and 2018. **Figure 5** provides detail on the distribution of vessel transit draft by class for sailings at 40-foot or greater. The data provided suggests past 40-foot there may be an inverse relationship between vessel size and the willingness to operate container vessels at deeper transit drafts. This is probably due to the fact that the squat, heel, and wave response of the vessel are more likely to be exacerbated as ship size increases.

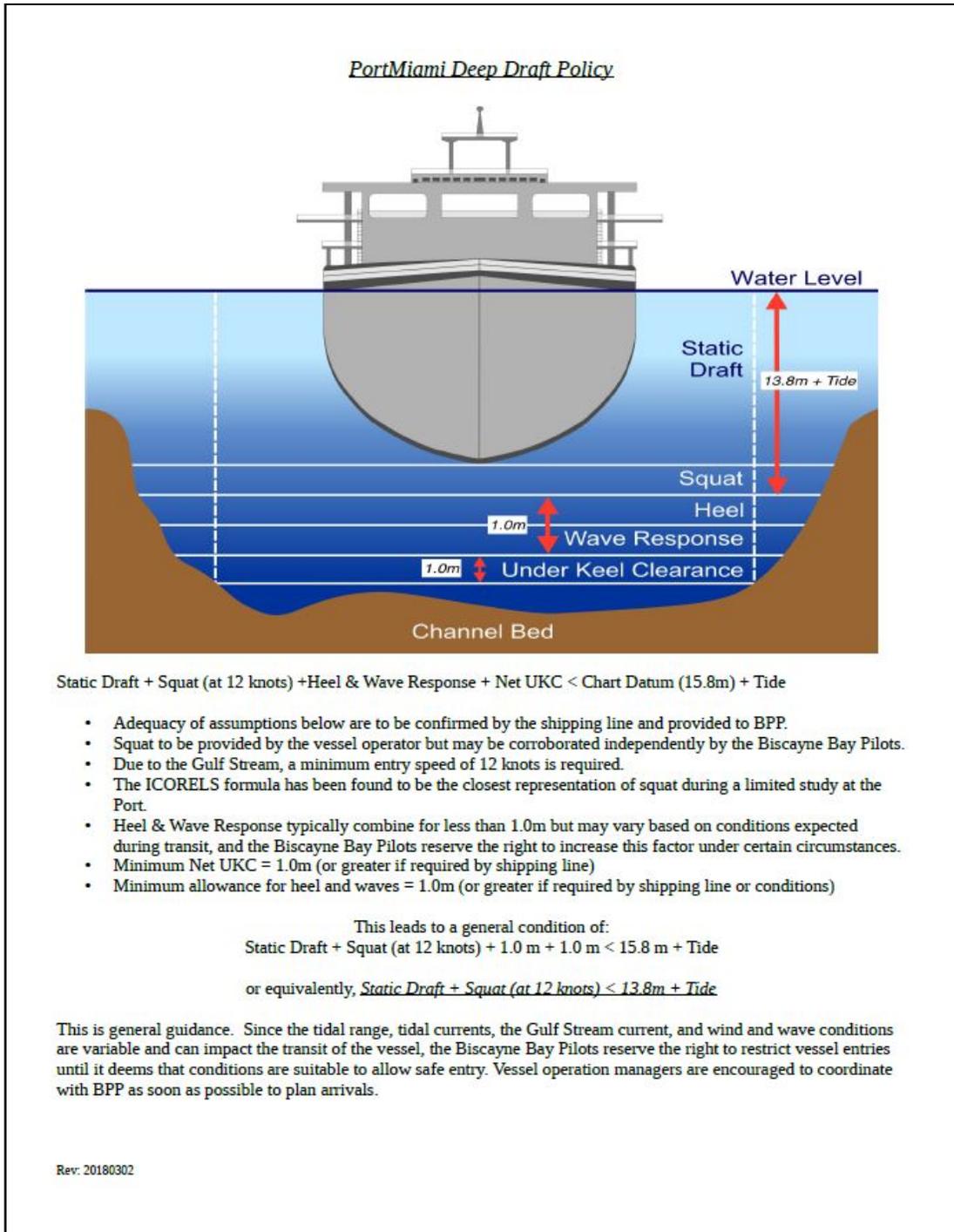
MAIN REPORT
INITIAL APPRAISAL

Figure 5. Sailing Draft Distribution.

Sailing Draft Distribution by TEU Class (40' - 44')						
Class	40	41	42	43	44	
4K TEU	 16%	 3%	 8%	0%	0%	
5K TEU	 16%	 11%	 11%	 11%	0%	
6K TEU	 43%	 45%	 47%	 44%	 57%	
7K TEU	 12%	 13%	 31%	 44%	 43%	
8K TEU	 9%	 21%	 3%	0%	0%	
9K TEU	 3%	 6%	0%	0%	0%	
10K TEU	 1%	 1%	0%	0%	0%	
# Calls	76	71	36	9	7	

MAIN REPORT
INITIAL APPRAISAL

Figure 6. Biscayne Bay Pilots Transit Draft Policy.



MAIN REPORT INITIAL APPRAISAL

2.2 ASSUMPTIONS FOR FUTURE CONDITIONS

2.2.1 Future Demand for Freight Transport at Miami Harbor

The population of Miami Dade is anticipated to grow from 2.6 million in 2015 to almost 3.2 million by 2040 according to US Census Bureau projections. As the South Florida Hinterland population grows, demand for freight transport of imported consumer goods is likely to grow along with it.

2.2.2 Future Composition of the Miami Harbor Container Ship Fleet

The size of the vessels that comprise the container fleet at Miami Harbor will continue to grow as 14,000 TEU vessels make up a greater share of the fleet servicing the US East Coast.

2.2.3 Container Vessel Loading

As vessel sizes grow, the volume of cargo loaded and discharged per vessel call will continue to increase as necessary to maintain service frequency and efficient use of vessel slot capacity.

2.2.4 Future Demand for Cruises at Miami Harbor

Demand for cruises is expected to continue to increase. *PortMiami* is likely to continue to make investments in terminal infrastructure to accommodate cruise demand. It is also anticipated that the sizes of cruise vessels are likely to increase in the future.

2.2.5 Future Transiting Constraints at Miami Harbor

It is likely the restrictions on vessel passage in Fisherman's Channel and constraints on container vessel transiting draft in the Cuts 1 and 2 will remain in place. The interplay between these restrictions, and increased demand for freight transport, larger and more frequently calling but inefficiently loaded container ships, as well as increased demand for cruises on larger cruise ships will create significant constraints on *PortMiami* operations.

2.3 ECONOMIC CONCLUSIONS

Based on the considerations, information and data presented in Section 2 of this appraisal, it is concluded that there is significant potential for NED benefits. Alleviation of sailing draft restrictions in the entrance channels and at Fisherman's Channel is likely to cause an increase in container vessel deadweight and slot capacity utilization, leading to voyage cost reductions.

In the future greater container and cruise vessel sizes and more frequent transits are anticipated. In addition, *PortMiami* has an incentive to potentially expand cruise ship berthing into the southwest corner of Dodge Island. This will increase the frequency of instances in which container and cruise vessels will need to pass in Fisherman's Channel. However, the transit rules prohibiting pass maneuvers in

MAIN REPORT
INITIAL APPRAISAL

Fisherman's Channel due to insufficient width will cause significant delays and congestion. Alleviating this congestion will lead to NED benefits by reducing delay times and port transiting cost.

3 PLAN FORMULATION

3.1 PROBLEMS & OPPORTUNITIES

The problems identified below are summarized from letters from *PortMiami* and the Biscayne Bay Harbor Pilots and relate primarily to the issues facing a larger class of Post-Panamax vessels which are now calling on *PortMiami* (requiring modifications to existing features constructed as a result of the 2004 GRR), as well as cruise ship industry growth.

PROBLEMS

1. Containerships
 - a. Outer entrance channel – Larger class of Post-Panamax containerships face maneuverability problems in the outer entrance channel due to cross currents and variable conditions (translates to needs of additional width and additional depth)
 - b. Possible need for additional width in Fisherman's Channel to allow vessels to pass larger class of Post-Panamax containerships while they are being loaded (translates to need of additional width and associated depth)
 - c. Lummus Island Turning Basin – Larger class of Post-Panamax vessels require additional width and associated depth for turning radius

2. Cruise Vessels
 - a. Lummus Island Turning Basin – Cruise ships require additional width and associated depth for turning radius.
 - b. Cruise vessels (and other vessels) are restricted from passing containerships while docked containerships are being loaded by the gantry cranes. (translates to additional width in Fisherman's Channel)
 - c. Transition from Fisherman's Channel to Dodge Island Channel for cruise ships (translates to transitional width in a bend)
 - d. Port is facing capacity issues as cruise vessels become larger and use more of the existing berth space, leaving less room for same number of cruises. (translates to expanding berth space)

OPPORTUNITIES

1. There is an opportunity to make strategic modifications which will allow the Port to take advantage of a larger class of post-panamax container vessel calls, with potential for reduced trips and increased efficiency, therefore reducing in transportation costs.
2. There is an opportunity to create static depths in the outer entrance channel to allow a larger

MAIN REPORT INITIAL APPRAISAL

class of Post-Panamax vessels currently calling to schedule calls in advance, therefore reducing associated costs of delays.

3. There is an opportunity to reduce vessel waiting times while containerships are being loaded in Fisherman's Channel, therefore reducing associated costs of delays
4. There is an opportunity to Federalize the Dodge Island Channel and increase capacity of cruises, thus increasing economic benefits.

3.2 OBJECTIVES & CONSTRAINTS

OBJECTIVES

1. Reduce transportation cost attributable to less efficient usage of the future containership fleet.
2. Reduce transportation cost attributable to delays from congestion in the federally authorized section of Fisherman's Cut

CONSTRAINTS

1. Avoid or minimize potential impacts to environmental resources in the area

3.3 POTENTIAL ALTERNATIVES

This brief alternative list and general description does not constitute a complete analysis of the full array of potential alternatives nor does it define a preferred alternative or NED plan. Detailed analyses are expected to be conducted in the proposed feasibility phase and would likely involve evaluation of all alternatives to address the problems and opportunities.

1. No Action
2. Widening the outer entrance channels (Cuts 1 & 2): This alternative could consist of a widening flare and elbow to assist larger vessels make entrance to the outer channel and the turn from Cut 1 to Cut 2 under the challenges of variable wind, waves, cross-currents, etc.
3. Deepening the outer entrance channels (Cuts 1 & 2): This alternative could consist of deepening one or more portions of the Cuts 1 & 2 to accommodate larger vessels requiring deeper draft vessels and margins of safety.
4. Widening Fisherman's Channel (South Channel): This alternative could consist of widening Fisherman's Channel to allow vessels to pass while containerships are berthed.
5. Widen Dodge Island Cut and Turning Basin: This alternative would widen Dodge Island Cut and Turning Basin for increased use by cruise vessels and would allow additional width for safe cruise transit as well as allow for cruise terminal expansion by the port.
6. Widening and Deepening the outer entrance channels (Cuts 1 & 2): This alternative would be a combination of Alternatives 2 and 3 as a focus on allowing larger draft vessels enter the outer channel.
7. Widening and Deepening the outer entrance channels (Cuts 1 & 2) and Widening Fisherman's Channel: This Alternative is a combination of Alternatives 2, 3, and 4 to allow larger draft vessels enter the outer channel, as well as pass berthed containerships when in Fisherman's Channel.

MAIN REPORT INITIAL APPRAISAL

3.4 ENVIRONMENTAL CONSIDERATIONS

Potential affects to environmental resources could include:

1. Possible additional seagrass mitigation due to increased width in Fisherman's Channel
2. Possible rock mitigation if deepening through rock is required

The Jacksonville District will coordinate with the Florida Department of Environmental Protection (FDEP), the Florida Fish and Wildlife Conservation Commission (FFWCC), the Florida State Historic Preservation Office (SHPO), the U.S. Fish and Wildlife Service (USFWS), the U.S. Environmental Protection Agency (USEPA), and the National Marine Fisheries Service (NMFS). A scoping meeting will be held at the beginning of the Feasibility Phase to investigate potential concerns regarding the proposed project. The Phase III Project mitigated outward of approximately 125' of projected seagrass impacts that did not occur upon review of final post construction monitoring. This up-front mitigation may offset most of the seagrass impacts proposed under the increased width alternative in Fisherman's Channel. All input received from the state and Federal resource agencies during the coordination will be discussed at this meeting.

Known concerns/issues and any other concerns raised by all stakeholders (i.e., State and Federal environmental resource agencies, the *PortMiami*, the shipping industry, non-profit environmental organizations, the general public, etc.) will be fully evaluated and documented in the NEPA document that will be prepared to support the Feasibility Study.

3.5 RISK AND UNCERTAINTY

While this brief analysis indicates growth in recent trends in vessels and commodities in Miami Harbor, it is by no means an assessment of true future conditions. However, the brief assessment performed does provide enough reason to believe that benefits could be gained that would outweigh the cost of such a project.

Costs estimates were not performed during this appraisal. In general, it is assumed that the costs of widening and deepening strategic portions of Miami Harbor would not outweigh benefits. However, there is risk that if mitigation is needed, initial assumptions of cost could increase.

4 FEDERAL INTEREST

Based upon the discussion in this initial appraisal report, there is Federal interest in proceeding to the feasibility phase of this study to further analyze and evaluate improvements to the Miami Harbor Federal navigation project. Preliminary data based on vessel calls, tonnage, and sailing drafts suggests that there are additional National Economic Development (NED) benefits associated with harbor modifications. At this time, the cost associated with these modifications is not quantifiable due to the lack of sufficient information on construction costs. However, costs and NED benefits will be further evaluated and quantified as part of the feasibility study.

MAIN REPORT
INITIAL APPRAISAL

5 PRELIMINARY FINANCIAL ANALYSIS

PortMiami, the non-federal sponsor, understands its cost-sharing responsibility for a new feasibility study and would be able to execute the FCSA and provide its share of the funding to support the cost-shared feasibility phase (Reference letter from PortMiami at the end of this report). The cost of the feasibility phase will be developed as part of the PMP upon receipt of study funds, and will be cost-shared 50% Federal and 50% non-federal.

6 SUMMARY OF FEASIBILITY STUDY REQUIREMENTS

The following assumptions will provide the initial basis for feasibility studies. These assumptions will be added to/ revised as needed during future iterations of the planning steps.

- Full analysis of reasonable alternatives will be performed, including the no action alternative, to optimize potential feasible alternatives in terms of depth and alignment while minimizing environmental effects.
- A detailed economic analysis will be performed in the economic evaluation in order to identify the effect of using constrained and unconstrained vessels.
- An incremental analysis will be performed in selected increments of channel depth to identify the optimum channel depth.
- Public involvement will be achieved through public meetings and/or workshops and interagency work group meetings.
- A National Environmental Policy Act (NEPA) analysis will be prepared to document the decision-making process and to analyze the project's effect on human health and the environment.
- The feasibility and the environmental study will address disposal of dredged material.
- Modeling studies conducted during the feasibility phase may include hydrodynamic, economics, sedimentation, and ship simulation models.
- Consideration of alternatives will be fully coordinated with the USFWS, NMFS, and other appropriate agencies pursuant to environmental statutes.
- The consideration of alternatives in the study will fully comply with the requirements of the Clean Water Act, as amended and the National Environmental Policy Act.
- Appropriate cultural resources analysis and/or investigation will be conducted within the study area to ensure historic areas are not adversely affected by proposed project plans.

7 RECOMMENDATIONS

This initial appraisal report determines there is Federal interest in further investigation of navigation improvements to the Miami Harbor Federal navigation project. Preliminary data based on vessel calls, tonnage, and sailing drafts suggests that there are additional National Economic Development (NED) benefits associated with harbor modifications, which would add benefit to the national economy. A feasibility study is the intended report to evaluate Federal interest over a period of evaluation of fifty years. This report will be used to support a Fiscal Year 2018 work plan budget request for a General Investigations (GI) funded feasibility study to be cost shared with the local sponsor, PortMiami, Miami-Dade County.

REFERENCE MAP
INITIAL APPRAISAL

Figure 7. Reference Map – Existing Federally Authorized & Constructed Features in Miami Harbor.

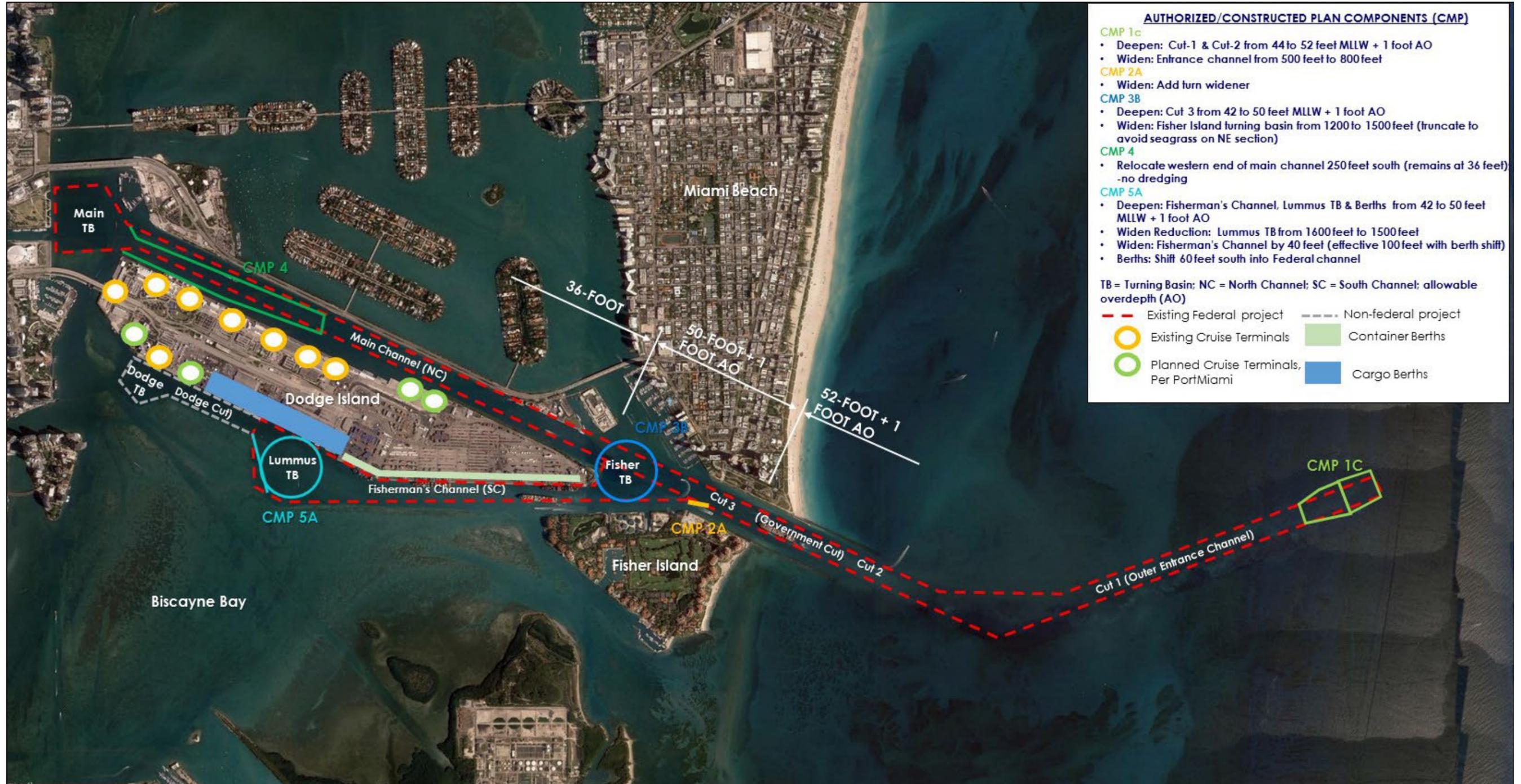


Figure 8. Letter from PortMiami to Request Initiation of Section 216.

