Report Summary

Canaveral Harbor Section 203 (WRDA 1986) Navigation Study, Brevard County, Florida
Integrated Feasibility Report and Environmental Assessment

Feasibility Scoping Meeting:	04 April 2007
Alternative Formulation Briefing	15 April 2011

STUDY INFORMATION

Study Authority. This study of potential navigation improvements at Canaveral Harbor, Florida has been prepared by the Canaveral Port Authority (CPA) under the authority granted by Section 203 of Water Resources Development Act (WRDA) of 1986 (P.L. 99-662).

Section 203 of WRDA 86 states:

SEC 203. STUDIES OF PROJECTS BY NON-FEDERAL INTERESTS.
PUBLIC LAW 99-662, NOV. 17, 1986. 33 USC 2231.

(a) SUBMISSION TO SECRETARY - A non-Federal interest may on its own undertake a feasibility study of a proposed harbor or inland harbor project and submit it to the Secretary. To assist non-Federal interests, the Secretary shall, as soon as practicable, promulgate guidelines for studies of harbors or inland harbors to provide sufficient information for the formulation of studies.[1]

(b) REVIEW BY SECRETARY - The Secretary shall review each study submitted under subsection (a) for the purpose of determining whether or not such study and the process under which such study was developed comply with Federal laws and regulations applicable to feasibility studies of navigation project for harbors or inland harbors.

(c) SUBMISSION TO CONGRESS - Not later than 180 days after receiving any study submitted under subsection (a), the Secretary shall transmit to the Congress, in writing, the results of such review and any recommendations the Secretary may have concerning the project described in such plan and design.

(d) CREDIT AND REIMBURSEMENT - If a project for which a study has been submitted under subsection (a) is authorized by any provision of Federal law enacted after the date of such submission, the Secretary shall credit toward the non-Federal share of the cost of construction of such project an amount equal to the portion of the cost of developing such study that would be the responsibility of the United States if such study were developed by the Secretary.

Study Sponsor. The non-Federal sponsor is the Canaveral Port Authority, which was created by a Special Act of the Florida state legislature in 1953 (the year the Port was dedicated), and is an independent governmental agency of the State of Florida that operates the Port.

[1] Guidelines for implementation of Section 203 (WRDA 86) studies were prepared by the Corps and are contained in ER 1165-2-122, Studies of Harbor or Inland Harbor Projects by Non-Federal Interests, 26 August 1991. This guidance was used in the development of the Port Canaveral Section 203 Study

Study Purpose and Scope. The purpose of this Section 203 study is to determine the feasibility of improvements to the existing Federal navigation project at Port Canaveral[2] and to identify the solution that best meets the economic, environmental, physical, and social needs of the region and the nation. Pursuant to Section 203 of WRDA 1986, this study is also intended to determine the advisability and extent of both Federal and non-Federal participation in cost sharing the proposed improvements.

The Canaveral Port Authority has conducted this Section 203 study to determine the feasibility of improvements to the Federal navigation project at Port Canaveral. Potential improvements include deepening and widening of navigational channels, expansion of the West Turning Basin, and expanded wideners at the port. The purpose of these potential improvements is to efficiently accommodate larger cruise ships and cargo vessels which are already using or projected to use the port in the very near future. These proposed improvements will also increase the efficiency and safety of cargo and naval vessel operations by reducing the current disruptions to cargo and naval operations from the surge effects of operating these extremely large cruise ships under high wind conditions in the narrow federal channel. This study identifies and evaluates alternatives that will:

1) reduce congestion at Port Canaveral;
2) accommodate recent and anticipated future growth in cargo and cruise vessel traffic;
3) improve the efficiency of operations for cruise ships, cargo vessels, and naval vessels within the Port complex;
4) allow for use of the Port by larger cruise ships and larger and more efficient cargo vessels; and
5) allow for development of additional terminals/berths without encroaching on the existing Federal channels and turning basins.

Project location/Congressional District Port Canaveral is located on the east coast of Florida in Brevard County, directly south of the John F. Kennedy Space Center, and approximately five to six miles north of Cocoa Beach. The Port is located about 155 miles south of Jacksonville Harbor, FL, about 198 miles north of Miami Harbor, 170 miles north of Port Everglades, 130 miles north of the Port of Palm Beach, and 50 miles east of Orlando, FL. The Port occupies both sides of the Canaveral Barge Canal and the Inner Reach of the deepwater entrance channel. The project is located in Florida's 15th Congressional District (U.S. Congressman Bill Posey).

Prior Reports and Existing Projects The existing Federal project at Port Canaveral was authorized by the Rivers and Harbors Acts of 2 March 1945 and 23 October 1962, and Sections 101, 114, and 117 of the Water Resources Development Act (WRDA) of 30 October 1992. The Federal navigation project consists of the outer, middle, and inner reaches, the west access channel, and three turning basins (Table 1). The project terminates at the Barge Canal.

[2] The existing project for deep draft navigation at Canaveral Harbor, Florida, authorized by the River and Harbor Acts of March 1945 and October 1962, and Sections 101, 114, and 117 of the Water Resources Development Act (WRDA) of 30 October 1992. The official name of the Federal project is Canaveral Harbor, Florida. Throughout the remainder of this report, this will be used interchangeably with the locally recognized name, Port Canaveral.

Table 1
Port Canaveral Channel Dimensions

(Project depths in Federally Authorized feet MLLW, lengths and width in linear feet)

Project Feature	Station Start / End (ft)	Length	Width[1]	Depth
Outer Reach	0+00 to 125+00	29,000	400	-44[2]
Middle Reach	125+00 to 181+70	5,658	400	-44[2]
Inner Reach	181+70 to 215+00	3,344	400	-40
Middle Turning Basin	215+00 to 241+70	2,260	NA	-39
West Access Channel (east of Station 260+00)	241+60 to 260+00	1,840	400	-39
West Access Channel (west of Station 260+00)	260+00 to 277+30	1,730	400	-31 (CPA maintains to -35)
Barge Canal[3]	141+60 to 227+70	8,610±	125	-12

Notes: [1] CPA maintains additional channel width in some limited areas (see Figures 2-3 & 2-4)
[2] US Navy Project to 44 feet, Civil Works Project authorized to 41 feet
[3] Barge Canal length from start of West Access Channel to Canaveral Locks

The three turning basins have the following dimensions:

- Trident Turning Basin: Approximately 1,600 feet wide by 1,800 feet long basin with an access channel that tapers in width from 650 feet at the north end, to 400 feet at the south end, -41 foot depth. The access channel has an authorized depth of -44 feet.
- Middle Turning Basin: Approximately 2,260 feet long basin (including channel), 1,800 feet wide at the north end, 2,600 feet wide at the south end, -35 foot depth east and north portion, -39 feet west and south portion, 1,200 foot diameter turning circle located in the south west corner.
- West Turning Basin: Trapezoidal basin, 2,750 feet wide at the widest point in the north, 1,400 feet wide at the narrowest point near the existing corner cut off, 1,650 feet long between Cruise Terminals 5 and 10, -31 feet federal project depth, -35 feet CPA maintained depth, 1,400 foot diameter turning circle in the NE quadrant. At the north side is the Cruise Terminal 5 Basin, 650 feet wide by 800 feet long, -35 foot depth.

The US Navy first requested that Congress assess the navigation potential at Port Canaveral in the late 1800s. The most recent survey report completed by the Corps of Engineers and reported to Congress was the October 1991 Navigation Study, Canaveral Harbor, Florida, Final

Feasibility Report and Environmental Assessment (EA). This report was the basis for the WRDA 1992 authorization and the navigation project improvements completed in 1995.

The last major improvement to the Federal project at Port Canaveral that increased port capacity was the deepening and widening that was authorized in WRDA 1992 and completed in 1995. Since that time, other Federal improvements have been made to increase project efficiency and decrease maintenance costs, such as improvement and extension of the north entrance jetty in 2005, south jetty improvement in 1993, 1995, and 2000, and the on-going sand by-pass project which initiated its third bypass event in November 2007 (previous bypasses were completed in 1995 and 1998). In addition, the CPA constructed a south entrance jetty sediment trap in 2007 to intercept sand shoaling from the south, as may occur during southerly non-tropical/tropical storm and/or hurricane events. The south jetty sediment trap compliments the north jetty extension in reducing shoaling at the entrance to the harbor.

OTHER STUDIES

Federal Interest. In February of 2002, the Jacksonville District, U.S. Army Corps of Engineers prepared an Initial Appraisal Study under the authority of Section 107 of the River and Harbor Act of 1960, as amended. Section 107 provides the U.S. Army Corps of Engineers authority to develop and construct small[3] navigation projects. The Initial Appraisal Report concluded that there was a Federal interest in conducting a feasibility study to evaluate expanding and deepening the West Turning Basin. However, funds were not available for the Corps of Engineers to initiate the feasibility phase of the Section 107 study at that time. Subsequently, concerns by CPA regarding the adequacy of the width of the Main Access Channel and wideners led to a desire to also evaluate project widening as another potential improvement. It was determined that widening in addition to expanding the West Turning Basin would result in a project that exceeded the cost limits of the Section 107 authority, requiring a new congressionally authorized feasibility study under the Corps' General Investigations Authority. Because no new project authorization bills had passed since the time of the Section 107 Initial Appraisal, Port Canaveral chose to conduct their own feasibility study under the authority of Section 203 of WRDA 1986.

STUDY OBJECTIVES

Problems and Opportunities. The last major navigation improvements to the Federal navigation project at Port Canaveral were completed by the Corps of Engineers in 1995. Since that time, the demand by users of the Port to accommodate larger and deeper cruise ships and cargo vessels has resulted in a need to provide deeper and wider channels and expanded turning basins. Opportunities exist to increase the efficiency of existing operations by providing deeper and wider channels that allow larger cruise ships to use the Port and larger cargo vessels to carry greater loads.

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[3] Section 107 Projects are limited to a maximum of $4,000,000 in Federal project costs. In addition to the per project limit, total Federal expenditures for construction and Operate, Maintain, Repair, Replace, and Rehabilitate (OMRR&R) under the Section 107 authority are limited to the greater of $4,500,000 or 2.25 times the Federal costs of the project, including costs for the feasibility through the construction phases.

There are vessels presently calling at Port Canaveral that could significantly benefit from deeper, wider channels, as well as newer, larger vessels that would use Port Canaveral if existing channels were improved. Since 2009, three new cruise ships which are among the largest in the world fleet have been homeported at Port Canaveral and a fourth is due to arrive in spring 2012. All of these vessels exceed the design dimensions of the project (nearly 300 feet longer and nearly 30 feet wider than the design vessel). The Canaveral Port Authority has made modifications to the Federal project (limited channel widening to 450 feet in selected locations, interim corner cutoff in West Turning Basin) in order to accommodate these vessels temporarily until the project can be upgraded. In addition, the new Seaport Canaveral facility, which began operations in 2010, provides the opportunity for substantial transportation cost savings if the project is deepened and widened to accommodate the longer and deeper tankers (up to 250 feet longer and 5 feet deeper than the design vessel) that Seaport Canaveral would like to use to transport petroleum products to their new facility. Additional transportation cost savings from project deepening would also accrue to other bulk carriers (rock, slag, cement), if existing vessels could be loaded more deeply and larger vessel could be used.

Projections for cruise traffic and cargo movements indicate sustained growth. The costs of transporting commodities could be significantly reduced if larger, more fully loaded vessels could call at Port Canaveral. Additionally, the cost of vessel operations within the Port could be substantially reduced by the improved vessel maneuverability afforded by a wider channel. Navigational safety, especially surge impacts on moored cargo and naval vessels, would be substantially improved by a wider channel.

Planning Objectives. In addition to the Federal objective of contributing to National Economic Development, other project specific planning objectives have been identified, which guided the plan formulation process in this analysis. Based on the problems posed by the combination of channel and berth constraints, continued population and economic growth in the port's hinterland, and ongoing port facility development, as detailed in Section 4 Problems and Opportunities, the following planning objectives have been established to assist in the development of management measures and evaluation of alternative plans:

- Objective 1: Reduce the requirement for tug assists to cruise ships and docked cargo vessels under high wind conditions from 2014 to 2064 (base year plus 50 years)
- Objective 2: Allow for deeper and more efficient loading of bulk vessels at Port Canaveral from 2014 to 2064
- Objective 3: Allow for more efficient operations through use of longer and deeper draft bulk vessels at Port Canaveral from 2014 to 2064
- Objective 4: Reduce damages to berthed vessels from surge effects of vessel transit through the Port Canaveral main channel from 2014 to 2064; and
- Objective 5: Support national defense requirements and needs, which include coordination with military tenants of the port and reduction of surge effects on the port's military infrastructure from 2014 to 2064.

Planning Constraints. The principal constraint on the formulation of alternatives for navigation improvements at Port Canaveral is avoidance of significant impacts to protected species located at or near Port Canaveral, including the:

- West Indian Manatee;
- Right Whale;
- Least Tern;
- Florida Scrub Jay;
- Southeastern Beach Mouse;
- Gopher Tortoise; and
- a variety of Sea Turtles, including Loggerhead, Leatherback, Green, Hawksbill and Kemp's Ridley.

Of the species listed above, it should be noted that only the West Indian Manatee, Gopher Tortoise, and Sea Turtles are located within the Port boundaries. The other species are located outside the Port, but within the region (Section 2.6.7 Protected Species).

Two resources constraints on the formulation of alternative plans include avoidance of:

- impacts of the existing land and waterfront uses (docks, wharves, terminals) at Port Canaveral on the range of alternatives under consideration;
- impacts on adjacent shoreline erosion.

Much of the Port's current terminal and berth configuration cannot be altered to any considerable degree without incurring unacceptable service disruptions and extremely significant expense to relocate or replace those facilities that the project is intended to serve. Therefore, the non-Federal sponsor, the Canaveral Port Authority, has requested that channel widening alternatives considered be limited to no greater that a 500 foot channel, under the Categorical Exemption to the NED Plan provision of ER 1105-2-100 (Paragraph 3-2.b.(10)). Similarly, the Canaveral Port Authority has requested that channel deepening alternatives considered be limited to no greater that a -44 foot deep channel.

ALTERNATIVES CONSIDERED

Plan Formulation Rationale. The Planning Guidance Notebook (ER 1105-2-100, dated 22 April 2000) states that "water and related land resources project plans shall be formulated to alleviate problems and take advantage of opportunities in ways that contribute to study planning objectives and, consequently, to the Federal objective" (page 2-1). Plan formulation has been conducted for this Section 203 Feasibility Study with a focus on achieving the Federal objective of water and related land resources project planning, which is to contribute to National Economic Development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Plan formulation also considers all effects, beneficial or adverse, to each of the four evaluation accounts identified in the Principles and Guidelines (1983), which are National Economic Development, Environmental Quality, Regional Economic Development, and Other Social Effects.

The federal objective in formulating alternative plans is based largely on contributions to NED. Contributions to NED are increases in the net value of the national output of goods and services

expressed in monetary units. Contributions to NED are the direct net economic benefits that accrue in the planning area and in the rest of the Nation. NED benefits for deep draft navigation projects are transportation cost savings that typically result from general navigation features, such as channels, dredged material disposal facilities, turning basins, etc. Transportation cost savings are calculated as reductions in the cost of transporting goods from their ultimate origin to their ultimate destination. Cargo vessel-related transportation cost savings typically result from more efficient use of the existing cargo fleet and from the use of larger, more efficient cargo vessels in the future. Cargo vessel-related transportation cost savings are the basic type of economic benefits typically used for navigation project justification and cost-sharing purposes.

Additionally, Federal law and Corps of Engineers guidance identifies cruise ship-related benefits as commercial navigation benefits for project justification and cost sharing purposes. Section 230 of the Water Resources Development Act of 1996 specifically directs that benefits generated by cruise ships are categorized as commercial navigation benefits. Planning Guidance Letter #97-06 (07Jul97) provides specific implementation guidance for Section 230 of WRDA 1996. PGL #97-06 states that the benefits generated by cruise ships are to be based on more efficient ship operations and increased tourism or enhanced tourism experience. In addition, PGL #97-06 states that cruise ship related benefits are to be considered commercial navigation benefits for project justification and cost sharing purposes. The Navigation chapter of the Corps' Policy Digest, EP 1165-2-1 (30Jul99), restates the implementation guidance contained in PGL #97-06 in Section 12-4-c.

Management Measures and Alternative Plans. This study identified and evaluated alternatives to solve the following problems and take advantage of the following opportunities: 1) reduce ship congestion at Port Canaveral; 2) accommodate recent and anticipated future growth in cargo and cruise vessel traffic; 3) improve the efficiency of operations and improve safety for cruise ships and cargo vessels currently operating within the Port complex; 4) allow for use of the Port by larger cruise ships and larger and more efficient cargo vessels; and 5) allow for development of additional terminals/berths without encroaching on the existing Federal channels and turning basins.

Potential improvements evaluated in this study include: the No Action Plan; non-structural alternatives; and structural alternatives such as deepening and widening of navigational channels, expansion of the turning basins, and expanded wideners at the port. All viable alternative plans were considered that had the potential to improve the efficiency of operations and reduce the costs to cargo shippers and cruise lines. The only viable alternatives identified in the analysis involved various combinations of channel deepening, widening, turning basin extensions, and expanded wideners that would allow larger vessels to operate more efficiently and safely within in the Federal navigation project.

The formulation of alternative plans carefully considered the optimization of channel widths and depths to maximize net average annual benefits and contributions to the NED account. This included identification of design vessels (cruise and cargo) and associated dredging requirements, identification of structural and non-structural improvements, and estimation of incremental costs and benefits. The plan formulation process also considered the characteristics and quality of dredged material and requirements for disposal. All non-Federal ancillary facilities that are required to deliver project benefits were identified, costs estimated, and are included as associated costs in the alternative evaluation and economic analysis. All plans were evaluated using the System of Accounts framework established in the Principles and Guidelines

(P&G 1983) promulgated by the Water Resources Council. The final alternatives were evaluated based on comparison to the No Action Plan, in order to identify the plan that maximized net economic benefits to the nation. Physical conditions at the Port constrained the array of alternatives that were evaluated such that the most economical plan analyzed may be a smaller scale plan than the NED Plan. Environmental impacts were identified and evaluated to determine conformity with environmental laws, policies, and other guidelines. Finally, as previously mentioned, the views of the public were solicited and considered in the alternative formulation and evaluation process.

Final Array of Alternatives. The following alternative plans were carried forward for more detailed analysis:

- Channel widening to 450 feet, from the sea to the West Turning Basin, and placement of an outbound range as an aid to navigation, repositioning of the existing inbound range, and extending an existing turn widener at the entrance from the sea;
- Channel widening to 500 feet, from the sea to the West Turning Basin, and placement of an outbound range as an aid to navigation, repositioning of the existing inbound range, and extending an existing turn widener at the entrance from the sea; and
- Channel deepening from the sea to the West Access Channel and Middle Turning Basin, in three increments. The name of each increment is based on the channel depth at the Inner Reach, which is the first reach from the sea that is not affected by wave action. The without-project depth of the Inner reach is -40 feet. The first increment is a two-foot increment; -42 feet) and each successive increment is a one-foot increment; -43 feet and -44 feet). Each depth increment includes any necessary associated berth deepening (non-federal responsibility).

The Canaveral Port Authority is not interested in partnering in a project deeper than the -44-foot plan at this time, due to high associated costs (port infrastructure upgrades) which would be required by channel depths deeper than the -44-foot plan. Likewise, CPA is not interested in any widening alternatives greater than 500 feet because they would involve extensive and extremely expensive reconstruction of berthing facilities at the South Cargo Piers, as well as at NCP 1 & 2. As a result, the CPA has requested a Categorical Exclusion under ER 1105-2-100 to not be required to analyze any plans wider than 500 feet or deeper than -44 feet.

Comparison of Alternatives. Potential project costs include construction costs, real estate costs, financial costs (interest during construction), engineering and design, supervision and administration, and operation and maintenance costs (Engineering Appendix: Section 10 Cost Estimates). Project costs also include any non-financial (i.e., non-cost shared) associated non-Federal costs, such as berth deepening, landside infrastructure, or other modifications that must be incurred in order for project benefits to be realized. A Cost Risk Analysis was conducted, which resulted in a project cost contingency of 20.97%. All total project costs used in this analysis include 20.97% contingency. All costs are calculated using FY 2012 dollars, a 50-year project life, and all discounting is conducted at the current FY 2012 Federal discount rate (4.00%).

The with-project condition transportation cost savings calculated in this analysis fully coincide with this example presented in the NED Procedures Manual. With-project condition cargo vessel transportation cost savings are based on safer more efficient operation of cargo vessels

and use of larger, more efficient cargo vessels. With-project condition cruise ship transportation cost savings are based on safer more efficient cruise ship operations at the port and on reduced cruise ship impacts to cargo operations within the port.

Channel Widening Plans 1 & 2, including associated aids to navigation and turning basin extension components, are standalone alternative plans. The two channel widening alternative plans do not require a channel deepening component to generate transportation cost savings. A wider channel would beneficially affect cruise ship operations in the Port, reduce the incidence and severity of surge effects on moored cargo vessels during cruise ship passage through the Port, and would allow larger tankers to navigate the channel to and from the Seaport Canaveral Fuel Terminal and other cargo berths. Transportation cost savings would be generated by fewer incidences of tug assist during cruise ship passage through the Port, by fewer incidences of tug assist for cargo vessels in the Port, and by efficiencies gained through the use of larger (longer) tankers at the Seaport Canaveral Fuel Terminal (Table 2).

There are two components to the beneficial effects of the alternative channel widening plans. One component is that a wider channel would allow longer (greater Length Overall [LOA]) tankers to call at Seaport Canaveral Fuel Terminal. At the request of Seaport Canaveral, the Canaveral Pilots Association has made determinations concerning maximum vessel LOA for Seaport Canaveral tankers. Under without-project conditions, the maximum LOA for Seaport Canaveral tankers is 800 feet. Under Channel Widening Plans 1 and 2, the maximum LOA for Seaport Canaveral tankers increases to 850 feet and 900 feet, respectively.

The second component of alternative widening plan beneficial effects is directly related to wind conditions at the Port. Under perfectly calm conditions (winds ranging from 0 to 5 knots) the existing channel is adequate for most vessel operations. As wind speeds increase, safe navigation within the channel becomes more challenging. At relatively high winds, additional tug assistance is required to maintain navigation within the channel or to provide stabilizing force to offset surge effects on vessels moored at vulnerable piers within the Port. Wind-related beneficial effects on port operations projected to result from the alternative widening plans, which are assessed in this analysis include:

- Reduction in the frequency of tug assistance for the largest cruise ships under strong wind conditions;
- Reduction in the frequency of tug assistance for the largest Seaport Canaveral tankers (tankers 800 feet LOA and larger); and
- Reduction in the frequency of tug assistance to offset surge impacts for vessels moored in or at
    - Trident Basin
    - North Cargo Piers 1 and 2
    - North Cargo Piers 3 and 4.

Table 2
Total Annual Channel Widening Benefits

	Total Benefits
Channel Widening Plan 1 (450 feet)	
Reduced Tug Assist	$606,126
Avoided Tanker Trips	$1,277,842
Total	**$1,883,968**
Channel Widening Plan 2 (500 feet)	
Reduced Tug Assist	$745,426
Avoided Tanker Trips	$2,084,322
Total	**$2,829,748**

With-project channel deepening benefits will result from cargo vessels arriving at Port Canaveral with deeper drafts and larger loads than under without-project conditions. Larger loads and deeper drafts allow vessels to operate more efficiently. This efficiency gain is calculated as the difference in operating costs for vessels delivering the projected commodity tonnage under without and with-project conditions. In the assessment of alternative plans, the annual projected tonnage is the same under without and with-project conditions, but the number of trips required and annual operating costs (ocean voyage costs plus landside costs) will decrease due to deeper with-project channel depths.

Identification of the commodities and vessel fleet that may be impacted by deeper channel depths is based on observed historical (fiscal years 2000 – 2009) and calendar year 2006 vessel operations and commodity data. Only six commodities (aggregates, cement, limestone, granite, slag, and fuel oil) are typically delivered in large quantities on cargo vessels of sufficient size to potentially take advantage of a deeper channel. For future fuel oil deliveries to the Seaport Canaveral Fuel Terminal, the projected fleet and projected volumes are based on Seaport Canaveral's operational projections as presented to the CPA and discussions with port planning and operations personnel.

Under without-project conditions, Seaport Canaveral point-to-point fuel oil tanker length is based on observations presented in Section 2.5.7 Existing Cargo Fleet Operations and Tidal Advantage. Although 800 feet LOA is the longest cargo vessel the Canaveral Pilots will bring into the harbor, at the existing unconstrained operating draft (36 feet) large tankers are required to light load to the extent that they are less efficient than a smaller tanker, which can be more fully loaded when operating with a draft of 36 feet. Because Seaport Canaveral point-to-point tankers do not use tidal advantage, they are regularly 600 feet LOA, which allows more efficient operations under the without-project depth constraint. Under channel widening and deepening conditions, Seaport Canaveral point-to-point tankers are projected to increase in length and operate at deeper drafts, which allow the longer vessels to operate efficiently.

- without-channel widening conditions (800 feet LOA maximum);
- with-project Widening Plan 1 (850 feet LOA maximum); and
- with-project Widening Plan 2 (900 feet LOA maximum).

Total and incremental average annual equivalent transportation costs for large cargo vessels under without and with-project conditions are presented in Table 3. Benefits are calculated with and without alternative widening plans in effect. Channel widening impacts deepening benefits because the projected tanker fleet (fuel oil vessels only) calling at Seaport Canaveral Terminal shifts to larger vessels under Widening Plans 1 and 2. Channel deepening benefits decline slightly with widening plans in effect because without-deepening project transportation costs are less due to the use of larger tankers resulting in fewer tanker calls. Projected benefits exhibit diminishing returns to channel deepening in that incremental benefits decline at successively deeper project depths. Channel deepening also extends the period of time when naval vessels can access the Trident Basin without the need for tidal advantage. Reducing the need for tidal advantage extends the unrestricted operational capability of naval vessels. NED benefits have not been calculated for this ancillary benefit to the US Navy.

Table 3
Average Annual Equivalent Transportation Cost Savings: Deepening Alternatives

Plan	Total Transportation Cost	Total Transportation Cost Savings	Incremental Cost Savings
Without Channel Widening			
Without-deepening	$26,708,104		
-42 feet	$25,074,989	$1,633,114	$1,633,114
-43 feet	$24,345,037	$2,363,067	$729,953
-44 feet	$23,767,018	$2,941,086	$578,019
With Widening Plan 1 (450 feet)			
Without-deepening	$25,430,262		
-42 feet	$23,976,241	$1,454,021	$1,454,021
-43 feet	$23,306,902	$2,123,360	$669,339
-44 feet	$22,755,178	$2,675,084	$551,724
With Widening Plan 2 (500 feet)			
Without-deepening	$24,623,781		
-42 feet	$23,231,700	$1,392,081	$1,392,081
-43 feet	$22,621,773	$2,002,008	$609,927
-44 feet	$22,092,217	$2,531,564	$529,556

Projects that employ widening and deepening plans would generate the cumulative benefits of both types of improvement. For example, a project that combines Widening Plan 1 (450-foot channel width) with a -42-foot channel depth would generate $1,883,968 in widening plan benefits and $1,454,021 in deepening plan benefits for a total project benefit of $3,337,989. Table 4 presents a matrix of total project benefits which would be generated by combining Widening Plan 1 (450 feet) or Widening Plan 2 (500 feet) with incremental deepening from -42 feet to -44 feet.

Table 4
Total Project AAEQ Benefits: Widening and Deepening Plan Combinations

	No Deepening	-42 feet	-43 feet	-44 feet
No Widening	-	$1,633,114	$2,363,067	$2,941,086
Widening Plan 1 (450 feet)	$1,883,968	$3,337,989	$4,007,328	$4,559,051
Widening Plan 2 (500 feet)	$2,829,748	$4,221,830	$4,831,756	$5,361,312

The alternative plan net benefits presented in Tables 5 through 8 are calculated as the difference between the total annual average equivalent costs and benefits of each alternative. The incremental net benefits of the alternative plans are decreasing with successive plan increments, but remain positive overall, which indicates that the incremental benefits of each successive alternative are greater than the incremental costs.

Table 5
Cost – Benefit Analysis: Channel Widening Only

Alternative Plan	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Incremental Net Benefits	B/C Ratio
Widening Plan 1 (450 feet)	$1,448,734	$1,883,968	$435,233	$435,233	1.3
Widening Plan 2 (500 feet)	$1,960,442	$2,829,748	$869,306	$434,073	1.4

Note: Discount rate = 4.00%, period 50 years

Table 6-6
Cost – Benefit Analysis: Channel Deepening Only

Alternative Plan	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Incremental Net Benefits	B/C Ratio
-42 feet	$157,949	$1,633,114	$1,475,165	$1,475,165	10.3
-43 feet	$396,407	$2,363,067	$1,966,660	$491,494	6.0
-44 feet	$668,011	$2,941,086	$2,273,075	$306,415	4.4

Note: Discount rate = 4.00%, period 50 years

Table 6-7
Cost – Benefit Analysis: Widening Plan 1 (450 feet) and Channel Deepening

Alternative Plan	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Incremental Net Benefits	B/C Ratio
450-foot widening (W1) only	$1,448,734	$1,883,968	$435,233	$435,233	1.3
W1 and -42-foot deepening	$1,504,084	$3,337,988	$1,833,905	$1,398,671	2.2
W1 and -43-foot deepening	$1,764,285	$4,007,328	$2,243,043	$409,138	2.3
W1 and -44-foot deepening	$2,055,296	$4,559,051	$2,503,756	$260,713	2.2

Note: Discount rate = 4.00%, period 50 years

Table 6-8
Cost – Benefit Analysis: Widening Plan 2 (500 feet) and Channel Deepening

Alternative Plan	Total AAEQ Costs	Total AAEQ Benefits	Total Net Benefits	Incremental Net Benefits	B/C Ratio
500-foot widening (W2) only	$1,960,442	$2,829,748	$869,306	$869,306	1.4
W2 and -42-foot deepening	$2,094,929	$4,221,830	$2,126,900	$1,257,594	2.0
W2 and -43-foot deepening	$2,377,931	$4,831,756	$2,453,826	$326,925	2.0
W2 and -44-foot deepening	$2,692,766	$5,361,312	$2,668,546	$214,721	2.0

Note: Discount rate = 4.00%, period 50 years

In addition to transportation cost savings generated by the project, the channel widening and deepening reduces surge effects in the Middle Turning Basin, Trident Basin, and at berths NCP3 & 4. The direct benefits to the Navy and Air Force vessels using the Middle and Trident Turning Basins due to reduced surge effect, such as damage reduction or line handling cost reductions, has not been quantified in monetary terms; however, the tug assist cost savings for Trident Basin vessels under with-project conditions has been included in the benefits calculations.

Plan formulation has been conducted for this study with a focus on contributing to National Economic Development (NED) with consideration of all effects, beneficial or adverse, to each of the four evaluation accounts identified in the Principles and Guidelines (1983).

Plan selection is based on a weighting of the projected effects of each alternative on the four evaluation accounts. Qualitative and quantitative information has been reviewed for major project effects and for major potential effect categories. The alternatives were also compared and contrasted according to their achievement of the additional criteria of a) effectiveness; b) completeness; c) acceptability, and d) efficiency according to applicable Corps guidelines.

In addition to these four traditional criteria, information on achievement of project-specific opportunities and avoidance of project-specific constraints is also presented in System of

Accounts format, for comparison at the same level of scrutiny of the information presented in other accounts.

Recommended Plan. The Principles and Guidelines require that the plan which maximizes net benefits, the NED plan, be identified. Typically, the incremental analysis includes depths beyond the depth which maximizes net benefits in order to "bracket" the NED plan and to show that net benefits in fact decline at deeper depths. However, ER 1105-2-100 paragraph 3-2 b.(10) Categorical Exemption to NED Plan states:

> *For harbor and channel deepening studies where the non-Federal sponsor has identified constraints on channel depths it is not required to analyze project plans greater (deeper) than the plan desired by the sponsor.*

This study identifies the most economical plan analyzed, the plan that has the greatest net economic benefits of all plans considered. At the request of the non-Federal sponsor, plans greater in depth and width were not analyzed due to financial and logistical constraints.

The recommended plan, which is the most economical plan analyzed consists of widening the main ship channel from the harbor entrance inland to the West Turning Basin and West Access Channel, from its current authorized width of 400 feet to 500 feet. In addition to widening, deepening of the existing Federal project and expansion of turning basins is recommended in the following reaches:

- Outer Reach, Cut 1A: deepen from -44' to -46' for a length of 11,000';
- Outer Reach, Cut1B: deepen from -44' to -46' depth for a length of 5,500';
- Outer Reach, Cut 1: deepen from -44' to -46' for the 5,300' long portion of Cut 1 that is seaward of buoys 7/8 (Station 0+00 to Station 53+00). The remainder of Cut 1 from buoys 7/8 to the apex of the channel turn, a length of 7,200', would also be deepened from -44' to -46';
- US Navy Turn Widener: deepen from -44' to -46' X 7.7 acres (triangular shaped area) bounded by outer and middle reaches to the north and northeast and the civil turn widener to the southwest;
- Civil Turn Widener: deepen from -41' to -46' X 15.6 acres (irregular shaped area) bounded to the north and northeast by the middle reach and the US Navy turn widener;
- New 203 Turn Widener: deepen to -46' X 23.1 acres (irregular shaped area) bounded to the north and northeast by the civil turn widener and Cut 1 of the outer reach;
- Middle Reach: deepen from -44' to -46' for a length of 5,658'. The middle reach extends from the apex of the channel turn westward to the western boundary of the Trident access channel;
- Inner Reach, Cut 2 and Cut 3: deepen from -40' to -44' for a length of 3,344';
- Middle Turning Basin: expand and deepen to encompass 68.9 acres to a project depth of -43' and a turning circle diameter of 1422'. The existing -39' federal project provides a turning circle diameter of 1200';
- West Access Channel (east of Station 260+00): deepen from -39' to -43' for a length of 1,840'; and

- West Turning Basin and West Access Channel (west of Station 260+00): expand the existing federally authorized turning circle from 1,400' diameter at a depth of -31' to 1,725' X 141 acres at a depth of -35'. The existing West Turning circle was deepened and is maintained to -35' by the Canaveral Port Authority. As part of the proposed expansion and shifting of the turning circle, the federally authorized depth will be increased to -35'.

Agency Technical Review – Independent External Peer Review

ATR. An external Agency Technical Review (ATR) was performed by a multi-disciplinary team consisting of technical staff from the USACE Mobile District. The ATR team membership and the scope of ATR work were coordinated with the USACE National Deep Draft Navigation Planning Center of Expertise (DDNPCX). All concerns resulting from the ATR have been considered, addressed, and resolved.

In general, the ATR team found that the information presented in the report describing the plan formulation and evaluation supported the selection of the recommended plan. As stated in the ATR Certification, "The Agency Technical Review (ATR) of the Port Canaveral Integrated Section 203Study Report and Environmental Document was performed in accordance with EC 1165-2-209; Civil Works Review Policy dated 31 January 2010" Certification of Agency Technical Review is dated 22 February 2011.

IEPR. Exclusion granted 13 April 2012.

EXPECTED PROJECT PERFORMANCE

Project Costs, Equivalent Annual Costs and Benefits. The recommended plan for commercial navigation is economically feasible, with total average annual benefits of $5,361,000, total average annual costs of $2,693,000, total net annual benefits of $2,669,000, and a benefit-cost ratio of 2.0 to 1. The plan was evaluated based upon a 50-year project life at the current FY 2012 Federal discount rate of 4.0 percent.

Cost Sharing. In accordance with the provisions of Federal laws and policies, the Federal share of the first cost of implementing the recommended plan is estimated to be $26,484,000. The estimated non-Federal share of the recommended plan is $15,218,000, including lands, easements, rights-of-way, relocations, disposal areas, and associated non-Federal costs. Incremental annual maintenance costs are estimated to be $623,415 annually and will be shared between the Federal and non-Federal sponsor 71% - 29% in accordance with the cost sharing breakdown for General Navigation Features. The Federal share of incremental annual maintenance costs is currently estimated to be $443,700. Maintenance of any non-Federal ancillary facilities is a 100% non-Federal responsibility.

While the feasibility study was being conducted, a new fleet of larger cruise ships arrived at Port Canaveral. The dimensions of these vessels exceeded the design limits of the existing Federal navigation project (as predicted by the feasibility study) so, at the request of the cruise lines and Canaveral Pilots, CPA made the decision to advance construction of a portion of the planned improvements to the project to accommodate this new fleet of larger vessels, rather than turn them away. Navigation improvements in the West Turning Basin were constructed by the CPA in advance of completing the feasibility study in order to maintain safe navigation within the

harbor for the newer, larger cruise ships that were entering the Port Canaveral fleet within the last several years.

The construction costs of these completed components ($13,775,063) are not included as a project cost in this report, because a prior agreement or authorization for these improvements to the existing Federal project was not yet in place between the Corps of Engineers and the non-Federal sponsor, the Canaveral Port Authority. However, as has been the case for a number of previous Federal navigation projects, the CPA intends to seek post-facto credit for those costs as part of the specific Congressional authorization for construction of the project improvements recommended in this report. The proposed project, including the costs of the advanced construction of navigation improvements, remains economically justified and the recommended plan does not change if the expended costs of this completed element are included. The required environmental documentation and coordination was also conducted by CPA prior to construction of these navigation improvements.

This Section 203 Study report includes an Integrated Final Environmental Assessment prepared in accordance with the requirements of the National Environmental Policy Act. This report is being submitted by the Canaveral Port Authority to the Assistant Secretary of the Army (Civil Works) for approval, processing of the NEPA document, and submission to Congress for authorization of construction. Upon approval and authorization, the study will proceed to preconstruction, engineering and design (PED), and construction by the Corps of Engineers. The schedule to proceed with construction is estimated to be as early at 2013, subject to Congressional authorization and appropriations, and the project base year is estimated to be 2014.

Project Implementation. Dredge material below -13 feet MLLW generally consists of silts and clays, and are not suitable for reuse. These silts and clays will be disposed in the Canaveral ODMDS located approximately 10 miles south of Canaveral Harbor. The present management plan for the ODMDS is the Site Management and Monitoring Plan (SMMP) dated February 2012, and is included as Engineering Appendix Attachment P. This updated SMMP replaces the previous SMMP dated October 2001. The estimated project dredged material quantity (below -13 MLLW) is 3.1 million CY, which would be dredged during a period of more than 200 days, spanning two calendar years. The current SMMP identifies an approved ten-year volume capacity as 9.2 million cubic yards (mcy) (i.e., half of the estimated remaining capacity of 18.4 mcy), and specifically recognizes and accounts for all construction dredging volumes associated with this project.

The suitability of the dredged material for ocean disposal will be verified as part of the permit process. Based on the recent and ongoing history of testing and evaluation of dredged material in Port Canaveral for ongoing O&M dredging, CPA projects like the ICCO, and the current Section 103 EPA authorizations, it is anticipated that all of the material below -13 feet MLLW proposed for ocean disposal will be determined suitable and approved for disposal in the ODMDS. .

The maximum amount of excavated material for reuse and/or upland disposal is estimated to be 354,069 cubic yards and will be disposed at the existing USACE upland containment site on the USAF property. Reuse of upland excavated material is considered to consist of the sands that are generally found at and above elevation -13 feet MLLW. The dredge material is expected to be of a quality suitable for construction fill material and would be stockpiled at an agreeable

location on the containment site for later reuse pending formal Air Force approval for use of that area for material placement.

Air Force approval for use of the existing USACE upland containment site for material placement will be based on an evaluation of potentially competing interests and on test results of the composition of the spoils to be placed. Brevard County has a beach restoration project that also intends to use the USAF disposal area to stockpile beach quality sand. Disposal of upland material from the Canaveral Harbor project can complement the Brevard County project disposal on this site.

The beach quality sand from the Brevard County project will be hydraulically dredged from just offshore of the USAF coastline and will require a competent dike system to contain the fluid spoil. The existing USAF containment dike, however, is in poor condition and will need to be restored, and possibly raised in elevation, with a new intermediate dike constructed to subdivide the containment area. Based on the previous channel widening and the Sponsor's experience with recent dredging, the Canaveral Harbor material above elevation -13 feet will be construction grade fill material recovered using excavation methods. This material will be suitable for the necessary dike modifications and the new intermediate dike needed for the Brevard County project. CPA is currently coordinating with USAF and Brevard County to insure that the one-time placement of the recovered spoil will complement the Brevard County project. Use of the recovered stockpiled material to reconstruct and improve the containment dike system would not reduce the area available for spoil on the USAF site.

In the unlikely event that the USAF should not approve placing the excavated upland material on their existing spoil disposal site, other options for reuse of the upland excavated material can be further developed, including off-site placement on CPA property, or existing disposal area dike upgrades requiring suitable fill. If the USAF wishes to retain ownership of their material (since the upland material is being excavated from their property), then the Sponsor could truck the material to a different site on CCAFS as designated by the USAF. Adequate areas are also available on Port property owned by CPA if USAF sites are unavailable. These alternatives would be somewhat more expensive than the recommended upland disposal plan due to additional haul distances, but would be expected to remain within the contingency allowance estimated in this report.

Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R). The operation and maintenance of the Recommended Plan is nearly identical to operation and maintenance of the existing Canaveral Harbor project, with the exception of an additional 69,000 cubic yards of annual maintenance dredging that is expected to occur mostly in the vicinity of the extended turn widener in the entrance channel. Material from this area has historically been suitable for placement at the ODMDS. This small volume of additional maintenance material is not projected to have a substantial impact on ODMDS capacity.

This additional maintenance volume in combination with the construction material, plus all other projected volumes as listed in the SMMP equal 9.75 mcy over a 10-year period, exceeding half of the remaining site capacity (9.2 mcy of 18.4 mcy) and therefore will (per the SMMP) require an assessment of the proposed action's impacts upon the ODMDS' capacity requirements prior to the next 10-year renewal cycle of EPA's Site Management and Monitoring Plan (SMMP). Impacts on the ODMDS site capacity would be assessed through a combination of management alternatives, evaluation of capacity based on bathymetric surveys, and an assessment using the

USACE MDFATE or MPFATE modeling. At this time it is anticipated that the ODMDS, which is established in the Jacksonville District Corps of Engineers' Canaveral Harbor Dredge Material Disposal Plan (DMMP) as the least cost dredge material disposal site, will continue to be available throughout the project life, subject to decennial development and approval of SMMPs.

Operation and maintenance costs generated by the project are defined as those incremental operations and maintenance costs that are in excess of the costs already required to operate and maintain the existing project. The operations and maintenance costs of the alternative plans are based on increased maintenance dredging volumes due to the widening of the existing channels. Analysis of historical maintenance dredging patterns and the hydrodynamics analysis of without and with-project conditions indicate that very minor changes in hydraulic conditions due to channel deepening would result in no additional maintenance dredging volumes due to the deepening alternatives. The estimated annual volume of additional maintenance dredging material generated by the Widening 2 alternative is 69,500 cubic yards. The resulting additional Widening 2 alternative plan-related maintenance dredging cost is $623,415 ($8.97/CY).

Key Social and Environmental Factors. This report includes an integrated Final Environmental Assessment, which was prepared in accordance with the requirements of the National Environmental Policy Act. This Final Environmental Assessment presents the assessment and evaluation of impacts to environmental resources and other attributes in accordance with Federal and State laws, ordinances, regulations, statutes, and other guidelines. The selected plan will result in minor, short-term adverse impacts related to temporary disruptions to the marine algal community, sea turtle feeding habitat, a temporary increase in turbidity, and temporary transportation disruptions during construction. The selected plan has been found to be in conformance with Federal, State, and local statutes and policies.

Stakeholder Perspectives and Differences. Coordination with the public and with Federal, State, and local agencies was conducted to aid in the formulation and evaluation of the Recommended Plan. Public and agency views including informal comments received to date from representatives of the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, National Marine Fisheries, and Florida Department of Environmental Protection which have indicated no opposition or major issues with the proposed action. The analysis of surge effects has resulted in a positive endorsement of the project from the US Coast Guard, US Air Force, and the US Navy.

Environmental Compliance. The proposed project integrated Environmental Operating Principles (EOP) as required under ER 200-1-5, dated 30 October 2003 and ER 1110-2-1150 31 August 1999 in affirming the Corps' commitment to include environmental considerations into the plan formulation and engineering design processes. These principles foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that employees consider conservation, environmental preservation and restoration in all Corps activities.

As described in Section 4.3 Constraints, the principal constraint on the formulation for navigation improvements at Port Canaveral is the avoidance of significant impacts at or near Port Canaveral. Prior to developing project alternatives, environmental evaluations were conducted to define environmental resources that could be influenced by the project construction or operation. State and Federal natural resource agencies were contacted and consulted regarding potential impacts to these natural resources and potential measures that could be utilized to

eliminate, reduce, or mitigate potential impacts. In addition, a public scoping meeting was conducted at Port Canaveral to elicit comments and suggestion from both the resource agencies and general public with regards to project design and plan formulation including elements for natural resource protection.

Channel widening and deepening has the potential to affect both manatees and sea turtles. Manatees and juvenile foraging sea turtles are protected species and are present in the harbor. Dredging methods and construction techniques were considered that would provide optimum protection to these species during the plan formulation process.

Construction techniques were selected that would protect resources within the project area such as manatees and sea turtles as well as preserving water quality. Consideration was given to include beneficial use of sediments and to conserve existing riprap material for reuse with the project to facilitate restoration of juvenile sea turtle foraging habitat. The Port has also adopted new manatee protection measures at the recommendation of the U.S. Fish and Wildlife Service. Monitoring will be conducted during construction to insure protection of the natural resources in the project area.

The predicted sea level rise will not produce any negative impacts on the existing port infrastructure during the current design life. Facilities developed in the future will be designed with Sea level rise impacts in mind. Sea level rise is not projected to affect project impacts on natural resources

Certification of Peer, Agency, Cost and Legal Review.

IEPR Certification	Exclusion Granted 13 April 2012
ATR Certification	February 2011
Cost Certification	February 2012
Legal Review Certification	July 2012