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CHIEF OF ENGINEERS
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DAEN

SEP 8 2015

SUBJECT: Charleston Harbor Post 45 Navigation Study, Charleston, South Carolina

THE SECRETARY OF THE ARMY

1. I submit for transmission to Congress the final integrated feasibility report and environmental impact statement on navigation improvements for Charleston Harbor, Charleston, South Carolina. It is accompanied by the report of the district and division engineers. This report was prepared under the authority of Section 216 of the Flood Control Act of 1970, Public Law 91-611, 91st Congress, H.R. 19877, December 31, 1970, which authorizes the review of completed projects to recommend modifications to their structures or operation, and for improving the quality of the environment in the overall public interest. Planning, engineering, and design activities for the Charleston Harbor Post 45 Navigation Project will continue under this same authority. Charleston Harbor has strategic national importance for military readiness. It supports Joint Base Charleston, which includes the U.S. Air Force 628th Air Base Wing, Air Mobility Command at Charleston Air Force Base and the U.S. Navy Naval Support Activity, Charleston containing the Naval Weapons Station Charleston and host to over 60 Department of Defense and federal agencies. Joint Base Charleston maintains base property and capital assets spanning three seaports, two civilian-military airfields, 38 miles of rail, and 22 miles of coastline; facilitates movement of critical munitions and military vehicles; and participates in the Global Threat Reduction Initiative. Charleston Harbor is also identified as a critical infrastructure project in the President's "We Can't Wait" Press Release, under Executive Order 13604, March 22, 2012.

2. The reporting officers recommend a project that will contribute to the economic efficiency of commercial navigation. The national economic development (NED) Plan includes a channel project depth of -50 feet Mean Lower Low Water (MLLW) with associated channel widening and turning basins. Based on Fiscal Year (FY) 2015 price levels, a 3.375-percent discount rate, and a 50-year period of analysis, the project first cost of the NED Plan is \$448,700,000, with average annual benefits of \$103,100,000; average annual costs of \$25,700,000; and a benefit-to-cost ratio of 4.0. The non-federal sponsor, the South Carolina Ports Authority (SCPA), subsequently requested a locally preferred plan (LPP) with a project depth of -52 feet MLLW containing associated channel widening and turning basins. The LPP has positive net benefits and is economically justified. In accordance with U.S. Army Corps of Engineers (Corps) policy, the LPP was submitted for consideration to the Assistant Secretary of the Army for Civil Works (ASA(CW)) and approved for consideration as the recommended plan on October 1, 2014. The recommended plan is the LPP and consists of the following navigation improvements (depths do not include overdepth or advance maintenance depths):

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a. Deepen the existing entrance channel from a project depth of -47 feet to -54 feet MLLW over the existing 800-foot bottom width, while reducing the existing stepped 1,000-foot top channel width to 944 feet. The entrance channel will be extended approximately three miles seaward from the existing location to a depth contour of -54-foot MLLW.

b. Deepen the inner harbor from an existing project depth of -45 feet to -52 feet MLLW from the Entrance Channel to the confluence of the Wando and Cooper Rivers, about two miles up the Wando River to the Wando Welch container facility and about three miles up to the Cooper River to the New Navy Base Terminal, and to a project depth of -48 feet MLLW over the five mile reach leading from the New Navy Base Terminal to the North Charleston container facility (over expanded bottom widths from 400 to 1,800 feet).

c. Enlarge the existing turning basins to a 1,800-foot diameter at the Wando Welch and New Navy Base terminals to accommodate Post Panamax Generation 2 and 3 container ships and widen selected reaches including Mt. Pleasant Reach (Cooper River Mile 18), Bennis Reach (Cooper River Mile 21), Horse Reach (Cooper River Mile 22), Hog Island Reach (Cooper River Mile 23), Wando River Lower Reach (1 mile upriver from the Cooper River), Wando River Upper Reach (2 miles upriver from the Cooper River), Drum Island Reach (Cooper River Mile 24), Myers Bend Reach (Cooper River Mile 25), Daniel Island Reach (Cooper River Mile 26), Clouter Creek Reach (Cooper River Mile 28), North Charleston Reach (Cooper River Mile 30), Filbin Creek Reach (Cooper River Mile 31), Port Terminal Reach (Cooper River Mile 32), and Ordnance Reach (Cooper River Mile 32.5).

d. Enlarge the North Charleston Terminal turning basin to a 1,650-foot diameter for Post Panamax Generation 2 container ships.

e. Under the least cost disposal option, about 29 million cubic yards of dredged material would be placed in the modified Ocean Dredged Material Disposal Site (ODMDS); about 2.9 million cubic yards would be placed in Daniel Island Disposal Area; about 900,000 cubic yards would be placed in Clouter Creek Disposal Area; about 2.3 million cubic yards would be placed in Yellow House Creek Disposal Area; about 360,000 cubic yards of rock would be used for artificial reef mitigation; approximately 6.3 million cubic yards of rock for ODMDS berm construction; about 1.9 million cubic yards of rock for reef construction at eight different sites (including two sites required for mitigation) along either side of the entrance channel; and about 240,000 cubic yards of rock would be placed at an existing South Carolina Department of Natural Resources artificial reef site. The total rock placement is anticipated to beneficially create approximately 664 acres of high relief hardbottom habitat in an area that currently contains relatively limited amounts of patchy low-relief habitat. The construction of the hardbottom reefs will create essential fish habitat and result in significant habitat benefits to a variety of offshore resources, and incidental benefits to both recreational and commercial fishing.

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f. An environmental impact statement (EIS) was prepared in accordance with the National Environmental Policy Act. The recommended plan has been determined to be economically justified and environmentally acceptable. The recommended plan includes mitigation consisting of 1) purchase and preservation of up to approximately 665 acres of wetlands to compensate for indirect impacts (salinity increases) to up to approximately 324 acres of freshwater forested and herbaceous wetlands and 2) creation of approximately 33 acres of artificial reef habitat to compensate for direct impacts to approximately 29 acres of existing hardbottom habitat within the entrance channel. Creation of the artificial reef is part of the project's base disposal plan. The land acquired for wetland mitigation would be transferred to the United States Forest Service and managed as a part of the Francis Marion National Forest. The total cost of the LPP's mitigation plan is \$3,030,000. In comparison, the NED Plan would impact about 232 acres of wetlands and require mitigation, consisting of the purchase and preservation of up to an estimated 476 acres at a total mitigation plan cost of \$2,180,000.

g. Based on an analysis of historical operation and maintenance (O&M) activities and the proposed modifications, the recommended plan would increase annual maintenance dredging requirements by about 831,000 cubic yards per year. The existing project footprint would continue to be maintained according to current practice at project depth plus 2 feet of advanced maintenance and 2 feet of allowable overdepth in most channel areas.

h. Environmental monitoring of wetlands, water quality, and hardbottoms will include an estimated 9 years of monitoring, including pre-construction monitoring (1 year), construction-concurrent monitoring (3 years), and post-construction monitoring (5 years) at an estimated cost of \$10,620,000. The project is expected to reduce vessel wake energy by reducing the total number of vessel calls; hence, no shoreline erosion impacts from the project are anticipated. However, in order to address concerns expressed by resource agencies about uncertainty in the ability to predict changes at specific locations and the potential for unanticipated erosion impacts, particularly at Fort Sumter, monitoring will also include a 9-year evaluation of wave, current, and shoreline changes at an estimated cost of \$5,310,000. If post-construction monitoring indicates that additional monitoring or corrective action as part of the federal project is warranted, the Corps could share in the cost of the additional efforts. The project monitoring costs are the same for both the LPP and NED Plan.

i. A Biological Opinion (BiOp) was received from the National Marine Fisheries Service on 22 April 2015 and amended on 11 May 2015. The BiOp covers the following listed species: loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles; North Atlantic right and humpback whales; and Atlantic and shortnose sturgeon. The USACE will adhere to all reasonable and prudent measures and terms and conditions as laid out in the BiOp.

3. Project Cost Breakdown based on FY 2015 (October 2014) prices.

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a. Project First Cost: The estimated project first cost is \$493,300,000, which includes the cost of constructing the General Navigation Features (GNFs) and the value of any lands, easements, rights of way, and relocations (LERR) estimated as follows: \$452,700,000 for channel modifications, \$5,310,000 for monitoring of shoreline erosion, \$10,620,000 for environmental monitoring of wetlands and hardbottom, \$9,110,000 environmental mitigation hardbottoms, \$3,030,000 for environmental mitigation of wetlands and associated real estate administrative costs, \$5,600,000 Planning Engineering and Design (PED), and \$6,930,000 Construction Management. The South Carolina Port Authority is the non-federal cost-sharing sponsor for all features.

b. Estimated Federal and Non-Federal Cost Shares: The estimated federal and non-federal shares of the project first cost are \$224,300,000 and \$269,000,000 respectively, as apportioned in accordance with the cost sharing provisions of Section 101 of WRDA 1986, as amended (33 U.S.C. 2211), as follows:

(1) The cost for the deepening of the GNFs from greater than -45 feet MLLW to -50 feet will be shared at a rate of 50 percent by the government and 50 percent by the non-federal sponsor. Accordingly, the federal and non-federal shares of the estimated costs in this zone are estimated to be \$224,300,000 each; plus

(2) The cost for the deepening of the GNFs from -50 feet MLLW to -52 feet will require the non-federal sponsor to pay the difference between the NED Plan project depth of -50 feet and the sponsor's LPP project depth of -52 feet. Accordingly, the federal and non-federal shares of the estimated costs for the LPP are estimated to be \$224,300,000 and \$269,000,000 respectively.

c. Additional 10 Percent Payment. In addition to the non-federal sponsor's estimated share of the project first cost of constructing the project in the amount of \$269,000,000, pursuant to Section 101(a)(2) of WRDA 1986, as amended (33 U.S.C. 2211(a)(2)), the non-federal sponsor must pay an additional 10% of the costs for NED GNFs of the project, estimated at \$44,870,000 before interest is applied, in cash over a period not to exceed 30 years, with interest. Interest is applied at the time of construction using the applicable interest rate. In general, the value of LERR is credited toward this additional 10 percent payment. However, for this project, the only LERR required are those for fish and wildlife mitigation of the project, and LERR required for mitigation are not credited toward the additional 10 percent payment. Instead, LERR required for mitigation are cost shared as GNF and included in the total cost of construction of the GNF.

d. Operation and Maintenance Costs (O&M). It is estimated that there will be an average annual increase of approximately 831,000 cubic yards (CY) of shoal material to be dredged each year from the new project with an added annual O&M cost of \$3,740,000. O&M costs for the NED depth increment of -50 feet is 100% federal. All O&M costs in excess of -50 feet depth as part of the LPP are a 100% non-federal responsibility. The annual cost attributable to O&M for

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the depth in excess of -50 feet is estimated at \$210,000 with the non-federal sponsor solely responsible for this cost.

e. Associated Costs. Estimated associated federal costs of \$620,000 include navigation aids, a U.S. Coast Guard expense. The modifications to navigation aids also result in a \$50,000 cost annually for increased O&M.

f. Local Service Facilities. The associated costs for local service facilities are approximately \$22,000,000 for upgrading the bulkheads and \$4,970,000 for berths at facilities, which benefit from the deeper channel. These costs are 100% non-federal and are not included in the project first costs of the recommended plan.

g. Authorized Project Cost and Section 902 Calculation. The project first cost, for the purposes of authorization and calculating the maximum cost of the project pursuant to Section 902 of WRDA 1986, as amended, includes estimates for GNF construction costs and the value of LERR. Accordingly, as set forth in paragraph 3.a. above, based on a FY 2015 Price Level (October 2014), the estimated project first cost for these purposes is \$493,300,000 with an estimated federal share of \$224,300,000 and an estimated non-federal share of \$269,000,000.

4. Based on October 2014 (FY 2015) price levels, a 3.375-percent discount rate, and a 50-year period of analysis, the total equivalent average annual costs of the project are estimated to be \$28,000,000. The average annual equivalent benefits are estimated to be \$108,900,000. The average annual net benefits are \$80,900,000. The benefit-to-cost ratio for the recommended plan is 3.9.

5. Risk and uncertainty were evaluated for economic benefits, costs and sea level rise. Economic sensitivities examined the effects of commodity forecasts which had lower growth rates or capped the growth earlier in the period of analysis. In accordance with the Corps' Engineer Regulation on sea level change the study analyzed three sea level rise rates; historic low (baseline), intermediate, and high. The historic low sea level change rate was determined to be 2.94 mm/yr or .00096 feet/yr. The projected rise in sea levels at the end of the 50-year period of analysis for the historic, intermediate, and high rates are 0.57 feet, 1.08 feet, and 2.74 feet, respectively. In general, regional sea level rise (baseline, intermediate, and high) will not affect the function of the project alternatives or the overall safety of the design vessel. There is expected to be a minor impact to non-federal structures or berths that the non-federal sponsor would manage without effects to the project. The majority of salinity changes will occur due to sea level change; with only minor impacts attributable to the project.

6. In accordance with the U.S. Army Corps of Engineers Policy on review of decision documents, all technical, engineering and scientific work underwent a comprehensive review process to ensure technical quality. This included District Quality Control (DQC), Agency

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Technical Review (ATR), Policy and Legal Compliance Review, Cost Engineering Directory of Expertise (DX) Review and Certification, Independent External Peer Review (IEPR), and Model Review and Approval. Overall the reviews resulted in improvements to the technical quality of the report. The IEPR was completed by Battelle Memorial Institute. A total of 18 comments were documented. The IEPR comments identified concerns in the areas of plan formulation, economics, engineering hydraulic analysis, and environmental analyses. The review comments resulted in expanded narratives throughout the report to support the decision-making process and justify the recommended plan. All comments from the above referenced reviews have been addressed and incorporated into the final documents.

7. Washington level review indicates that the plan recommended by the reporting officers is technically sound, environmentally and socially acceptable, and on the basis of congressional directives, economically justified. The plan complies with all essential elements of the 1983 U.S. Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Land Related Resources Implementation Studies. The recommended plan complies with other administration and legislative policies and guidelines. The views of interested parties, including federal, state, and local agencies have been considered.

8. I concur with the findings, conclusions, and recommendations of the reporting officers. Accordingly, I recommend that navigation improvements for Charleston Harbor be authorized in accordance with the reporting officers' recommended plan at an estimated first cost of \$493,300,000 with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost sharing, financing, and other applicable requirements of federal laws and policies, including Section 101 of WRDA 1986, as amended. These requirements included, but are not limited to the following items of local cooperation from the non-federal sponsor:

a. Provide 50 percent of the cost of design and construction of the GNFs attributable to dredging to a depth in excess of -45 feet MLLW but not in excess of -50 feet MLLW, plus 100 percent of such costs attributable to dredging to a depth over -50 feet MLLW.

b. Provide all lands, easements, and rights-of-way, including those necessary for the borrowing of material and placement of dredged or excavated material, and perform or assure performance of all relocations, including utility relocations, all as determined by the government to be necessary for the construction or O&M of the GNFs.

c. Pay with interest, over a period not to exceed 30 years following completion of the period of construction of the GNFs, an additional amount equal to 10 percent of the total cost of construction of the NED GNFs.

d. Provide, operate, and maintain, at no cost to the government, the local service facilities in a manner compatible with the project's authorized purposes and in accordance with

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applicable federal and state laws and regulations and any specific directions prescribed by the government.

e. Provide 100 percent of the cost of O&M that the government determines exceeds the cost of O&M of the NED Plan.

f. Accomplish all removals determined necessary by the federal government other than those removals specifically assigned to the federal government.

g. Give the federal government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-federal sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating and maintaining the GNFs.

h. Hold and save the United States free from all damages arising from the construction or O&M of the project, except for damages due to the fault or negligence of the United States or its contractors.

i. Perform, or ensure performance of, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, and rights-of-way that the government determines to be necessary for the construction or operation and maintenance of the GNFs. However, for lands that the government determines to be subject to the navigation servitude, only the government shall perform such investigation unless the government provides the non-federal sponsor with prior specific written direction, in which case the non-federal sponsor shall perform such investigations in accordance with such written direction.

j. Assume complete financial responsibility, as between the government and the non-federal sponsor, for all necessary cleanup and response costs of any hazardous substances regulated under CERCLA that are located in, on, or under lands, easements, and rights-of-way that the government determines to be necessary for the construction or O&M of the project.

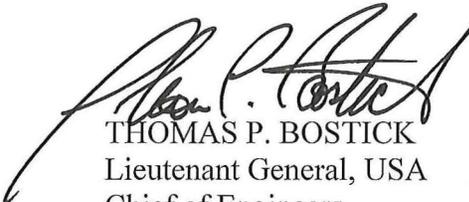
k. Agree, as between the federal government and the non-federal sponsor, that the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability.

l. To the maximum extent practicable, perform its obligations in a manner that will not cause liability to arise under CERCLA.

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9. The recommendation contained herein reflects the information available at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program or the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to the Congress, the state of South Carolina, the South Carolina Port Authority (the non-federal sponsor), interested federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.



THOMAS P. BOSTICK
Lieutenant General, USA
Chief of Engineers