Report Synopsis
for
Mobile Harbor General Reevaluation Report

1.0 Stage of Planning Process

The current stage of this study is the development of a focused array of alternatives for the Alternatives Milestone of the General Reevaluation Report. A charette was held with vertical team members and agencies on 28-29 January, 2015, where decisions logged included: 1) there is a federal interest and 2) the Project Delivery Team (PDT) should pursue a 3x3x3 exemption. A 3x3x3 exemption was granted on 09 October, 2015 and an Amendment to the Design Agreement was executed on 09 November, 2015. Environmental representatives mailed a Notice of Intent (NOI) to publish a Supplemental Environmental Impact Statement (EIS) on 11 December, 2015. The NOI to prepare an SEIS appeared in the Federal Register on 23 December, 2015. The PDT held a Public Scoping Meeting on 12 January, 2016. The approved plan has a study cost of $7.8M and an expected execution time of 48 months.

2.0 Timeline

The schedule for the Mobile Harbor GRR is as follows.

Amended Design Agreement Signed	09 NOV 2015
Alternatives Milestone	17 FEB 2016
Intermediate Review and Screening of Alternatives	18 APR 2017
Tentatively Selected Plan Milestone	27 MAR 2018
Agency Decision Milestone	23 NOV 2018
Division Engineer Transmittal	21 MAY 2019
GRR Approval	04 NOV 2019

3.0 Study Authority

As Authorized in the Water Resources Development Act of 1986 and per the 1981 Chief's Report for Mobile Harbor, Alabama, the major components of the project are as follows:

a. Deepen and widen entrance channel over the bar to 57 by 700 feet, a distance of about 7.4 miles.
b. Deepen and widen Mobile Bay Channel from mouth of bay to south of Mobile River, 55 by 550 feet, a distance of about 27.0 miles.
c. Deepen and widen an additional 4.2 miles of Mobile Bay Channel to 55 by 650 feet.
d. Provide 55-foot deep anchorage area and turning basin in vicinity of Little Sand Island.
e. Deepening the Mobile River channel to 55 feet to a point about 1 mile below the Interstate 10 and U.S. 90 highway tunnels.

4.0 Non-Federal Sponsor

The Project Sponsor is the Alabama State Port Authority (ASPA).

5.0 Purpose and Need

This report is an interim response to the study authorization. The report will examine the costs and benefits as well as the environmental impacts of modifying the dimensions of the existing Federal project within its authorized limits. The purpose of the study will be to determine improvements for safety and efficiency of harbor users. Vessels are experiencing delays leaving and arriving at port facilities and inefficiencies have increased as the volume of cargo has grown and larger vessels call on the port to handle the increased cargo.

6.0 Study Scope

6.1 Study Background

Construction of Mobile Harbor to 45-feet depth was completed in FY94. The construction depth was limited to 45-feet because the sponsor did not have the funds to construct to the fully authorized depth. A 1300-foot extension in the river channel was a separable element new start with the PPA signed in FY98 and construction completed in FY00. A 1200-foot and a 2100-foot extension in the river channel were also separable element new starts with the PPA signed in FY04 and work completed in FY08. The Turning Basin was also a separable element new start with the PPA signed in FY09 and construction completed in Aug 2010.

Due to traffic changes, vessel delays began being experienced into and out of the port as traffic was limited to one-way as larger ships transited the channel. The ASPA requested that the Corps consider widening a portion of the authorized channel to allow two-way traffic to reduce delays. Subsequently, the Corps initiated a Limited Reevaluation Report (LRR) to consider widening a portion of the upper bay channel. The design agreement for the LRR was executed on 14 Aug 2012. After initial analysis and coordination with the ASPA and its users, the design agreement for the LRR was amended on 14 Apr 2014 to account for a change in location for the proposed widening to include an approximate 5 mile section of the lower bay channel up to the authorized width of 550 feet and to widen an approximate 2 mile section of the bar channel to its authorized width of 700 feet (all work within the existing project authorization) to lift daylight only restrictions imposed by the U.S. Coast Guard (USCG) and bar pilots.

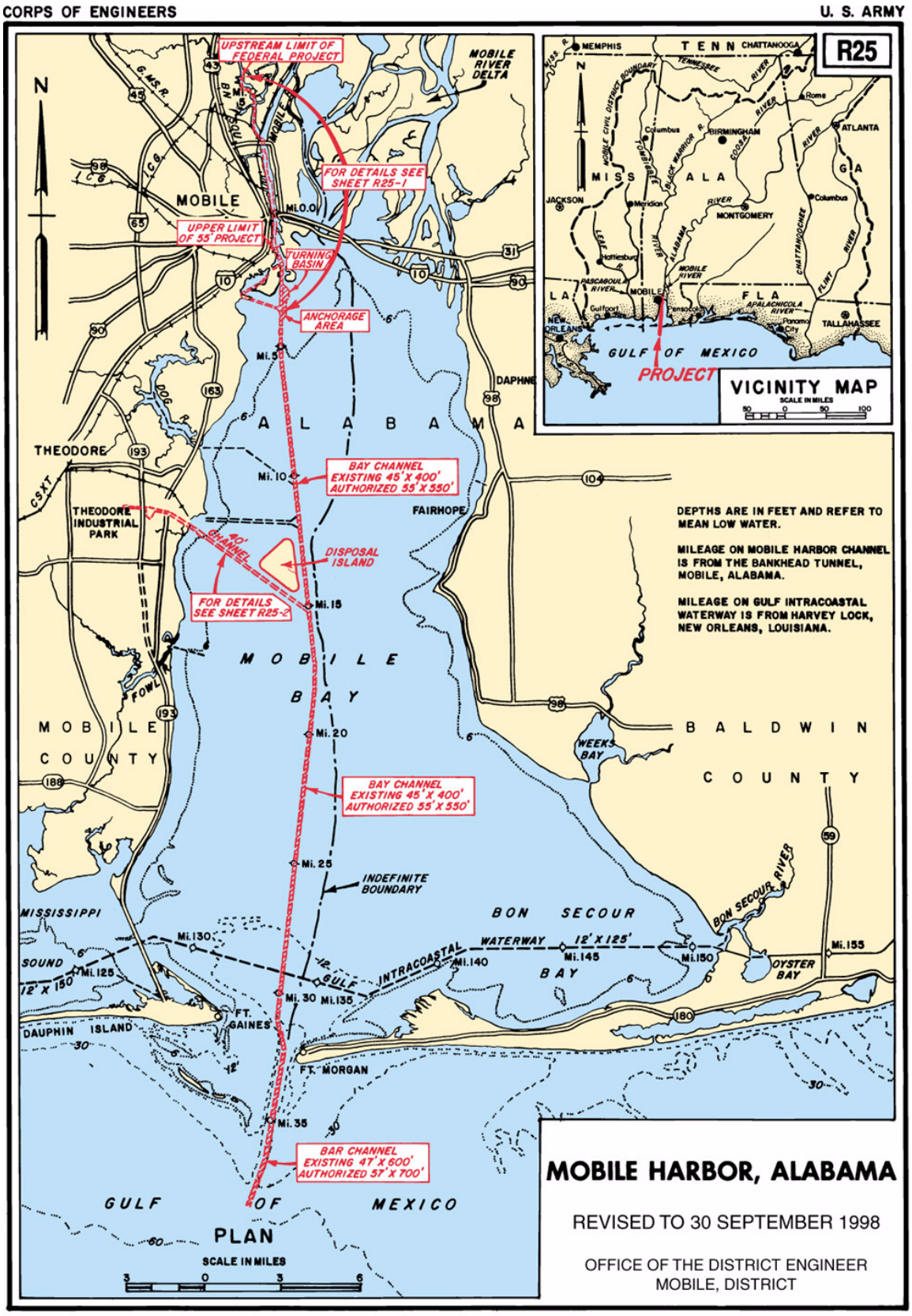
On June 12, 2014, the ASPA requested that the Corps undertake additional studies to determine the feasibility of deepening and widening the channel to its full authorized depths and widths. Per letter dated October 20, 2014, the ASA(CW) approved redirecting $600,000 of GI funds provided to complete PED for the channel widening for Mobile Harbor to initiate a GRR

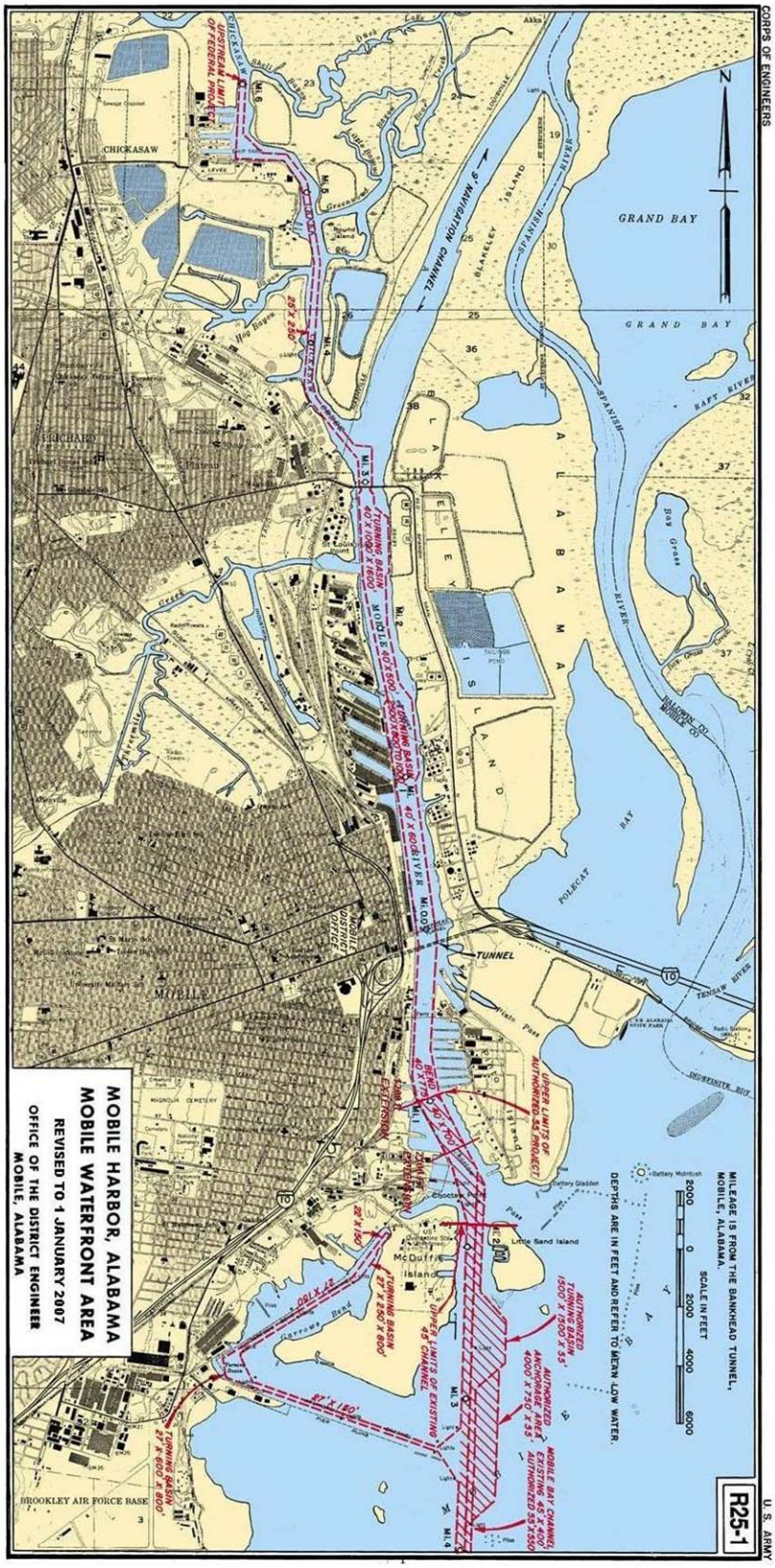
to evaluate deepening and widening of the channel to its full authorized dimensions. This letter also directed Mobile District to halt all work on the LRR being prepared for the widening project.

6.2 Study Area

Mobile Harbor, Alabama, is located in the southwestern part of the state, at the junction of the Mobile River with the head of Mobile Bay. The port is about 28 nautical miles north of the Bay entrance from the Gulf of Mexico and 170 nautical miles east of New Orleans, Louisiana. The current dimensions of the existing navigation channel are: 47 feet deep by 600 feet wide across Mobile Bar and 45 feet deep by 400 feet wide in the bay and 45 feet deep by 730 feet wide in the Mobile River to a point about 1 mile below the Interstate 10 highway tunnels. The channel then becomes 40 feet deep and proceeds north over the Interstate 10 and U.S. 90 highway tunnels to the Cochrane/Africatown Bridge. The Mobile River, on which the Alabama State Docks facilities are located, is formed some 45 miles north of the city with the joining of the Alabama and Black Warrior/Tombigbee Rivers. The Mobile River also serves as the gateway to international commerce for the Tennessee/Tombigbee Waterway. In the southern region of Mobile Bay, access can be gained to the Gulf Intracoastal Waterway which stretches from St. Marks, Florida, to Brownsville, Texas.

Figures R25 and Figure R25-1 show the authorized limits of the Mobile Harbor Federal Navigation Channel.


CORPS OF ENGINEERS
U. S. ARMY
R25
UPSTREAM LIMIT OF FEDERAL PROJECT
MOBILE RIVER DELTA
FOR DETAILS SEE SHEET R25-1
MOBILE
UPPER LIMIT OF 55' PROJECT
TURNING BASIN
ANCHORAGE AREA
DAPHNE
ALABAMA
THEODORE
BAY CHANNEL EXISTING 45' X 400' AUTHORIZED 55' X 550'
THEODORE INDUSTRIAL PARK
FAIRHOPE
DISPOSAL ISLAND
FOR DETAILS SEE SHEET R25-2
MOBILE BAY
MOBILE COUNTY
BALDWIN COUNTY
WEEKS BAY
INDEFINITE BOUNDARY
MISSISSIPPI SOUND
BON SECOUR
BON SECOUR RIVER
WATERWAY 12' X 125'
INTRACOASTAL
GULF
OYSTER BAY
DAUPHIN ISLAND
FT. GAINES
FT. MORGAN
BAR CHANNEL EXISTING 47' X 600' AUTHORIZED 57' X 700'
GULF OF MEXICO
PLAN
SCALE IN MILES
VICINITY MAP
PROJECT
DEPTHS ARE IN FEET AND REFER TO MEAN LOW WATER.
MILEAGE ON MOBILE HARBOR CHANNEL IS FROM THE BANKHEAD TUNNEL, MOBILE, ALABAMA.
MILEAGE ON GULF INTRACOASTAL WATERWAY IS FROM HARVEY LOCK, NEW ORLEANS, LOUISIANA.
MOBILE HARBOR, ALABAMA
REVISED TO 30 SEPTEMBER 1998
OFFICE OF THE DISTRICT ENGINEER
MOBILE, DISTRICT


CORPS OF ENGINEERS
MOBILE HARBOR, ALABAMA
MOBILE WATERFRONT AREA
REVISED TO 1 JANUARY 2007
OFFICE OF THE DISTRICT ENGINEER
MOBILE, ALABAMA
R25-1
U.S. ARMY
GRAND BAY
MOBILE BAY
TUNNEL
BROOKLEY AIR FORCE BASE
MILEAGE IS FROM THE BANKHEAD TUNNEL, MOBILE, ALABAMA.
DEPTHS ARE IN FEET AND REFER TO MEAN LOW WATER.
SCALE IN FEET

7.0 Prior Reports and Existing Water Projects

Department of the Army, Assistant Secretary of the Army (Civil Works). (1986). *A Report of the Chief of Engineers, Department of the Army, on Mobile Harbor, Alabama, Together with Other Pertinent Reports 99th Congress, 2d Session, House Document 99-241.* Washington: U.S. Government Printing Office.

U.S. Army Corps of Engineers. (1975). *Final Environmental Impact Statement, Mobile Harbor (Maintenance Dredging) Mobile County, Alabama.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1977). *Special Report, Mobile Harbor, Alabama, Theodore Ship Channel (approved as General Design Memorandum-Phase I).* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1977). *Theodore Ship Channel & Barge Channel Extension, Mobile Harbor, Alabama, Phase II, General Design Memorandum, Design Memorandum No. 1.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1984). *Draft Supplemental Environmental Impact Statement, Mobile Harbor, Alabama, Channel Improvements, Offshore Dredged Material Disposal.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1985). *General Design Memorandum, Mobile Harbor Deepening, Alabama, General Design Memorandum No. 1, Main Report.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1985). *Mobile Harbor, Alabama Channel Improvements, Offshore Dredged Material Disposal, Environmental Impact Statement.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1986). *General Design Memorandum, Mobile Harbor Deepening, Alabama, Design Memorandum No. 1, Appendix H, Design Analysis.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1991). *Mobile Harbor Deepening, Design Supplement No. 1, General Design Memorandum, Turning Basin Basin Development Plan.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1995). *Mobile Harbor Deepening, Design Supplement No. 2, General Design Memorandum, Turning Basin Basin Development Plan.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (1997). *Limited Reevaluation Report, Mobile Harbor Project Extension.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (2000). *Mobile Harbor 2100-foot Project Extension, Limited Reevaluation Report.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Army Corps of Engineers. (2004). *Final Environmental Impact Statement for Choctaw Point Terminal Project, Mobile, Alabama.* Mobile: U.S. Army Corps of Engineers, Mobile District.

U.S. Environmental Protection Agency. (1982). *Environmental Impact Statement (EIS) for the Pensacola, FL., Mobile, AL., and Gulfport, MS. Dredged Material Disposal Site Designation (Including Appendix A).* Washington: U.S. Environmental Protection Agency.

8.0 Problems/Opportunities

The following problems and opportunities have been identified by the project delivery team for this study.

8.1 Problem Identification

The principal navigation problem is vessels are experiencing delays leaving and arriving at port facilities and their cargo capacities are limited. This problem is a result of increasing number and size of vessels entering and departing the port. In the last five years, the Alabama State Port Authority (ASPA) has added two new facilities at the lower end of the Mobile River (at the upper portion of Mobile Bay) -- the Choctaw Point container terminal and the Pinto Island Terminal. Both facilities have increased the amount of traffic into the port. The existing channel depths and widths limit vessel cargo capability, restrict many vessels to one-way traffic and in some reaches limit transit operations to daylight only. Therefore, evaluation of deepening and widening the Entrance and Bay channels over a combined distance of approximately 37 miles to their fully authorized dimensions through a GRR has been proposed.

8.2 Opportunities

Since 2000, the total value of international trade has risen by over 40 percent and it is becoming a larger part of our national economy. The combined value of foreign trade (imports and exports) represented 13 percent of Gross Domestic Product (GDP) in 1990, rising to nearly 22 percent in 2006. If this trend continues, it is projected that the value of U.S. foreign trade will be equivalent to 35 percent of the Nation's GDP in 2020 and 60 percent in 2030. Marine transportation will become even more important to our economy as 95 percent of America's foreign trade is moved by ship. The bottom line: to sustain expected growth, it is estimated the U.S. must expand its overall port capacity by 10 percent annually. This would require port expansion, mainly on the West Coast, Gulf Coast and South Atlantic. That is the equivalent of adding capacity equal to the Port of Oakland every year.

Mobile Harbor's ranking as a global trading port is consistently in the top twelve nationally. In 2013, the Mobile Harbor ranked twelfth (out of 200 deep-draft ports) in cargo value, and ninth (out of 80 container ports) in container traffic.

Shipping trends in Mobile show adherence to projections for considerable growth in ship size, in all three dimensions, draft, beam, and length. As economies of scale and improved vessel

technologies have driven ship sizes larger, the world's port infrastructure must be rapidly expanded in channel depths and widths and terminal capacity to accommodate larger ships. The number of ports able to handle larger vessels around the world is growing, and, most importantly, the Panama Canal is currently expanding lock capacity to handle ships of 25% greater draft (up to 50 ft), 52% greater beam (up to 160 feet), and 30% greater length (up to 1250 feet). Ships have been under construction for several years to be ready for the new canal capacity when the new Panama Canal locks open in 2016.

There is opportunity to deepen and widen the navigation channel at Mobile Harbor to accommodate larger vessels. Particularly important is the great increase in the deployment of those vessels, which is occurring now and expected to increase when the Panama Canal Expansion Project is completed in 2016. These larger vessels, commonly referred to in the shipping industry as the "Super Post-Panamax" vessels, are expected to comprise greater percentages of vessel fleet composition over the next several decades. This transition to larger vessels is expected to occur rapidly and current Panamax vessels are expected to no longer be used in the Asia service by 2024. Additional depth would be required to serve existing users of Mobile Harbor by that time, as the transition from the current Panamax fleet is complete.

The McDuffie coal shipments are currently utilizing Cape/Post-Panamax size vessels. At the current channel depth, vessels cannot fully utilize vessel capacity. Coal shippers forecast availability of deeper drafts along with an expanded Panama Canal would increase the US coal competitiveness in Asia.

In addition to the economic opportunities afforded by a larger channel, there also exists safety and potentially environmental opportunities. Hazards of traffic moving in and out of the port as well as navigation features of the channel would be improved by a larger channel. There is also potential for beneficial use of sediment material that would be obtained from the channel dredging.

9.0 Planning Goals/Objectives

The proposed study goals, objectives and constraints follow.

9.1 Study Goals and Objectives

The National or Federal objective of water and related land resources planning 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. This objective is the project goal for this effort.

Problem #1: Larger size vessels experience transit delays due to existing width of channel.

Objective 1. Reduce vessel congestion.

Objective 2. Improve the efficiency of operations for containerships, tankers, bulk carriers and general cargo vessels within Mobile Harbor.

Problem #2: Existing channel depths limit vessel cargo capacity.

Objective 1. Accommodate current and anticipated growth in containerized and bulk cargo and vessel traffic.

Objective 2. Allow more efficient use of containerships and bulk carriers.

Problem #3: Existing traffic congestion has increased safety concerns.

Objective 1. Provide navigation improvements for increased vessel safety,

9.2 Constraints

The formulation of alternatives to address the study objective is limited by planning constraints. Constraints are statements of effects that the alternative plans should avoid. Constraints are designed to avoid undesirable changes between without and with-project future conditions. Constraints could include resources, legal, or policy constraints. Constraints which are applicable to this study, are:

a. There must be adequate disposal area capacity
b. Dredge material for ODMDS and open water placement must meet state and federal suitability criteria
c. Avoid or minimize to the extent practicable negative environmental impacts to:
    1. Protected species
    2. Submerged Aquatic Vegetation
    3. Essential Fish Habitat
    4. Existing Natural Resources (marshes, wetlands, and bay bottoms)
    5. Cultural Resources
d. Avoid or minimize to the extent practicable negative impacts to coastal and sediment transport processes
e. Avoid or minimize to the extent practicable shoreline erosion

10.0 Inventory and Forecast

Mobile Bay has been recognized as a nationally significant estuary of the United States since 1995, with the designation as one of 28 National Estuary Programs established by Environmental Protection Agency's (EPA). The Mobile Bay and the Mobile Tensaw river delta supports a diverse set of fish and wildlife habitats including: bogs, bottomland hardwoods, freshwater and hardwood swamps, freshwater wetlands, maritime forests, pine savanna, submerged aquatic vegetation (SAV), tidal and brackish water marshes and oyster reefs. These

habitats are present along the northern, eastern and western shores and upper and lower part of the Bay.

11.0 Key Uncertainties

Following is a list of key uncertainties discussed during the charette and recommended actions to address these uncertainties:

a. Cultural resource surveys on potential dredging and beneficial sites have not been performed.

Potential Impacts: There is the potential for discovery of culturally significant sites throughout the project area since the 1986 re-authorization. Even though Section 106 coordination was conducted at that time, this would not cover any activities outside of the project's authorized dimensions, specifically relating to beneficial use opportunities that will not be identified until later in the study. Any beneficial use activities would require Section 106 coordination.

Uncertainties: Discovery of new historically significant sites and resources may add additional coordination above and beyond what was conducted during the last authorization. These activities could impact the cost, overall schedule, and delay construction.

Planning Decisions: Cultural resources investigations and associated consultations should be addressed early as possible in the study for channel expansion. Begin Section 106 coordination on the beneficial use opportunities once they have been identified. Tolerate risk and proceed.

b. Sediment testing has not been performed on the entirety of the project area. Limited data is available.

Potential Impacts: Because sediment testing is delayed until the Preconstruction, Engineering, and Design Phase, testing results may indicate the presence of contaminants which could result in restricting disposal methods and hopper dredging load sizes being taken to the ODMDS. Such restrictions would result in significant cost and scheduling impacts over what is presented in the GRR and SEIS.

Uncertainties: Estimating costs on new work material disposal when using hopper dredges is based largely upon hopper volume capacity. If sediment testing reveals the presence of contaminants, the hopper load capacities going to the ODMDS could be significantly restricted causing significant uncertainties in disposal costs and project scheduling. This could also limit the type of beneficial use opportunities.

Planning Decisions: The risk has been reduced in the GRR by performing some limited sediment testing during feasibility to provide an indication of sediment suitability.

c. Although significant geotechnical data is available, investigations have not been performed on the entirety of the project area.

Potential Impacts: Assumptions of the soil properties could differ from the properties of the soil actually present within the alignment of the channel alternatives under consideration. A misrepresentation of soil types could affect the disposal area location and estimated production rates during dredging operations. This could result in significant cost and schedule impacts.

Uncertainties: Geotechnical data is available for a large portion of the alignment; however, approximately 25% of the alignment does not have data that extends to a depth below elevation -52.0 feet. The current data that extends below elevation -52.0 feet shows variations in the soil type.

Planning Decision: The risk will be reduced by performing a limited geotechnical investigation of 15 borings, if the TSP requires dredging to an elevation greater than -52.0 feet.

d. Projections of future traffic may not adequately capture fleet.

Potential Impacts: If the actual future fleet is different than the forecasted fleet, the benefits claimed may be higher or lower than projected.

Uncertainties: The world economy affects the commerce growth rates which affects the future vessels calling Mobile Harbor. If the economy grows faster or slower than predicted based on history and trends, the number of vessels predicted to call can be higher or lower. The number and dimensions of vessels calling the harbor affect the benefits of the project. By including data from multiple sources, uncertainty can be reduced by having more recent years of data in which to project commerce and a more representative fleet that is currently calling the harbor. Detailed evaluations of Load Factor Analysis (LFA) have only been undertaken for a few or certain east coast ports and aren't necessarily representative of the entire east coast. Also, the current LFA is for containerships and the potential project benefits for Mobile Harbor extends to vessel utilization for coal carriers and bulk carriers. The data and relationships for the previous load factor efforts is five (5) or more years old. Some data has appeared to exhibit relative stability over the short to interim term such as weight for both carriage and lading for

container movement, other factors such as fleet evolution and the criteria for slot or TEU capacity and nature of utilization have changed considerable and can significantly impact LFA.

Planning Decisions: Include additional sources of data to determine commerce trends to include the most recent year of data available. Develop Load Factor Analysis as it relates to Mobile Harbor in determining vessel utilization at the harbor.

e. The extent of the potential environmental impacts of alternatives including water quality, saltwater intrusion, sediment transport effects, habitat impacts, and potential mitigation needs.

Potential Impacts: The potential impacts include unidentified and/or misidentified environmental effects and mitigation requirements due to the uncertainty associated with the primarily qualitative engineering and environmental approach to evaluate/compare the alternatives. In addition, potential project delivery delays could occur due to increased scrutiny and reduced acceptance by stakeholders and regulating agencies. (Note: Quantitative modeling (hydrodynamics, sediment transport, morphological response, and WQ) will only be utilized to evaluate/compare the future w/o project condition and the plan that maximizes net benefits.)

The Mobile Bay system is not only unique in its composition and behavior, but also in its diverse biological communities and economic and recreational values. Many of the habitats within the estuary and delta system are highly sensitive to changes in circulation patterns, water quality, and/or sedimentation. Salinity gradients, temperature, circulation, and sediment transport patterns within the bay system are in turn driven by several factors including river discharge, tides, wind, and the navigation channel. Changes in the salinity levels of wetlands and SAVs can alter the vegetative composition, soils, and habitat function of the system, as these systems are not typically adapted to increased frequencies or durations of salinity variations. Salinity tolerance for SAV's and wetland vegetation determines the density and distribution of each species. Alterations of the estuarine and riverine salinity regime could result in spatial redistribution or disappearance of certain species subsequently causing impacts to the numerous fish and wildlife resources that utilize them.

Oysters constitute one of the most significant economic fisheries within the Bay with over a million pounds being harvested annually since 1880. Flow modifications that alter salinity values are largely attributed with historic health and productivity of native oyster populations. The ideal salinity range for oysters is 14-28 psu (~14- 28 ppt). Several reports have documented higher salinity and water temperatures increase predation and infectious conditions and decrease spat recruitment.

Uncertainties: Recent USACE studies for navigation channel deepening and/or widening (Savannah Harbor, Charleston Harbor, Jacksonville Harbor) have found a wide range of direct and indirect environmental impacts, mitigation and monitoring requirements, and costs which appear to be highly dependent on the sensitivity of the system and the extent of the proposed project modifications within that system.

For Mobile Bay a physical model was completed in 1974 in support of the General Design Memorandum No. 1., Results of alternative modeling showed no alternatives maintained the status quo of salinity (<0.5 ppt variance) or current directions. Salinity changes averaged between the surface and bottom waters were within a range of -2.6 ppt to +2.6 ppt depending on the alternative. A majority of the salinity variances seem moderate; however, graphs illustrating model result calibrations to prototype data show over and under exaggerations of salinity from 5-10 ppt at several stations.

Subsequent simulations were conducted to determine if proposed modifications of General Design Memo No. 1 would cause significant changes to salinity in areas of shellfish production. They consisted of a numerical model calibrated to prototype data originally collected as part of the 1975 physical model effort. Model results remained unmatched to the measurements taken at several stations at the mouth of the Bay.

A geophysical scale modeling system was successfully applied to the Mobile Bay system in a 2012 Multiagency Regional Sediment Management/Beneficial Use study to look at sediment transport within the bay. Specifically, parallel versions of ADCIRC, STWAVE, MB-CH3D-West and sediment transport module, SEDZLJ were applied. In addition, studies funded by the National Fish and Wildlife Foundation (NFWF) under the Gulf Environmental Benefit Fund to be undertaken by USACE, Mobile District in partnership with ERDC and USGS are applying parallel versions of these same models in addition to the water quality module CE-QUAL-ICM and Delft 3D. This work is using previous modeling studies in the region including studies completed as part of the USACE Mississippi Coastal Improvements Program (MsCIP).

Planning Decision: Modeling to quantify environmental effects of channel modifications will be delayed until after the most favorable plan based on economic evaluations (i.e. plan that maximizes net benefits) and engineering safety is identified. If the environmental impacts from the plan that maximizes net benefits are too significant, additional modeling will be performed to identify a plan that is both environmentally acceptable and economically justifiable. In an effort to reduce cost and schedule, existing models and primarily qualitative engineering and environmental analyses will be used to evaluate/compare alternatives in support of identifying the plan that maximizes net benefits.

f. It is not known if there is adequate disposal capacity in the existing ODMDS for constructing and maintaining the project improvements.

Potential Impacts: Although beneficial options will be explored, it is assumed a significant amount of new work material will be taken to the ODMDS. The Mobile District is in the process of coordinating with EPA regarding the re-designation of the Mobile ODMDS. It is a possibility that the ODMDS may be down-sized thus limiting the disposal capacity.

Uncertainties: EPA has committed to provide a smaller site with intensions of expanding it in the near future. However, the timeframe of the expanded ODMDS is not known. If a larger ODMDS is not provided, ODMDS disposal alternatives may be drastically restricted.

Planning Decisions: For the Mobile Harbor GRR, modeling will be performed to determine if the existing disposal areas, for example the ODMDS, have the capacity to handle the new work dredge material (generated from channel widening and deepening) as well as the anticipated increase in maintenance dredge material that will result from the deepening and widening of the navigation channel. The GRR will use MPFATE to simulate the placement of the dredge material and LTFATE to simulate its subsequent long term erosion, transport, and deposition.

g. Cost of potential beneficial use sites may not be fully known during the GRR.

Potential Impacts: The creation and development of a beneficial use site(s) may present a considerable cost to the initial construction as well as long term maintenance of the project. These costs may have significant impact on the benefits derived from the deepening and widening of the channel. In addition, real estate acquisition, and cultural resource assessments could impact the overall cost of the project.

Uncertainties: The cost of creating beneficial use sites as well as long term maintenance costs of delivering dredge material to the sites. In addition, real estate needs and potential impacts to cultural resources are unknown at this time.

Planning Decision: Tolerate the risk and proceed. The need and development of a beneficial use site(s) will be further refined as the study progresses. Depending on the site(s) selected, it could potentially add real estate, cultural resources assessments, and other costs to the study.

h. Limited ship simulations (i.e. geographic extent and vessels) from previous harbor studies were used in formulation of the initial array of alternative plans.

Potential Impacts: Vessel safety and channel efficiency evaluated during the TSP with ship simulations utilizing refined design vessel(s) could identify channel refinements beyond the initial array of alternatives (e.g. widths and passing lane lengths).

Uncertainties: Recent ship simulations used to evaluate widening the upper bay segment of Mobile Harbor channel for two-way traffic for Post-Panamax containerships (1140- x 140- x 47.5 ft. and 965- x 106- 41.3-ft) determined that two Post-Panamax vessels could pass safely within a channel width of 550 feet over a distance of 5 miles. Using current USACE design guidance the required width for passing the same two Post-Panamax containerships is around 770 feet. Evaluation of channel passing with a Computer Aided Operations Research Facility and mathematical simulations to determine delay costs in 1984 for a 700 x 105 ft. design vessel indicated passing in the lower/middle bay channel could be done safely within 3 miles at a width of 625 feet.

Planning Decision: Build off previous ship simulation studies and apply a two phased approach with reduced simulations during TSP.

i. Timely and appropriate selection of the design vessel(s).

Potential Impacts: Improper selection of the design vessels could invalidate ship simulation and could lead to underestimating or overestimating of proposed project improvements. New vessel classes/types could bring new restrictions that affect other vessel movement and possible delays.

Uncertainties: Changes in vessel classes can result in dramatic differences in cargo capacity such as Panamax vs. Post-Panamax. Vessel handling characteristics change with new vessel classes and improved hull designs.

Planning Decision: Assistance from DDNPCX and Vertical Team should occur to ensure appropriate selection of design vessel(s) during the TSP milestone.

j. The locations and depth of pipeline crossings are not known.

Potential Impacts: Significant cost and schedule delay implications if pipelines or land based channel markers are impacted by project and require relocation.

Uncertainties: Currently, it is unknown if or how many facility or utility relocations will be required in connection with the proposed project.

Planning Decision: During the planning phase, additional research will be performed as to locations and depths of pipelines in relation to potential project footprints.

12.0 Formulating Alternative Plans

Alternative plans are formulated and refined by combining, adapting, and scaling measures to identify specific ways to achieve the planning objectives within the planning constraints. Measures available for consideration can be classified as structural or nonstructural. Basic structural measures identified to be considered for Mobile Harbor include deepening the channel, widening the channel, and deepening the turning basin. Nonstructural measures that could be considered include relocation of navigation aids, use of tugs, lightering, and topping-off offshore; however, after discussions within the PDT it was determined that a nonstructural measures alone would not achieve the planning objectives. The Mobile Harbor GRR will include evaluation of a future "without" project condition and structural measures to modify the Bay and Entrance channels and the turning basin. An array of channel modifications to consider have been identified which include deepening and widening the Bay and Entrance Channels and deepening the turning basin.

12.1 Initial Alternative Plans

a. Deepening – The alternative depths to screen for analysis range from 46 to 55 feet with two additional feet of depth in the entrance channel. Turning basin depth alternatives will correspond to the considered project depth.

b. Widening - The alternative depths to screen for analysis are 500 and 550 feet to allow for two way traffic within the Bay Channel for the full length. Also, widening a portion of the Entrance Channel up to 700 feet with bend easing to allow for 24 hour operations will be considered.

12.2 Evaluation and Comparison of Array of Alternative Plans

Alternative plans are evaluated by applying numerous, rigorous criteria. Per the *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*, four general criteria are considered during alternative plan screening: completeness, effectiveness, efficiency, and acceptability.

Completeness: Completeness is the extent that an alternative provides and accounts for all investments and actions required to ensure the planned output is achieved. These criteria may require that an alternative consider the relationship of the plan to other public and private plans if those plans affect the outcome of the project. Completeness also includes consideration of real estate issues, operations and maintenance (O&M), monitoring, and

sponsorship factors. Adaptive management plans formulated to address project uncertainties also have to be considered.

Effectiveness: Effectiveness is defined as the degree to which the plan will achieve the planning objective. The plan must make a significant contribution to the problem or opportunity being addressed.

Efficiency: The project must be a cost-effective means of addressing the problem or opportunity. The plan outputs cannot be produced more cost-effectively by another institution or agency.

Acceptability: A plan must be acceptable to Federal, state, and local government in terms of applicable laws, regulation, and public policy. The project should have evidence of broad-based public support and be acceptable to the non-Federal cost sharing partner.

There are also specific technical criteria related to engineering, economics, and the environment, which also need to be considered in evaluating alternatives. These are:

Engineering Criteria:

- The plan must represent a sound, acceptable, safe, efficient and reliable engineering solution.

Economic Criteria:

- The plan must contribute benefits to NED.
- Tangible benefits of a plan must exceed economic costs.
- Each separable unit of improvement must provide benefits at least equal to costs.

Environmental Criteria:

- The plan would fully comply with all relevant environmental laws, regulations, policies, and executive orders.
- The plan would represent an appropriate balance between economic benefits and environmental sustainability.
- The plan would be developed in a manner that is consistent with the USACE Environmental Operating Principles (EOPs).

Adverse impacts to the environment would be avoided to the extent practicable. In cases where adverse effects cannot be avoided, mitigation must be provided based on the guidance in ER 1105-2-100, paragraph C-3(d)(1), and Memorandum dated 31 August 2009

Implementation Guidance for Section 2036(a) of WRDA 2007-Mitigation for Fish and Wildlife and Wetland Losses.

12.3 Screening of Initial Alternatives

For the stated evaluation criteria, there would be a significant amount of analysis required to fully evaluate the entire range of deepening and widening alternatives. Based on guidance from the Corps' SMART Planning initiative, the number of alternatives to be analyzed were reduced considering information developed in previous study efforts, a planning Charette held in January 2015, and vertical coordination conducted for approval to conduct the GRR.

The project delivery team determined that the best approach to achieve the project objectives would be to examine the existing condition, three depths, two widths and three lengths of wideners. The deepening alternatives evaluated will range of useable drafts from 47 to 52 feet in the Bay Channel and 49 to 54 feet in the Entrance Channel. Widening measures will be evaluated to include 500 and 550 feet widths in the Bay Channel and up to 700 feet widths within a portion of the Entrance Channel. The economic justification of the length of the widening component will be analyzed for three length increments (e.g. 5, 10, and 15 miles). In addition to these alternatives, bend easing in the Entrance Channel and increased depths of the turning basin to match deepening alternatives will be considered.

Based on historical vessels calling Mobile Harbor, few had design drafts greater than 52 feet. Data from the sponsor showed a significant increase in vessels calling Mobile Harbor with design drafts of 52 feet or less. Therefore, alternatives with depths greater than 53 feet were screened from further analysis (53' was used to account for depth optimization). The depth of 46 feet was also screened from further analysis because the protocol in deep draft navigation projects is typically a minimum of two feet greater than the existing channel depth.

For the depth alternatives, the first analysis will be performed on the existing condition and the 50' depth. Based on the results of that analysis, it will be known whether to then bracket with a 52' depth or to reduce to a depth less than 50' (for example, 48' depth). The fourth and final depth analyzed would provide the necessary information to determine the depth at which the most benefits are derived.

For the widening alternatives, the existing condition width of 400' and channel widths of 500' and 550' in the bay channel will also be evaluated. The 500' width would allow for passing a Panamax and Post-Panamax ship in the channel. The 550' channel width would allow for two Post-Panamax vessels to pass in the channel. These ships were the selected design vessels considered during the previous widening LRR. The results of the ship simulation performed on these two design vessels meeting in the upper channel during the LRR can be found in the

Navigation Study for Mobile Harbor Widening, Mobile, Alabama Data Report dated December 2012. Widening within a portion of the bar channel up to the authorized 700' will be evaluated in addition to bend easing to allow for safe 24 hour operations for ships within the channel. Currently, passage over the bar is limited to daylight only for larger vessels due to the hazards of transiting through the bends in the bar channel.

The three widener lengths are also partially based on the results of the December 2012 Data Report performed during the previous widening LRR. During that study, the pilots felt that a 5 mile widener in the Upper Bay Channel north of Gaillard Island was required for the two design vessels to pass. Due to differing environmental conditions (wind, waves, and flows) conditions between the upper and lower bay, three widener alternatives (e.g. 5, 10, and 15 miles) will be evaluated to bracket the necessary length for safe vessel passing.

12.4 Focused Array of Alternative Plans

a. Deepening – The alternative depths to screen for analysis range from 47 to 53 feet with two additional feet of depth in the entrance channel. Turning basin depth alternatives will correspond to the considered project depth.

b. Widening - The alternative depths to screen for analysis are 500 and 550 feet to allow for two way traffic within the Bay Channel for lengths of 5, 10, and 15 miles. Also, widening a portion of the Entrance Channel up to 700 feet with bend easing to allow for 24 hour operations will be considered.

13.0 Identifying a Tentatively Selected Plan

The Tentatively Selected Plan will be developed through an iterative process that will evaluate the cost, benefit, and impact of alternatives selected for consideration. The alternatives will be those that the PDT has identified as possibly fulfilling the identified needs for modifying the project and satisfying NED goals and complying with applicable laws and regulations. The alternatives will have varying dimension in depth, width, and length. The resulting cost and benefit of the alternatives will be evaluated and the plan that produces the largest net benefit while causing the least environmental impact will be selected as the tentatively selected plan.

The estimated benefits and costs of each alternative will be tabulated and compared to determine which alternative provides the greatest net benefits (estimated benefits less estimated cost). To get to this point, after developing the commodity and fleet forecasts, a Harborsym model will be developed to simulate port operations under existing, future without, and with deepening and widening alternatives to estimate traffic flow changes into and out of the port. Traffic flow changes will be converted into positive or negative cost changes (benefits). These benefits will then be compared to the parametric and historically based costs

to determine if channel modifications are supported. Qualitative engineering and environmental analyses will be used to develop the parametric and historically based costs.

The alternative that produces the greatest net benefits will then be further refined by applying quantitative modeling (hydrodynamics, sediment transport, morphological response, and WQ) to evaluate/compare the future without project condition with the estimated benefits to assess its environmental impacts. If those impacts are deemed to be too significant, additional alternatives will be assessed to determine what reduced project features can provide in regard to environmental impacts. Ultimately, the alternative that produces the largest net benefit while causing the least environmental impact will be selected as the tentatively selected plan.

14.0 Environmental Operating Principles

The general environmental criteria for projects of this nature are identified in Federal environmental statutes, executive orders, planning guidelines, and the Corps Environmental Operating Principles (EOP) originally established in 2002. During the planning studies, care will be taken to preserve and protect significant ecological and cultural resources, and to conserve natural resources. This effort will provide the means to maintain and restore, as applicable, the desirable qualities of the human and natural environment. Alternative plans will be formulated to avoid damaging the environment to the extent practicable and contain measures to minimize or mitigate unavoidable environmental damages.

15.0 Key Social and Environmental Factors

The intent of the environmental component will be to conduct habitat impact assessments using existing historical data and any new information generated from this study. Knowledge of the effects on hydrodynamics, sedimentation, and water quality are key components to predict and provide the basis to conduct accurate habitat impacts assessments. If accurate information is not readily available, effects of changes in salinity, DO, and other nutrients may not be accurately realized and quantification of impacts may result in low confidence values. The intent is to address potential habitat impacts resulting from the actions and provide the means to determine any necessary mitigation requirements.

15.1 Stakeholder Perspectives and Differences

An agency scoping meeting was held December 9, 2015 with the Federal and state support agencies to develop the issues of concern to be considered during the environmental impact analysis process. As required by the NEPA guidelines, a public scoping process was organized and conducted once funding was received to begin the GRR study. The scoping process allowed public input into the development of issues and alternatives to be considered during the NEPA analysis. Minutes compiled from the scoping process will be publically available and used as guidance for the NEPA analyses. Minutes of these meetings will be prepared and used to guide

the environmental studies process. In addition, regular interagency meetings will be conducted to focus on progress updates and discuss and comment on technical outputs. Activities will be undertaken to ensure compatibility to other Federal programs and plans.

15.2 Environmental Compliance

An SEIS will be prepared to meet NEPA requirements. In support of this effort, the USEPA, NMFS, USFWS, ADEM, ADCNR, ASPA, and other appropriate Federal and state agencies will be asked to be cooperating agencies in the NEPA process. Some activities associated with this effort will be able to begin immediately upon receiving funds to initiate the study.

16.0 Sponsor Support

See attached Letter of support from the Alabama State Port Authority.

ALABAMA STATE PORT AUTHORITY

June 12, 2014

Colonel Jon J. Chytka
Commanding Officer
US Army Corps of Engineers, Mobile District
P.O. Box 2288
Mobile, AL 36628-0001

Dear Colonel Chytka:

The Alabama State Port Authority serves as the non-federal sponsor of the Mobile Harbor and plays a key role in planning, design, construction and initial maintenance of federally authorized harbor and navigation improvement projects supporting the twelfth largest seaport in the United States. Currently, the Alabama State Port Authority and the Mobile District's staff are nearing completion of a Limited Reevaluation Report to widen a five mile segment of the Mobile Harbor, as authorized by the Water Resources Development Act of 1986. This vitally important project was identified and pursued to reduce navigation hazards and improve vessel transit efficiency in response to an increase in wide-bodied and Post-Panamax sized traffic in our port. The channel widening improvement project currently includes a preliminary draft Environmental Assessment, as required by the National Environmental Policy Act, an engineering and design program, and the development of construction specifications at an estimated cost of $15 million and a preliminary 4:1 Cost Benefit Ratio.

In response to the Corps' and the Port Authority's collaboration on the Mobile Channel widening improvement program to mitigate critical safety and efficiency challenges today, a very few citizens have called for an expanded and more costly environmental review of the widening project. The Port Authority has considered carefully these requests, and while the state cannot justify beyond regulatory requirement the resources and the significantly higher cost for additional study and potential legal challenges to the proposed 5- mile widening project, the Port Authority does see merit in beginning any necessary studies to expand the scope of improvements to take the Mobile Harbor to its authorized and economically justified widths and depths, which would trigger environmental studies.

The Port Authority also carefully factored market pressures and customer long range needs for improved infrastructure at the Port of Mobile in consideration of this proposed improvement. In recent years maritime industry analysts, shippers, carriers and seaports have grappled with much needed harbor improvements and escalating costs to support the U.S. economy and jobs growth, forecasted increases to U.S. foreign trade, and significant market demands for increased vessel capacity and size. According to the Organization of Economic Cooperation and Development (OECD), the pre-recession U.S. trade to GDP ratio (sum of imports and exports relative to U.S. GDP) topped 28%. Since the recession, the World Bank predicts this

ratio will reach 35% by 2020. The U.S. Maritime Administration reports the total volume of U.S. trade through the nation's seaports will grow from 1.42 billion tons in 2008 to 2.37 billion tons by 2038.

Seaborne trade already accounts for 90% of the global freight movements by volume and 78% of U.S. imports and exports move through the nation's deeper seaports, including the Port of Mobile. Trade growth has already stimulated public and private investments in U.S. manufacturing, more efficient and larger ocean carriage, landside seaport infrastructure and equipment, inland rail and highway capacity and an expanded Panama Canal – all geared toward securing our economic competitiveness through economies of scale that can only be delivered by larger ships.

One key gap in U.S. investment is notably deeper and wider seaport channels and harbors capable of handling these larger ocean going ships. Currently, the Port of Mobile's competitors are pursuing deepening projects to meet shipper requirements, and the passage of the Water Resources Reform and Redevelopment Act of 2014 clearly looks to implement reforms and funding priorities to achieve these much needed investments in the nation's leading seaports.

It is the Port Authority's charter and fiduciary responsibility to provide efficient and cost effective seaport infrastructure for its manufacturing, mining and agribusiness markets. The Port Authority cannot idly delay next steps in deference to cost concerns, while our neighboring seaports pursue deeper and wider channels. For our port's shippers and manufacturers, the reduced competitiveness and jobs losses due to higher transportation fees to reach better equipped seaports well outweigh the costs to pursue authorized and necessary widths and depths at the Port of Mobile.

The Alabama State Port Authority, as the non-federal sponsor to the federal project, is prepared to meet its obligations under law to achieve the necessary improvements, and requests the US Army Corps of Engineers initiate the necessary studies to achieve justified improvements.

Please feel free to work with my staff to move these improvements forward.

Sincerely,

James K. Lyons
Director and Chief Executive Officer

C: Pete Taylor, Deputy District Engineer for Programs & Project Management, USACE, Mobile District
William W. Fuller, Chief of Operations, USACE Mobile District