

CORPUS CHRISTI SHIP CHANNEL DEEPENING AND
BARGE SHELVES LIMITED EVALUATION REPORT

COMMUNICATION

FROM

THE ASSISTANT SECRETARY OF THE ARMY,
CIVIL WORKS, THE DEPARTMENT OF DE-
FENSE

TRANSMITTING

THE CORP'S REPORT ON THE CORPUS CHRISTI SHIP CHANNEL
DEEPENING AND BARGE SHELVES



SEPTEMBER 17, 2013.—Referred to the Committee on Transportation and
Infrastructure and ordered to be printed

U.S. GOVERNMENT PRINTING OFFICE



HOUSE DOCUMENT NUMBER 113- ~~61~~

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
CIVIL WORKS
106 ARMY PENTAGON
WASHINGTON DC 20310-0108

AUG -8 2013

Honorable John Boehner
Speaker of the House
of Representatives
U.S. Capitol Building, Room H-232
Washington, D.C. 20515-0001

Dear Mr. Speaker:

The Secretary of the Army recommends increasing the authorized total project cost of the Corpus Christi Ship Channel (CCSC), Texas, Deep-Draft Navigation and Ecosystem Restoration Project. The increase is necessary because the construction cost is projected to exceed the maximum project cost established by Section 902 of the Water Resources Development Act (WRDA) of 1986. The enclosed Limited Re-evaluation Report, dated December 2012, sets forth the cost increase and documents that the project remains economically justified, technically sound and environmentally acceptable.

Section 1001(40) of the Water Resources Development Act (WRDA) of 2007 originally authorized the project at a project first cost of \$188,110,000. The authorized project consists of deepening and widening of the CCSC from -45 feet to -52 feet, mean lower low water (MLLW), construction of Barge Shelves adjacent to the open bay portion of the CCSC, extension of the La Quinta Channel at a depth of 39 feet and construction of two separate ecosystem restoration features. After completion the components would generate measurable savings through reductions in shipping costs. The restoration components would protect and restore productive estuarine habitat. The maximum cost for the authorized project, adjusted for inflation in accordance with Section 902 of the WRDA of 1986, is \$283,544,726 (October 2012 price levels). The revised project first cost exceeds the Section 902 limit.

The revised project first cost is \$344,610,000 (October 2012 prices). The revised cost is the result of increases in costs for construction materials, fuel, labor, as well as design refinements. There are no changes in project location, purpose or scope. The federal share of the project first cost is estimated to be \$169,593,000 and the non-federal share is estimated at \$175,016,000. The federal government would be responsible for the operation, maintenance, repair, replacement and rehabilitation (OMRR&R) of the Barge Shelves after construction, at a cost currently estimated at \$16,000 per year and would also be responsible for the OMRR&R of the La Quinta Extension after construction, at a cost currently estimated at \$1,256,000 per year. The federal government is responsible for 100 percent of the costs of maintaining the main channel to a depth of -45 feet; the added cost of maintaining the channel to depths deeper than -45 feet is shared at the rate of 50 percent by the federal government and

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50 percent by the non-federal sponsor in accordance with Section 101 of WRDA 1986. OMRR&R costs for the main channel are estimated at \$5,705,000 per year. The non-federal sponsor will be responsible for OMRR&R of the ecosystem restoration features of the project after construction, at a cost currently estimated at \$166,260 per year.

The project continues to be economically justified based principally on a reduction in shipping costs and ecosystem restoration benefits. At the October 2012 price level, a 3.75 percent discount rate, and a 50-year period of economic analysis, the estimated total equivalent annual costs for the remaining construction are \$23,693,000 and total equivalent annual benefits are \$52,685,000. Net benefits are estimated at \$28,991,000 and the benefit cost ratio is 2.2 to 1.

There have been no significant changes in the project area or sensitive resources that would result in impacts to resources not previously considered and accounted for in the 2003 Final Environmental Impact Statement. The October 1, 2007 Record of Decision remains applicable to the recommended plan.

The Office of Management and Budget (OMB) advises that there is no objection to the submission of the report to Congress and concludes that the report recommendation is consistent with the policy and programs of the President. OMB also advises that should Congress increase the project authorization for construction, the Corps would need to update and refine its analysis of the benefits and costs before proceeding with the fourth element of the project; and that this element of the project would need to compete as a separable element with other proposed investments in future budgets. A copy of OMB's letter, dated July 31, 2013 is enclosed. I am providing a copy of this transmittal and the OMB letter to the Subcommittee on Water Resources and the Environment of the House Committee on Transportation and Infrastructure, and the Subcommittee on Energy and Water Development of the House Committee on Appropriations. I am also providing an identical letter to the President of the Senate.

Very truly yours,



Jo-Ellen Darcy
Assistant Secretary of the Army
(Civil Works)

Enclosures

Enclosures



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D. C. 20503

July 31, 2013

The Honorable Jo-Ellen Darcy
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, DC 20310-0108

Dear Ms. Darcy:

As required by Executive Order 12322, the Office of Management and Budget has reviewed your report on a December 2012 Army Corps of Engineers (Corps) limited reevaluation report (study) on a project that the Congress authorized in 2007 to deepen, widen, and otherwise improve the Corpus Christi Ship Channel. The report re-estimates the costs and benefits of this project, and recommends on that basis that the Congress increase the authorized level of appropriations for this project to \$381.854 million (October 2012 prices).

According to the study, the authorized project consists of four elements. The Corps has nearly completed two of them; and the third would only cost around \$500 thousand to construct. Therefore, the main purpose of this study was to re-evaluate the fourth element of the project, which primarily involves deepening and widening the main navigation channel at this port.

The report estimates that the benefit-cost ratio (BCR) for this fourth element of the project is 2.2 to 1 at a 3.75 percent discount rate. This is the discount rate for FY 2013 under section 80 of the Water Resources Development Act of 1974. According to the Corps, the equivalent BCR is 1.1 to 1 at a discount rate of seven percent. This is the discount rate that the Administration uses in budgeting to measure the performance of Corps construction projects, like this one, whose primary purpose is to provide an economic return to the Nation.

However, nearly all of the estimated benefits come from transportation cost savings for imports of crude oil (48.6 percent of the benefits) and petroleum products (39.7 percent of the benefits). The report assumes that the levels of these imports will increase steadily on average over 50 years, once the Corps completes this project. By comparison, in the most recent year for which the Corps now has data (2011), imports for these commodities at this port were roughly at the same levels as in the mid-1990s. The study does not provide any basis for its assumption that the port is likely to experience such a steady long-term rate of growth for these imports. While future projections are inherently speculative, the overall historic trend at this port for these imports does not support this key assumption of the study.

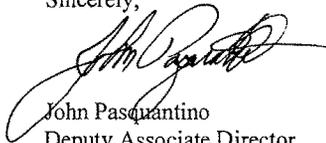
Also, if one were instead to assume that imports of crude oil and petroleum products to this port will remain roughly at their current levels, on average, over the next 50 years, the Corps

estimates that the BCR for the fourth element of the project could be as low as 1.2 to 1 at a discount rate of 3.75 percent, and as low as 0.7 to 1 at a discount rate of seven percent. This estimate of the BCR raises questions about the justification for proceeding with the widening and deepening of the main channel under current conditions. Of course, the actual return could be higher, though lower than the estimate provided by the Corps.

Notwithstanding these concerns, based on the Corps estimate of the benefits and costs, we have concluded that an increase in the authorized level of appropriations for this project would be consistent with the program and policies of the President. The Office of Management and Budget does not object to you submitting this study to the Congress. However, when you do so, please inform the Congress that the Corps should update and refine its analysis of the benefits and the costs in view of the concerns noted above, before proceeding with the fourth element of the project; and that this element of the project would need to compete as a separable element with other proposed investments in future Budgets.

Thank you for your assistance and for the assistance of your staff during our review of this project.

Sincerely,

A handwritten signature in black ink, appearing to read "John Pasquantino", with a long, sweeping flourish extending to the right.

John Pasquantino
Deputy Associate Director
Energy, Science, and Water



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

REPLY TO
ATTENTION OF

FEB 12 2013

CECW-ZB

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project, Limited Reevaluation Report dated November 2012

1. Purpose. Request your review and approval of the Corpus Christi Ship Channel (CCSC), Texas, Deep-Draft Navigation and Ecosystem Restoration Project, Limited Reevaluation Report (LRR) which documents the need to modify the project authorization to increase the authorized cost to \$344,610,000 (enclosure 1).
2. Post Authorization Change. Section 1001(40) of Water Resources Development Act (WRDA) of 2007 originally authorized the project at a total cost of \$188,110,000. The revised estimated total project first cost (without inflation), is \$344,610,000 (October 2012 prices). The revised cost is the result of increases in costs for construction components such as rock and fuel. There are no changes in project location, purpose, or scope. The currently estimated total project cost inflated to the midpoint of scheduled future construction period is \$381,854,000. The maximum cost for the authorized project, adjusted for allowable inflation in accordance with Section 902 of the WRDA of 1986, is \$283,544,726 (October 2012 price levels); the revised total project cost exceeds the Section 902 limit.
3. Background and Discussion.
 - a. The authorized project consists of deepening and widening of the CCSC from 45 feet to 52 feet, construction of Barge Shelves adjacent to the open bay portion of the CCSC, extension of the La Quinta Channel at a depth of 39 feet and construction of two separate ecosystem restoration features. After completion the components will generate significant savings with reductions in shipping costs. The restoration components will protect and restore habitats of national significance.
 - b. A Project Partnership Agreement with the non-federal sponsor, the Port of Corpus Christi, for construction of the LaQuinta Channel Extension and Ecosystem Restoration Features was executed on 13 August 2009. Funds to initiate construction of the La Quinta Extension and Ecosystem Restoration components were appropriated in Fiscal Year (FY) 2009. As of November 2012, project construction was about 50 percent complete. Remaining construction includes deepening and widening of the CCSC and construction of the Barge Shelves.
 - c. At the October 2012 price level, the estimated total project first costs is \$344,610,000. The Cost Engineering Center of Expertise completed a Cost and Schedule Risk Analysis and certified the revised total project cost estimate by memorandum dated 23 August 2012. By

CECW-ZB

SUBJECT: Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project, Limited Reevaluation Report dated November 2012

memorandum dated 16 April 2012, the Chief of Engineers granted an exclusion from the requirements to conduct a Type I Independent External Peer Review.

d. A total economic update was completed for the subject LRR. The project continues to be economically justified based principally on a reduction in shipping costs and ecosystem restoration benefits. At the October 2012 price level, a 3.75 percent discount rate, and a 50-year period of economic analysis, the estimated total equivalent annual costs for the remaining construction are \$23,694,000 and total equivalent annual benefits are \$52,658,000. Net benefits are estimated at \$28,991,000 and the benefit cost ratio is 2.2 to 1.

e. In accordance with the cost sharing provisions of Section 103(a) of the WRDA of 1986, deep-draft navigation is cost shared differently depending on the depth of the modification. Construction of the barge lanes is cost-shared at 90 percent federal and 10 percent non-federal. Construction of the La Quinta Extension is cost-shared on a prorated amount of 79.5 percent federal and 20.5 percent non-federal due to its crossing of cost share boundaries. The widening and deepening of the main channel of the CCSC is cost shared at 50 percent federal and 50 percent non-federal. The construction of the ecosystem restoration features is cost-shared 65 percent federal and 35 percent non-federal, all in accordance with the original project authorization.

f. The federal share of the project first cost is estimated to be \$169,593,000 and the non-federal share is estimated at \$175,017,000. The federal government will be responsible for the operation, maintenance, repair, replacement, and rehabilitation (OMRR&R) of the Barge Shelves after construction, at a cost currently estimated at \$16,000 per year. The federal government will be responsible for the OMRR&R of the La Quinta Extension after construction, at a cost currently estimated at \$1,256,000 per year. The federal government is responsible for 100 percent of the costs of maintaining the main channel to a depth of 45 feet; the added cost of maintaining the channel to depths deeper than 45 feet is shared at the rate of 50 percent by the federal government and 50 percent by the non-federal sponsor. Operations and maintenance costs for the main channel are estimated at \$5,705,000 per year. The non-federal sponsor, will be responsible for OMRR&R of the ecosystem restoration features of the project after construction, at a cost currently estimated at \$166,260 per year.

4. Conclusions. The Galveston District prepared the LRR, dated November 2012, in accordance with ER 1105-2-100, Appendix G, to document the increase in the project cost and recommend an increase in the authorized project cost. Headquarters policy compliance review of the LRR concluded that there are no unresolved policy issues and that the project is technically sound, environmentally acceptable, and economically justified. Documentation of Headquarters review is at enclosure 2.

CECW-ZB

SUBJECT: Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project, Limited Reevaluation Report dated November 2012

5. Recommendation. I recommend that the enclosed LRR be transmitted to Congress as a basis for increasing the authorized project cost of the Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project to \$344,610,000 (October 2012 price levels). Documents necessary to coordinate this recommendation with the Office of Management and Budget will be developed in coordination with your staff and provided under separate cover.

6. Point-of-contact. Any questions on this matter should be directed to Ms. Sandy Gore, Deputy Chief, Southwestern Division Regional Integration Team, 202-761-5237.



STEVEN L. STOCKTON, P.E.
Director of Civil Works

2 Encls

1. Limited Reevaluation Report
2. Documentation of HQ Review



**US Army Corps
of Engineers**
Galveston District

**CORPUS CHRISTI SHIP CHANNEL
DEEPENING AND BARGE SHELVES**

Limited Reevaluation Report

Corpus Christi, Texas



**Corpus Christi Ship Channel Deepening and Barge Shelves
US Army Corps of Engineers
Southwestern Division
November 2012
(Revised December 2012)**

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Figure 1 - Corpus Christi Ship Channel and Ingleside Channel – Years Denote Date of Completion

Figure 2 - General Location of CCSC and Barge Shelf Selected Plan Components

APPENDICES

A – Cost Appendix

B – US Fish and Wildlife Service Endangered Species Coordination

C – National Marine Fisheries Service Endangered Species Coordination

D – Section 902 Analysis and Project Cost Increase Fact Sheet

E – Real Estate Appendix **NOT USED**

F – Acronyms and Abbreviations

**CORPUS CHRISTI SHIP CHANNEL - DEEPENING AND BARGE SHELVES
LIMITED REEVALUATION REPORT**

1.0 INTRODUCTION

1.1 Purpose of Report

The purpose of this reevaluation is to update project costs, economics, and environmental information to insure that the project components remain justified in accordance with the previously authorized feasibility study.

Current guidance requires that if “more than three fiscal years have elapsed since the release of the Report of the Chief of Engineers, an economic reevaluation must be the first item of work upon receipt of any funds intended to further project implementation” (Engineer Regulation (ER) 1105-2-100).

Further, when it appears that the total cost of an authorized project under construction may exceed the project cost limit as determined under Section 902 of the Water Resources Development Act of 1986 (WRDA 86), a report is prepared to obtain additional authority for the estimated cost increase. This report serves that function.

1.2 Authority

Section 1001(40) of WRDA 2007 authorized modifications to the CCSC with the following language:

CORPUS CHRISTI SHIP CHANNEL, CORPUS CHRISTI, TEXAS.—

(A) IN GENERAL.—The project for navigation and ecosystem restoration, Corpus Christi Ship Channel, Texas: Report of the Chief of Engineers dated June 2, 2003, at a total cost of \$188,110,000, with an estimated Federal cost of \$87,810,000 and an estimated non-Federal cost of \$100,300,000

(B) NAVIGATIONAL SERVITUDE.—In carrying out the project under subparagraph (A), the Secretary shall enforce the navigational servitude in the Corpus Christi Ship Channel (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of section 101 of the Water Resources Development Act of 1986 (33 U.S.C. 2211).

1.3 Description of the Existing Project

The Corpus Christi Ship Channel (CCSC) provides deep water access from the Gulf of Mexico to the Port of Corpus Christi (Port), via Aransas Pass, through Redfish Bay and Corpus Christi Bay. Access points include the La Quinta Channel, the Gulf Intracoastal Waterway (GIWW), and the Rincon Canal. The waterway extends from deep water in the Gulf through the Aransas Pass jettied entrance, then westerly 20.75 miles to and including a turning basin at Corpus Christi, then westerly 1.75 miles through Industrial Canal to and including a turning basin at Avery Point, then westerly 0.9 miles to and including the Chemical Turning Basin, then 3.3 miles to and including a turning basin near Tule Lake, then northwesterly 1.8 miles to the Viola Turning Basin. The landlocked portion of the CCSC is referred to as the Inner Harbor. The La Quinta Channel extends off of the CCSC near Ingleside, Texas, and runs parallel to the eastern shoreline of Corpus Christi Bay for 5.5 miles to the La Quinta Channel Turning Basin (Figure 1).

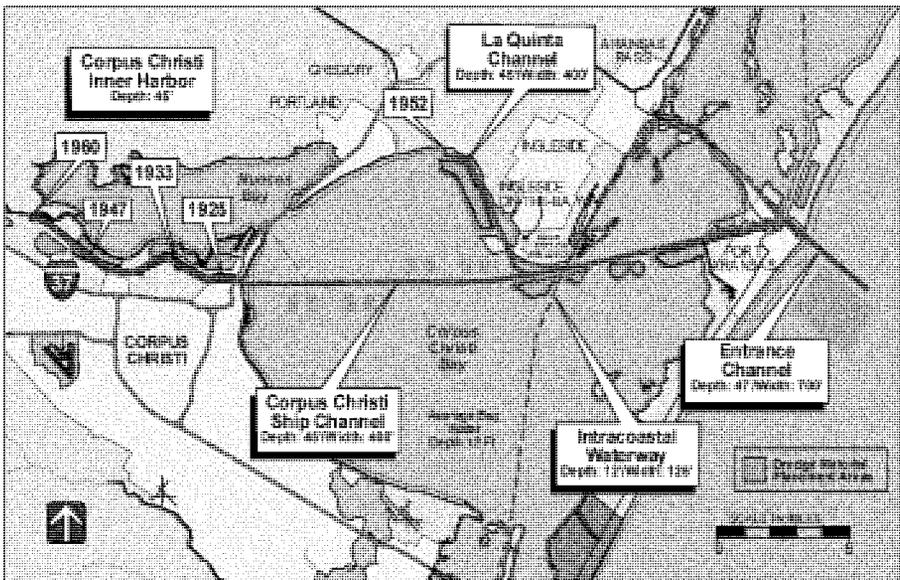


Figure 1 - Corpus Christi Ship Channel & La Quinta Channel – Years Denote Date of Completion

The current depth for both the CCSC and the La Quinta Channel is 45 feet. Project width of the CCSC ranges from 700 feet in the entrance channel to 200 feet at locations in the Inner Harbor. The La Quinta Channel measures 300 to 400 feet wide. Construction of the existing 45-foot project on both the Corpus Christi and La Quinta Channels was completed in 1989.

The size of ships has steadily increased such that vessels have to be light-loaded to traverse the waterway. The current channel depth requires that large crude carriers remain offshore and transfer their cargo into smaller crude tankers for the remainder of the voyage.

1.4 Description of Authorized Project

The Chief of Engineer's Report dated June 2, 2003, recommended a plan to modify the existing projects for Corpus Christi and La Quinta channels and provide ecosystem restoration to areas near the navigation channel. The plan consisted of the following improvements:

- a. Deepen the CCSC from Viola Turning Basin to the end of the jetties in the Gulf of Mexico (approximately 34 miles) to - 52 feet MLT (53-54 feet MLLW); deepen the remainder of the channel into the Gulf of Mexico (approximately 2 miles) to -54 feet MLT (55-foot MLLW); and widen the Upper Bay and Lower Bay reaches (approximately 20 miles) to 530 feet.
- b. Construct barge shelves (channels) 200 foot wide and 12 foot deep MLT (14 feet MLLW) on both sides of the CCSC from its junction with the La Quinta Channel to the entrance of the Inner Harbor (approximately 10 miles).
- c. Extend the La Quinta Channel approximately 1.4 miles beyond its current limit at a depth of -39 feet MLT (40.5 feet MLLW). The channel will measure 400 feet wide and include a second turning basin. The turning basin will be constructed at the end of the proposed channel extension with a diameter of 1,200 feet, to a depth of -39 feet MLT (40.5 feet MLLW). The existing La Quinta Channel will remain at the existing 45 foot depth. The creation of 15 acres of seagrass adjacent to the La Quinta Channel extension will mitigate for project impacts to approximately five acres of seagrass.
- d. Construct two ecosystem restoration features, including rock breakwaters and geotubes to protect 1,200 acres of an existing high quality, complex wetland ecosystem that is comprised of a valuable mix of subtidal habitat, saltmarsh, blue-green algal flats, sandflats and associated uplands. Additionally, the features protect 40 acres of highly productive seagrass. Both components are adjacent to the CCSC in the Lower Bay reach of the channel.

Each of these measures was individually justified and all are considered separable elements. Construction of the La Quinta Channel Extension and the Ecosystem Restoration Features is nearing completion.

The *Corpus Christi Ship Channel, Texas, Channel Improvement Project, Final Feasibility Report and Final Environmental Impact Statement*, dated April 2003 (2003 Feasibility Report) was a comprehensive navigation study investigating the feasibility of improving the CCSC and La Quinta Channel. The project was subsequently authorized by Section 1001(40) of WRDA 07 (Public Law 110-114, 121 Stat 1056). A Limited Reevaluation Report (LRR) was initiated in 2007, but due to funding constraints the reevaluation was restructured to move forward in 2008 with a LRR for just two of the four separable elements, including the La Quinta Channel extension and an ecosystem restoration feature. The extension of the La Quinta Channel was justified via benefits associated with a proposed container terminal. The ecosystem restoration feature will restore and protect 40 acres of seagrass habitat near Ingleside on the Bay, Texas, with the construction of an offshore stone breakwater. The LRR was finalized for these two elements and the document was approved by Southwestern Division (SWD) in February of 2010. The construction of the ecosystem feature is complete and the construction of the La Quinta Channel extension is scheduled to be complete in the summer/fall of 2013. This LRR update includes economic and environmental information for the remaining two separable elements including the CCSC deepening and widening and the construction of barge shelves on a portion of the channel.

Army regulations and U.S. Army Corps of Engineers (USACE) Headquarters guidance on tidal datum, provided in Engineering Technical Letter (ETL) 1110-2-349 *REQUIREMENTS AND PROCEDURES FOR REFERENCING COASTAL NAVIGATION PROJECTS TO MEAN LOWER LOW WATER DATUM*, dated April 1, 1993, and Engineer Manual (EM) 1110-2-1003, April 1, 2002, stress the necessity of converting local datum, such as mean low tide (MLT) to mean lower low water (MLLW). EM 1110-2-1003 further states that MLLW should be tied to the North American Vertical Datum of 1988 (NAVD 88). The predominate reasons for conversion to MLLW is the need for consistency throughout the ports of the U.S., to enhance the continuity of National Oceanic and Atmospheric Administration (NOAA) and U.S. Coast Guard (USCG) navigation charts and to avoid misconceptions within the shipping and dredging industries with regard to channel depths.

Galveston District (District) is in the process of complying with the above referenced guidance on referencing tidal datums using MLLW. Conversion will be completed at a later date in accordance with the District's action plan to convert all projects within the District to MLLW. Vertical survey measurements at tide gauges and benchmarks are currently being used to estimate the relative difference between MLT and MLLW datums along the CCSC. The objective is to maintain an effective water depth for each of the proposed channel modifications while correctly referencing resulting water surface level in MLLW. A very simplified synopsis of the four phases the District will perform to comply with the above reference guidance with estimated cost and estimated duration is as follows:

- Phase 1: Use active and inactive Texas Coastal Ocean Observation Network (TCOON) gages to determine calibration/conversion values between MLLW (approximately \$300,000 and one year).
- Phase 2: Establish new gages if needed to better define the MLT and MLLW relationships in the coastal region (approximately \$1,311,000 and 18 months).
- Phase 3: Install new or reconfigure existing staff gages to reflect MLLW datum (approximately \$300,000-500,000 labor and 18 months scheduled parallel with Phases 1 and 2 to minimize delay in overall conversion).
- Phase 4: Update technical materials and communicate conversion impacts to internal/external stakeholders (no cost/duration cited).

Activities associated with Phases 1 and 2 have been initiated via contract. Because of the data collection requirements, these tasks are scheduled to be completed by 3rd Quarter fiscal year (FY) 13. As the study and its documentation were completed in 2003 using MLT, references to MLT have been maintained throughout this document.

Additional References for consultation during PED may include the following post-2003 guidance pertaining to tidal datum:

1. ER 1110-2-8160, "Policies for Referencing Project Elevation Grades to Nationwide Vertical Datums", dated March 1, 2009;
2. Engineer Circular (EC) 1110-2-6070, "Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects", dated July 1, 2009;
3. EM 1110-1-1005, "Engineering and Design – Control and Topographic Surveying", Appendix B-6. Implementation Actions, dated January 1, 2007; and
4. EM 1110-2-6056, "Standards and Procedures for Referencing Project Evaluation Grades to Nationwide Vertical Datums", dated December 31, 2010.

GENERAL NAVIGATION FEATURES OF THE CCSC DEEPENING SELECTED PLAN

Entrance Channel

The Entrance Channel, shown in Figure 2, is defined as that portion of the CCSC extending from Station 310+00 in the Gulf of Mexico to Station -37+82 in the Inner Basin. It is 700 feet wide and protected on two sides by jetties. The land locked portion of the Entrance Channel would be deepened to 52 feet plus 2 feet of advanced maintenance. This would be modified in the portion of the channel that enters the open waters of the Gulf. This segment will be dredged to a 54-foot authorized depth with two feet of advanced maintenance to insure safe vessel passage in a high

wave energy environment. The existing channel will be extended an additional 10,000 feet into the Gulf in order to reach the 56-foot contour. Minor widening of 100 feet is necessary on the northern side of the channel for approximately 4,000 feet adjacent to San Jose Island based on the results of Engineer Research and Development Center's (ERDC's) Ship Simulation Report. This will improve the turning radius for vessels passing through the entrance channel and making the turn either out to the Gulf or into the Lower Bay portion of the channel.

Lower Bay portion of the CCSC

The Lower Bay portion of the CCSC, shown in Figure 2, extends from Station 12+55 and abuts the Inner Basin to Station 540+00 just west of the La Quinta Junction. This segment will be deepened from 45 feet to 52 feet plus 2 feet of advanced maintenance. Based on the ERDC's Ship Simulation Report, recommendation, the part of the existing channel with 500-foot width will be widened to 530 feet, beginning at Station 35+00 and proceeding westward or upstream. Downstream of this Station, the channel will keep its existing footprint.

A rock breakwater will be used to protect high quality rookery and nesting habitat on Pelican Island. The breakwater will protect the northeastern corner of the island. The Pelican Island site is an island encompassing two placement areas (PAs) that is used by an endangered species, the Brown Pelican, as a nesting site. The armoring protection described for this site was coordinated with the U.S. Fish and Wildlife Service (USFWS) during Section 7 consultation under the Endangered Species Act (ESA).

Upper Bay portion of the CCSC

The Upper Bay segment, shown in Figure 2, is defined as that portion of the CCSC extending from Station 540+00 near the La Quinta junction to Station 1050+00 near the Harbor Bridge. This reach is currently 400 feet wide and 45 feet in depth. This portion of the channel which crosses the open water segment of Corpus Christi Bay is the most physically restrictive in terms of width in addressing the need for ships to meet safely and in a timely manner. This entire stretch will be widened to 530 feet, based on the results of ERDC's Ship Simulation Report. This reach will also be deepened to 52 feet with 2 feet advanced maintenance.

Inner Harbor

Since the Harbor Bridge and Tule Lake Lift Bridge currently prevent two-way traffic in the Inner Harbor portion of the channel, no consideration was given to alternatives that would widen this reach. The Inner Harbor segment, measured from Station 1050+00 to 1561+00, will be deepened to 52 feet plus advanced maintenance (see Figure 2). The channel width will range between 300 and 400 feet. Several minor modifications will be made to the turning basins to insure that they meet USACE navigation requirements. One basin, the Avery Point Basin, will not meet USACE width criteria due to the presence of industry on the shoreline of the channel. In the vicinity of the Tule Lake Lift Bridge, because the bridge may be removed and/or replaced, plan formulation was performed assuming that the channel width in this area will be 400 feet. This width is consistent with the remainder of the Inner Harbor channel segment. Making the channel width consistent in this area, should the bridge be removed, will allow the construction of a channel consistent with

USACE criteria, and will create safer passage through the channel for all ship traffic. Should the bridge remain at the time of project construction, channel width will be limited to 200 feet to insure no impacts to the bridge supports. This 200-foot width is sufficient to allow all expected traffic access beyond the bridge. The continued presence of the bridge will not prevent the realization of benefits described in the economic analysis portion of this document.

GENERAL NAVIGATION FEATURES OF THE BARGE SHELF SELECTED PLAN

To evaluate the need for barge shelves across the bay, ERDC established video monitoring of barge traffic in the area. Because sufficient depths exist across a large portion of the bay adjacent to the channel, barge shelf markers were placed outside of the existing deep-draft channel to aid pilots. The video monitoring of these shelves suggests that the widths currently marked with navigation aids are sufficient for the entire barge shelf. The existing aids to navigation are located approximately 200 feet from the bottom edge of the existing deep-draft channel. Based on information from ERDC's video monitoring, discussion with pilots in the area, the need for minimal dredging, economic benefits, and enhanced safety, the barge shelves are to be dredged to 200 feet in width. As shown in Figure 2, the shelves will be constructed on both sides of the channel, will be located from Station 540+00 to Station 1070+00, and will be dredged to a depth of 12 feet with 2 feet of advanced maintenance.

1.5 Funding Since Authorization

The CCSC began receiving Federal funds in FY 03 for the PED phase and has received funds each year since. These totals are detailed by FY in Table 1.

	PED FY 03-08	FY 2009	FY 2010	FY 2011	FY 2012	TOTAL
OMB Budget	\$0	\$0	\$0	\$0	\$0	\$0
Appropriated	\$1,614,000	\$1,148,000	\$921,000	\$58,477,000	\$0	\$62,160,000
American Recovery & Reinvestment Act	\$0	\$1,500,000	\$751,000		\$0	\$2,251,000
Other Adjustment	(\$3,000)	\$0	\$0		\$0	(\$3,000)
Rescission	(\$5,000)	\$0	\$0	(\$121,206)	\$0	(\$126,206)
Savings & Slippage	(298,000)	\$0	\$0		\$0	(\$298,000)
5% Holdback	\$0	\$0	\$0		\$0	\$0
Allocated	\$1,308,000	\$2,648,000	\$1,672,000	\$58,355,794	\$0	\$63,983,794
Total Reprogramming	\$255,676	\$0	(\$1,324,171)	(\$24,951)	(\$14,987,507)	(\$16,080,953)
Total Allocated	\$1,563,676	\$2,648,000	\$347,829	\$58,330,843	(\$14,987,507)	\$47,902,841
Cumulative Total	\$1,563,676	\$4,211,676	\$4,559,505	\$62,890,348	\$47,902,841	

Table 2 shows the total expenditures (Federal and Local Sponsor funds) for the CCSC beginning with the PED phase which was initiated in FY 2003 as \$23,697,208.

End of FY	Federal Construction Cost	Non-Federal Construction Cost	Yearly Construction Cost	Cumulative Construction Cost
Sep 03-08	\$1,399,894	\$336,980	\$1,736,874	\$1,736,874
Sep 09	\$329,025	\$183,361	\$512,386	\$2,249,260
Sep 10	\$1,549,507	\$240,095	\$1,789,602	\$4,038,862
Sep 11	\$476,975	\$458,351	\$935,326	\$4,974,188
Sep 12	\$14,069,312	\$4,653,045	\$18,722,357	\$23,696,545
Total	\$17,824,713	\$5,871,832	\$23,696,545	

Source: Galveston District Annual Report – Table A worksheet

Although Table 2 only shows 37.2 percent of the allocated Federal funds having been expended as of September 30, 2012, an additional 41.5 percent of the allocated funds were obligated towards ongoing construction contracts with the remaining 21.3 percent scheduled for construction management and contingencies.

2.0 MAIN CORPUS CHRISTI SHIP CHANNEL ECONOMIC ANALYSIS

This section updates the Main (Corpus Christi Ship) Channel economic analysis as summarized in the 2003 Chief of Engineers Report. For this analysis, the 2003-period project costs and benefits for the National Economic Development (NED) depth and width recommendation of 52 feet wide by 530 feet wide plus barge shelves were recalculated based on October 2011 dollars. The updated average annual benefit and cost calculations are based on a 2014-2064 period of analysis, the Federal discount rate of 3.750 percent and Economic Guidance Memorandum (EGM 11-05) deep-draft vessel operating costs as amended by USACE in July 2011.

2.1 Previous Report

The purpose of the 2003 study was to develop and evaluate alternatives for navigation problems that directly affect the CCSC (and La Quinta Channel) within the Corpus Christi Bay system. To allow for a more effective, safe, and efficient waterway, the study focused on eliminating the major problems contributing to inefficiencies on the waterway, such as insufficient depth and width, as determined by fleet forecasts, the requirement for one-way traffic in portions of the channel, and the need for safe barge shelves.

The feasibility study evaluated several alternatives including deepening the main channel from 45 feet to 52 feet, widening the CCSC within the Corpus Christi Bay from 400 and 500 feet to 530 feet and adding two barge shelves, each 200 feet wide, on either side of the ship channel in Corpus Christi Bay. The extension of the La Quinta Channel, a major side channel to the north of Corpus Christi Bay, has been approved based upon the 2009 La Quinta Reevaluation Study and construction is underway. This analysis uses current data and the HarborSym model to update the 2003 estimate of benefits of two alternatives: 1) widening the channel in Corpus Christi Bay from 400 and 500 feet to 530 feet, and deepening the channel from 45 feet to 52 feet, and 2) adding 200 foot barge shelves on both sides of the widened channel. Table 3 summarizes the NED benefits for the period of 2006-2056, as presented in the 2003 report.

Year	Widening & Deepening	Barge Shelves
Base Year	\$17,547,265	\$105,888
2006	\$17,739,217	\$112,906
2016	\$27,011,509	\$124,718
2026	\$36,284,950	\$137,767
2036	\$47,453,572	\$152,180
2046	\$62,243,259	\$168,102
2056	\$81,812,282	\$185,689
2006-56 Equivalent Annual Benefits at 5.785%	\$32,606,649	\$134,598

Table 4 summarizes the NED benefits and costs and benefit-to-cost ratios (BCR) for the main channel and barge shelves as presented in the 2003 report. Later in this report Table 50 presents the comparison of the current economic update with this information.

	CCSC	Barge Shelves
Project Cost	\$110,231,110	\$910,986
Months to Construct	63	7
Interest During Construction	\$18,521,997	\$13,490
Deep-Draft Utility Relocations	\$26,031,294	\$0
Removals	\$1,130,895	\$0
Bulkhead, Berthing Modifications	\$8,677,500	\$0
Interest During Construction for Other & Associated Costs	\$6,023,082	-
Total Other & Associated Costs	\$41,862,771	-
NED Investment Cost	\$170,597,878	\$924,476
Average Annual Cost Including Incremental O&M	\$12,304,973	\$84,614
Annual Benefits	\$32,606,650	\$134,598
Net Excess Benefits	\$20,301,677	\$49,543
B/C Ratio	2.6	1.6

2.2 General

This section outlines the data used in the analysis and provides an overview of current traffic data and updated traffic forecast used in the benefit calculations. Project benefits were calculated based on the difference in transportation costs between the without- and with- project conditions. The without-project condition would retain a 45-foot deep navigation channel with its periodic maintenance dredging program, per the current conditions. Use of the channel by multiple

vessels would be limited because of the current 400-foot width of the Upper Bay portion of the channel. As vessels increase in draft and beam, the restrictive depth and width of the CCSC would prevent some vessels from entering with full loads, or prevent the use of the channel complex altogether by large vessels. The need for lightering and light loading would increase costs and decrease efficient use of vessels wishing to use the port facilities. The with-project condition features a widened ship channel and the addition of barge shelves, as analyzed in the 2003 Feasibility Report and later authorized in 2007. The channel in the Lower Bay will be widened from 500 feet to 530 feet, and the channel in the Upper Bay will be widened from 400 feet to 530 feet. Barge shelves with widths of 200 feet will be added to either side of the channel in the Upper Bay (identified previously in Figure 2).

Data Sources

Several sources of data and information were used for this analysis. Data associated with vessel traffic restrictions were obtained from the Aransas-Corpus Christi Pilots Association. The pilots association also provided additional information, such as how vessel speeds would increase with a deeper and wider channel. The pilots association provided input for determining how the pilot rules would be changed by channel widening. The increase in vessel transit speeds in the harbor and the changes in pilot rules are the basis for estimating the benefits of widening the channel. The Port of Corpus Christi provided detailed vessel call information from the 2007 Harbormaster File. This information was combined with data from the USACE Navigation Data Center's Entrances and Clearances File and the Lloyds-Register Fairplay Sea-web database to obtain arrival drafts and the vessel dimensions needed for the HarborSym model. The vessel dimensions required for HarborSym include length overall (LOA), beam width, design draft, deadweight tons (DWT), immersion ratio, net registered tons, and gross registered tons. These dimensions are important because most of the pilot rules are based upon sailing drafts and vessel size, especially LOA and beam. Sea-web provided the design draft, DWT, and immersion ratio, measured as tons per inch (TPI). DWTs are used to determine a vessel's capacity, and TPI is used by HarborSym to calculate departure drafts. The Corpus Christi Harbormaster data was the only source of arrival times at the harbor entrance and at the destination docks. The Harbormaster data times were used to calibrate the HarborSym model to reflect transit times in the harbor. A similar calibration of HarborSym for vessel departures was not possible as departure times for vessels leaving the harbor were not available. However, there is no reason that transit times for departures should be different than transit times for arrivals, and this data omission is not considered significant.

The 2003 CCSC Feasibility Study was the basis for the current economic update. EGM 11-05 was the source of deep-draft vessel operating costs. Informa Economics' August 12, 2008 shallow-draft operating costs were also utilized as this is the most recently approved shallow-draft

operating costs. The channel and dock measurements were obtained from Navigation Data Center Port and Waterways Facilities files, the USACE Port Series Number 25, and various maps.

Information from IHS Global Insight and the Energy Information Administration (EIA) of the U.S. Department of Energy (DOE) was used to forecast future crude oil and petroleum product flows through the Port. Information from the U.S. Department of Agriculture (USDA) was used to forecast grain exports.

The most recent data year used in this appendix is generally 2010 and is available from the USACE “Waterborne Commerce of the U.S.” publications.

Economic Models Used

An Excel spreadsheet model was utilized for the deepening analysis. The model was developed by the District and by Memorandum dated 11 September 2012, received approval for one-time use solely for the CCSC LRR. Model review was conducted in accordance with EC 1105-2-412, Assuring Quality of Planning Models dated 31 March 2011, and EC 1105-2-407, Planning Models Improvement Program: Model Certification dated 31 May 2005. This model incorporates the EGM 11-05 deep-draft vessel operating cost and utilizes commodity specific worksheets. Using the model, transportation costs calculations are determined for the without- and with-project channel conditions using commodity specific representative vessel classes. One foot of underkeel clearance reflects existing conditions and, therefore, the without- and with-project conditions are based on one-foot underkeel clearance. The discussions of the commodity specific benefit calculations generated using the model are presented within the text of this report.

The HarborSym model, a certified model, was utilized for the widening analysis. The HarborSym model was not used to develop benefits of widening for the 2003 feasibility study. HarborSym performs data driven Monte Carlo simulations of vessel transits through harbors based upon user input. The model quantifies uncertainty based on a user input range of parameters such as speed through a specified reach of the channel, loading and unloading times at docks, and docking and undocking times. The simulations of vessel transits model the interaction of vessels as they move from the harbor entrance to their destination dock and back to the harbor entrance. The harbor entrances, docks, anchorages, and turning basins are “nodes”, and they are connected by channel “reaches”. Together, these features form the node network.

In HarborSym, the simulations are defined by hourly step times. At each step time the model determines if each vessel can move from one node to the next without violating transit rules. If a transit rule would be violated by a vessel entering a reach, such as passing another vessel when the channel width is too narrow, then the vessel waits until the next step time. This waiting continues

until the rule is no longer violated and the vessel resumes its journey. HarborSym records and accumulates the time and cost of vessel waits. Since many variations of events can occur as a vessel transits through the harbor, 50 iterations of the simulation were run to obtain results. These simulation results include total and average vessel time in the harbor, total and average vessel time waiting, and the total operating costs of vessels in the harbor during the simulation period.

2.3 Present Market Conditions

This section presents the current traffic data analysis and the traffic forecast. The primary commodities shipped through the Port of Corpus Christi are crude oil, petroleum products, grain and alumina. Distribution of Corpus Christi's 1990-2010 tonnage is displayed in Table 5.

Table 5
Corpus Christi Ship Channel Total Tonnage and Major Chemical Product Tonnage (1000's of Short Tons)

	Total Tonnage <i>a/</i>	Petroleum & Chemical Coastwise	Crude Petroleum Imports	Petroleum Products		Bulk Grain Exports	Aluminum Imports
				Imports	Exports		
1990	62,020	9,583	16,269	8,112	1,901	728	4,713
1995	70,427	10,824	27,183	7,818	2,042	774	2,932
1996	80,460	9,560	36,737	8,350	3,092	961	3,312
1997	86,844	8,892	41,627	8,388	3,241	1,417	3,591
1998	86,180	10,108	39,886	7,495	2,886	1,404	4,260
1999	78,146	7,243	36,029	7,627	2,699	1,633	3,730
2000	81,315	7,875	35,840	9,652	3,162	1,485	3,840
2001	77,576	7,592	32,226	8,304	3,484	1,707	3,550
2002	72,000	6,309	28,534	8,537	3,602	1,676	3,568
2003	77,225	7,491	32,516	7,679	3,402	1,595	3,578
2004	78,925	7,199	30,140	10,489	3,093	1,763	2,769
2005	77,647	6,210	30,514	8,354	2,815	1,564	4,606
2006	77,557	6,754	30,068	8,656	3,060	1,595	4,369
2007	81,073	7,388	33,519	7,829	4,145	2,784	4,390
2008	76,786	6,561	29,466	7,717	4,098	4,793	4,048
2009	68,240	3,782	27,405	7,577	5,146	2,192	3,346
2010	73,663	3,595	27,970	8,220	6,420	2,707	3,599

Source: U.S. Army Corps of Engineers, *Waterborne Commerce of the U.S., Part 2, 1990–2010*.

a/ Includes commodities in addition to what is shown.

Tables 6-7 display Corpus Christi's 1999-2010 petroleum product imports and exports by product group. The 2003 feasibility study forecast of commodity flows is revised in this analysis based upon data accumulated from 2003 to 2010. The port vessel fleet forecast was also revised based upon the commodity forecast, trends in the composition of the worldwide fleet, and trends in the composition of the fleet calling on the Port of Corpus Christi.

Table 6 Corpus Christi Petroleum Product Imports by Commodity Classification and as a % of U.S. Imports
(1,000s of Short Tons)

Product	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gasoline	0	96	0	10	355	1,266	1,505	1,692	1,502	1,058	1,213	503
Kerosene	142	0	0	0	0	0	0	0	0	0	0	0
Naphtha & Solvents	2,846	1,129	1,156	1,027	962	951	382	383	195	463	165	189
Distillate Fuel Oil	2,487	1,608	1,792	1,891	2,169	4,877	4,848	5,062	4,772	4,710	5,602	7,153
Residual Fuel Oil	1,315	5,024	3,537	3,829	2,271	1,395	1,193	1,363	1,263	1,463	482	337
Lube Oil	835	1,794	1,819	961	1,885	1,816	0	0	0	0	0	0
Petroleum Coke	0	0	0	819	37	183	427	142	95	23	59	38
Total Product	7,625	9,651	8,304	8,537	7,679	10,488	8,355	8,642	7,827	7,717	7,521	8,220
Corpus Christi % of U.S. (Major Commodity Import Groups)												
Gasoline	0%	0%	0%	0%	1%	2%	2%	3%	3%	2%	2%	1%
Distillate Fuel oil	10%	8%	9%	9%	7%	9%	9%	9%	9%	10%	10%	11%
Residual Fuel oil	4%	12%	9%	11%	7%	10%	9%	14%	12%	10%	10%	7%
Total as a % of U.S.	6%	7%	6%	7%	5%	6%	5%	5%	5%	6%	6%	6%

Source: U.S. Army Corps of Engineers, *Waterborne Commerce of the U.S., Parts 2 and 5, 1999–2010.*

Table 7
Corpus Christi Petroleum Product Exports by Commodity Classification and as a % of U.S. Export
(1,000s of Short Tons)

Product	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Gasoline	729	744	1,040	1,026	1,180	1,201	954	1,139	1,475	2,145	3,157	4,200
Kerosene	2	341	228	354	265	10	99	81	143	40	44	109
Distillate Fuel Oil	613	903	834	793	757	519	426	702	932	812	472	1,035
Residual Fuel Oil	276	88	66	58	28	-	-	31	75	-	100	-
Lube Oil & Greases	-	-	6	-	-	-	-	4	-	-	44	-
Naphtha & Solvents	-	74	114	41	18	34	31	9	30	30	116	35
Liquid Natural Gas	-	-	-	-	-	3	-	9	-	-	-	-
Asphalt	71	-	-	-	102	-	16	34	27	14	17	7
Petroleum Coke	1,008	1,012	1,196	1,330	1,052	1,326	1,289	1,051	1,463	1,057	1,196	1,034
Total Product	2,699	3,162	3,484	3,602	3,402	3,093	2,815	3,060	4,145	4,098	5,146	6,420
Corpus Christi % of U.S. (Major Commodity Export Groups)												
Gasoline	19%	12%	15%	15%	18%	11%	10%	11%	12%	12%	13%	16%
Distillate Fuel oil	16%	19%	17%	14%	11%	3%	3%	28%	3%	2%	1%	2%
Residual Fuel oil	3%	0%	0%	0%	0%	0%	0%	0%	1%	0%	1%	0%
Petroleum Coke	6%	4%	5%	5%	4%	4%	4%	3%	5%	3%	4%	3%
Total as a % of U.S.	6%	6%	6%	6%	6%	5%	4%	4%	5%	4%	5%	5%

Source: U.S. Army Corps of Engineers, *Waterborne Commerce of the U.S., Parts 2 and 5, 1999–2010.*

Commodity Forecast

The 2003 Feasibility Report considered four categories of products for the estimation of the net benefits associated with the channel improvement project in the Port of Corpus Christi: the import of crude oil, the import of petroleum products, the export of petroleum products and the export of grains. Navigation Data Center data for 2010 reveals that these are still the principal products shipped at the port. Because the project concerns deep water draft improvements, forecasts are developed only for foreign commodity flows. In 2010, crude oil imports represented 51 percent of all deep-draft cargo with 27 million short tons. Petroleum product imports and exports were the second and third most important category, respectively, with 8.2 million short tons of imports and 6.4 million short tons of exports. Grain exports were fifth with 2.7 million short tons. The fourth largest category was non-ferrous ore and scrap with 3.6 million short tons imported in 2010. Nearly all of the Port's ore and scrap is transported through the Sherwin Alumina Plant on the La Quinta Channel. Since deepening of the La Quinta Channel is not being evaluated as part of the current economic update, a forecast of non-ferrous ore and scrap was not included in the analysis. Containers were also evaluated in the 2009 La Quinta LRR, and will not be included in this report. The new aggregated forecast is presented in Table 8.

Year	Imports		Exports	
	Crude Oil	Petroleum Products	Petroleum Products	Bulk Grains
1998	39,886	7,495	2,886	1,404
1999	36,029	7,627	2,699	1,633
2000	35,840	9,652	3,162	1,488
2006	30,068	8,656	3,060	1,595
2007	33,519	7,829	4,146	2,783
2008	29,466	7,717	4,099	4,793
2009	27,405	7,577	5,146	2,192
2010	27,970	8,220	6,418	2,707
2012	31,090	8,687	6,677	2,973
2020	36,206	10,834	7,824	4,326
2025	42,491	12,439	8,638	5,469
2026	43,485	12,837	8,724	5,551
2030	45,699	14,560	9,078	5,892
2036	52,122	17,589	9,637	6,442
2046	62,203	24,101	10,645	7,476
2056	71,712	33,025	11,759	8,677
2060	75,515	37,459	12,236	9,209
Average Annual Growth Rates				
2000-2026	0.75%	1.10%	3.98%	5.19%
2000-2060	1.25%	2.29%	2.28%	3.08%
2026-2060	1.64%	3.20%	1.00%	1.50%

Crude Oil Imports

Based on the U.S. EIA 2003 Annual Energy Outlook's (AEO) forecast of a 1.5 percent compounded average annual growth rate (CAGR) increase from 2000 to 2025 for U.S. crude oil imports, the 2003 Feasibility Study estimated a 1.7 percent CAGR increase in crude oil imports until 2025 and a 1.0 percent increase afterwards. This would have led the Port to import 42,037 short tons of crude oil in 2006. Actual imports for 2006 were almost 30 percent lower at 30,068 short tons.

Starting in its 2008 AEO, the EIA has revised significantly downward its forecasts for U.S. imports of crude oil. Long-run CAGR for U.S. imports of crude oil were 1.5 percent, 1.3 percent, 1.0 percent, 0.4 percent, -1.5 percent and -0.5 percent respectively for the AEOs in 2003, 2006, 2007, 2008, 2009 and 2010. In the 2010 AEO, the EIA predicts that U.S. production of crude oil in the lower 48 states will increase at a CAGR of 1.2 percent from 2008 to 2035, while foreign imports will decrease by a CAGR of -0.5 percent. Moreover, 54 percent of the additional increase in the consumption of liquid fuels from 2009 to 2036 is predicted to come from renewable sources such as ethanol, because a Federal mandate requires 35 billion gallons to be blended with gasoline by 2017. Among other important factors for their recent change in estimates, the EIA predicted changes for light-duty vehicle efficiency standards and updated projections of investments costs for many categories of capital-intensive energy projects.

In the past, USACE has also relied on global commodity forecasts from Global Insight's publication "*U.S. Energy Outlook*". In its December 2009 reports, Global Insight does not show the decrease in U.S. crude oil imports described in the 2010 AEO of the EIA. While taking into account the most recent policies relevant to energy consumption, Global Insight still forecasts a strong U.S. dependency on foreign oil. In its December 2009 report, Global Insight forecasts net imports of crude oil to reach 11,169 thousands of barrels per day in 2030, a 0.6% compounded annual growth rate from 2008 to 2030.

Corpus Christi's updated 2014-2064 crude oil imports tonnage forecast was prepared using Global Insight's projections and is presented in Table 9. The average annual growth rates range from 0.68 percent to 1.64 percent.

Table 9
Corpus Christi Crude Oil Imports Historic (1998-2008) and Forecast (2012-2060)
(1000s of Short Tons)

Year	U.S. Imports Forecasts			Corpus Christi Imports Forecasts	
	EIA (Annual Energy Outlook)		Global Insight	2003 Feasibility Study	2012 Update
	AEO 2003 ^a	AEO 2010	2009 ^b	Base Case	Base Case
1998	476,638	476,685	471,093	39,886	39,886
1999	477,999	478,047	472,017	36,029	36,029
2000	484,584	498,022	494,361	34,031	35,840
2006	570,286	554,018	553,145	42,037	30,068
2007	586,869	549,266	548,267	51,058	33,519
2008	606,560	537,155	534,606	52,771	29,466
2012	675,482	502,897	516,989		31,090
2016	674,092	488,003	535,560	51,023	33,648
2020					36,206
2025	709,060	473,121	579,385	54,050	42,491
2026	719,939	473,276	586,049	53,093	43,485
2030					45,699
2036			648,250	55,247	52,122
2046				57,488	62,203
2056				59,821	71,712
2060					75,515
Average Annual Growth Rates					
2000-2025	1.5%	-0.2%	0.6%	1.9%	0.68%
2000-2060		-	-	1.0%	1.25%
2026-2060		-	-	0.4%	1.64%

Source: 2003 Feasibility Study, EIA Annual Energy Outlook (AEO) 2003 and 2010, Global Insight 2010

^a Data comes from the 2003 Feasibility Study, Table 2 on page 7 of Appendix G.

^b Net Imports from the U.S. Energy Outlook.

The 2003 Feasibility Report showed Venezuela, Mexico and the Middle East as the primary sources of Corpus Christi crude oil imports. At that time, approximately 35 percent of imports came from Venezuela and the remaining 65 percent was largely divided between Mexico and the Middle East. Table 10 displays Corpus Christi's 2007-2010 crude oil imports by region of origin. Recent imports from the Middle East primarily consist of Saudi Arabia and Kuwait crude.

Region//Country of Origin	2007	2008	2009	2010
Canada	0.4%	0.4%	0.4%	0.1%
Mexico & Central America a/	18.7%	32.9%	41.4%	31.6%
South America & Caribbean b/	38.9%	40.4%	32.5%	33.5%
Europe & Africa & Mediterranean	27.0%	16.6%	15.7%	23.6%
Middle East & Asia	15.0%	9.7%	10.0%	11.2%
Total	100.0%	100.0%	100.0%	100.0%
Short Tons (1,000's)	33,519	29,466	27,405	27,970

a/ Primarily includes Mexico, Belize, and Guatemala

b/ Primarily includes Venezuela and Colombia

Source: U.S. Army Corps of Engineers, Navigation Data Center, Detailed Records, 2007-2010.

In the 2010 AEO, the EIA shows U.S. crude oil imports from Mexico declining significantly and shows relatively flat growth for imports from Venezuela and the Middle East. Table 11 displays the EIA most recent trade route forecast. The main region that the EIA shows growth for is Canada. Other regions of growth include "Other Latin America" and "Other Middle East". Current expectations for Corpus Christi are for imports from the other Latin America locations to increase over the forecast period. Expectations concerning the Middle East are subject to uncertainty. Expectations are for Canadian imports to remain low. The U.S. Gulf Coast market for Canadian crude is characteristically uncertain and small due to relatively high transport costs in comparison to pipeline transmittal to the U.S. Midwest.

Table 11
U.S. Crude Oil Imports Historic (2007-2009) and Forecast (2015-2035)

Source	Millions of Barrels Day						2008 to 2035 CAGR
	2007	2008	2009	2015	2025	2035	
Canada	1.89	1.96	1.96	2.13	2.34	2.60	1.1%
Mexico	1.41	1.19	1.16	1.08	0.90	0.75	-1.7%
North Sea	0.16	0.11	0.09	0.09	0.07	0.06	-2.2%
OPEC Total ¹	5.58	5.41	4.94	4.53	4.14	3.97	-1.1%
<i>Latin America</i>	<i>1.35</i>	<i>1.26</i>	<i>1.22</i>	<i>1.22</i>	<i>1.14</i>	<i>1.09</i>	<i>-0.5%</i>
<i>North Africa</i>	<i>0.53</i>	<i>0.38</i>	<i>0.38</i>	<i>0.36</i>	<i>0.33</i>	<i>0.31</i>	<i>-0.8%</i>
<i>West Africa</i>	<i>1.58</i>	<i>1.43</i>	<i>1.35</i>	<i>1.31</i>	<i>1.12</i>	<i>0.97</i>	<i>-1.4%</i>
<i>Persian Gulf</i>	<i>2.12</i>	<i>2.34</i>	<i>1.99</i>	<i>1.64</i>	<i>1.55</i>	<i>1.60</i>	<i>-1.4%</i>
Other Middle East	0.02	0.13	0.08	0.08	0.09	0.10	-1.9%
Other Latin America	0.41	0.50	0.48	0.58	0.73	0.93	2.0%
Other Africa	0.30	0.29	0.25	0.22	0.19	0.15	-2.8%
Other Asia	0.24	0.21	0.19	0.20	0.16	0.12	-2.8%
Total Crude Oil	10.01	9.80	9.15	8.91	8.62	8.68	-0.4%
U.S. Imports Percentage by Region							
Canada	20%	20%	21%	24%	27%	30%	
Mexico	14%	12%	13%	12%	10%	9%	
South America	18%	18%	18%	20%	22%	23%	
Europe, Africa, & Mediterranean	26%	23%	23%	22%	20%	17%	
Persian Gulf & Asia	24%	27%	25%	22%	21%	21%	
Total	100%	100%	100%	100%	100%	100%	
U.S. Imports Percentage by Region (excluding Canada)							
Mexico	17%	15%	16%	16%	14%	12%	
South America	22%	23%	24%	27%	30%	33%	
Europe, Africa, & Mediterranean	32%	28%	29%	29%	27%	25%	
Persian Gulf & Asia	29%	34%	31%	28%	29%	30%	
Total	100%	100%	100%	100%	100%	100%	

¹The OPEC Total is comprised of the four regions listed: Latin America, North Africa, West Africa, and the Persian Gulf.

Source: Compiled from U.S. Department of Energy, 2010 Annual Energy Outlook, (Table 127: Imported Petroleum by Source).

Note on Refinery Capacity at the Port of Corpus Christi

The Texas Gulf Coast refining capacity is shown in Table 12. The Port refinery capacity represents 15 percent of the Texas Gulf Coast total. According to the 2010 EIA Refinery Capacity Report, the Port experienced a 0.4 percent decrease in distillation capacity since 1999. According to Hydrocarbons Technology, in addition to on-site refineries, there are also pipelines with a capacity of 150,000 barrels per day that link the Port to refineries in Houston, San Antonio, and the Rio Grande Valley.

Port	Annual Growth Rate (1999 to 2009)^a	Total Capacity^b	Percent of Texas Gulf Coast
Corpus Christi	-0.40%	593,468	15%
Houston-Texas City			
Baytown	2.30%	572,500	14%
Deer Park	2.10%	329,800	8%
Houston	0.40%	353,600	9%
Texas City	1.20%	731,290	18%
Sabine Neches			
Beaumont	0.30%	344,500	8%
Port Arthur	3.00%	804,000	20%
Sweeny (Freeport)	2.10%	247,000	6%
Others	0.00%	100,000	2%
Texas Gulf (Total)	1.40%	4,076,158	100%

Source: 2010 EIA Refinery Capacity Report

**Total Operable Capacity of Atmospheric Crude Distillation*

^a Compounded Annual Growth Rate

^b Barrels per Calendar Day

Petroleum Product Imports

Imports of petroleum products at the Port have remained constant since the early 1990s at around seven million short tons annually. Similar to crude oil, the 2003 Feasibility Report based its forecast on very high positive growth rates of the EIA AEO 2003. Since then, the CAGR for U.S. imports of petroleum products has fallen steadily. The CAGR was at 4.0 percent, 2.2 percent, 1.5 percent, -1.1 percent, -0.8 percent and -2.5 percent respectively for the AEOs in 2003, 2006, 2007, 2008, 2009 and 2010.

In the 2003 Feasibility Report, it was shown that imports of petroleum products at the Port are not positively correlated with the U.S. imports, as shown in Table 13, but rather, these imports are positively and significantly associated with the U.S. gross domestic product (GDP). U.S. GDP is now forecasted by the 2010 AEO of the EIA to increase at a CAGR of 1.9 percent from 2010 to 2056 instead of 2.9 percent in the 2003 AEO. A strong positive growth rate is still expected for petroleum products imported into the Port, in part for the reason explained below.

The main refined petroleum product imported at the Port is distillate fuel oil. Distillate fuel oil includes diesel and Number 2 Fuel which are expected to be increasingly used by auto manufacturers as they will seek to achieve the Energy Independence and Security Act of 2007 vehicle efficiency standards. Both the EIA and Global Insight forecast robust U.S. import growth for distillate fuel oil. Distillate fuel oil has represented more than half the total imports of petroleum products at the Port since 2005, compared to almost zero before 2000. In fact, the Port appears to be importing less residual fuel oils and more distillate fuel oil. According to the U.S. Energy Outlook (Global Insight), residual fuel oil which contains relatively high amounts of pollutants, is expected to be used less in the U.S. due to further emissions restrictions and the expected increase in the use of natural gas. As such, the Port seems to have positioned itself in the right markets regarding the import of petroleum products.

Table 13
Corpus Christi Petroleum Product Imports
Historic (1998-2008) and Forecast (2012-2060)
1,000s of Short Tons

Year	U.S. GDP ^a		U.S. Imports		Corpus Christi Imports	
	EIA (Annual Energy Outlook)		EIA (Annual Energy Outlook)		2003 Feasibility Study	2012 Update
	AEO 2003 ^b	AEO 2010	AEO 2003 ^b	AEO 2010	Base Case	Base Case
1998	8,509	8,509	109,760	109,739	7,495	7,495
1999	8,859	8,859	116,340	116,278	7,627	7,627
2000	9,191	9,191	131,160	131,272	9,702	9,652
2006	10,665	9,567	141,651	196,697	12,975	8,656
2007	10,977	9,761	148,994	188,371	13,261	7,829
2008	11,298	9,886	162,149	172,117	13,543	7,717
2012		10,527		158,568		8,687
2016	14,702	11,676	189,573	156,206	19,472	9,701
2020		13,043		157,187		10,834
2025	18,917	14,864	229,405	158,444	26,614	12,439
2026	19,447	15,265	231,111	157,961	27,596	12,837
2030		16,835		156,190		14,560
2036					39,124	17,589
2046					54,429	24,101
2056					74,720	33,025
2060						37,459
Average Annual Growth Rates						
2000-2025	2.9%	1.9%	2.3%	0.8%	4.1%	1.0%
2000-2060	-	-	-	-	3.7%	2.3%
2026-2060	-	-	-	-	3.4%	3.2%

Source: USACE 2003, EIA Annual Energy Outlook, 2009, 2010

^a In billions of 1996 dollars

^b Data comes from the 2003 Feasibility Report, Table 6, Page 12 of Appendix G.

Petroleum Product Exports

The forecast of exports of petroleum products from the Port is the only category for which there are no major changes since the 2003 Feasibility Report. In the 2010 AEO, the EIA still forecasts a positive trend for U.S. petroleum product exports. The historic and forecasted petroleum product export data is shown in Table 14. Petroleum product exports at the Port have increased over time and are expected to gradually increase in the future.

Year	U.S. Imports		Corpus Christi Exports Forecasts	
	EIA (Annual Energy Outlook)		2003 Feasibility Study	2012 Update
	AEO 2003	AEO 2010	Base Case	Base Case
1998	45,659	45,744	2,815	2,886
1999	44,960	45,043	2,699	2,699
2000	54,307	54,408	3,112	3,162
2006	50,869	70,805	2,860	3,060
2007	51,084	77,008	2,878	4,146
2008	51,300	97,437	2,894	4,009
2012	56,827	88,728	3,286	6,677
2016	60,341	97,912	3,537	7,228
2020				7,824
2026	60,790	98,432	3,569	8,724
2030				9,078
2036			3,876	9,637
2046			4,210	10,645
2056			4,573	11,759
2060				12,236
Average Annual Growth Rates				
2000-2025	0.4%	2.4%	0.5%	4.1%
2000-2060		-	0.7%	2.3%
2026-2060		-	0.8%	1.0%

Source: USACE 2003, EIA Annual Energy Outlook, 2010.

Bulk Grain Exports

In 2008, grain exports at the Port reached more than four million short tons for the first time since the late 1970s, but then again fell to more than two million short tons in 2009. The increase can be attributed to a sharp increase in sorghum exports, which jumped from around 500,000 short tons annually between 2004 and 2006 to two million short tons in 2008. Since 2007, the Port has represented close to one third of total U.S. sorghum exports, up from approximately 10 percent in the prior years. Corpus Christi comprises less than 10 percent of total U.S. wheat exports, and corn exports at the Port are negligible.

In the 2003 Feasibility Report, the USDA's CAGR forecasts for U.S. exports of sorghum, wheat, and corn were 1.7 percent, 1.7 percent and 2.0 percent respectively from 2000 to 2012. The USDA's 2010 export forecasts suggest that only sorghum and corn will experience significant

growth rates, with CAGRs of 4.8 percent and 2.3 percent respectively until 2020. Wheat exports are forecasted to experience no growth in the next decade. The historic and forecasted grain export data is shown in Table 15, which assumes that the Port export forecasts will follow U.S. grain exports forecasts. Grain exports are expected to initially grow at the U.S. sorghum export forecast and then expected to grow at the U.S. bulk grain exports CAGR.

Year	2003 Feasibility Study	2012 Update
	Base Case	Base Case ^a
1998	1,404	1,404
1999	1,633	1,633
2000	1,484	1,488
2006	1,190	1,595
2007	1,232	2,783
2008	1,260	4,793
2012	1,678	2,973
2016	1,748	3,586
2020		4,326
2026	2,023	5,551
2030		5,892
2036	2,500	6,442
2046	3,514	7,476
2056	3,653	8,677
2060		9,209
Average Annual Growth Rates		
2000-2026	3.5%	5.2%
2000-2060	2.3%	3.1%
2026-2060	2.0%	1.5%

^a Bulk grain's exports are initially expected to grow at the U.S.D.A. sorghum export forecast of 4.8%, while corn and wheat export volumes remain constant. The forecast is then expected to grow at the USDA's U.S. export of bulk grain (wheat, sorghum and corn) CAGR of 1.5%.

Deep-Draft Vessel Fleet

Many deep-draft vessels use the processes of lightering and lightening to import liquid bulk commodities. These practices allow large vessels to carry fuller loads on their transoceanic journeys than the depth of the intended harbor will allow. Lightering consists of the large transoceanic vessel unloading its entire load to smaller, deep-draft vessels at an offshore location, which then shuttle it into the port. Lightening consists of the large vessel unloading just enough of its commodity to other vessels so that its draft is low enough to be able to enter the harbor itself. However, due to data limitations, the exact number of lightened or lightered vessel calls is uncertain.

In 2007, the Port had 1,447 deep-draft vessel calls. These were primarily tankers carrying crude oil and petroleum products, but also included bulk ships, general cargo ships, heavy-load carriers, and other vessels, including naval vessels. They ranged in size from vessels with less than 4,000 DWT to vessels with over 160,000 DWT. Overall, general cargo ships were the smallest vessels and crude oil tankers were the largest. The number of 2007 vessel calls by vessel type and size is listed in Table 16.

Vessel Type	≤25,000	25,001 - 50,000	50,001 - 75,000	75,001 - 100,000	100,001 - 125,000	125,001 - 150,000	>150,000	Total
Crude Oil Tanker	1	43	42	150	220	19	30	505
Chemical/Product Tanker	144	262	96	4	34	1	1	542
Bulk Carrier	11	142	112	11	0	0	0	276
General Cargo	88	11	0	0	0	0	0	99
Heavy Load Carrier	1	6	2	0	0	0	0	9
Other	15	1	0	0	0	0	0	16
Total	260	465	252	165	254	20	31	1,447

The 2007 vessel call list included the 1,447 harbor entrances along with 157 intra-harbor movements. The intra-harbor movements include vessels that initially berth at one dock, and then move to another before leaving the harbor. There are several reasons that vessels would do this. Some vessels unload some of their cargo at one dock, and the rest at another dock. Other vessels unload cargo at one dock, and move to another dock to load another type of cargo. Additionally, some vessels may just be waiting for dock space availability at their intended dock, although this is not captured in HarborSym. Within each vessel category, vessels were divided into classes based on their DWT size. The hourly vessel operating cost was determined by vessel class based on the USACE EGM 08-04. These vessel operating costs were input into HarborSym, which uses the operating costs to determine the total vessel operating cost for the simulation. The difference in total vessel operating costs under the with- and without-project conditions are the monetary benefits of the project. The number of 2007 vessel calls by vessel class and the foreign-owned hourly vessel operating costs are shown in Table 17.

Table 17
2007 Corpus Christi Deep-Draft Vessel Calls by Vessel Type and DWT

Vessel Type and Class	DWT Range		Foreign Vessel Hourly Operating Cost		2007 Calls
	Min	Max	At-sea	In-port	
Bulk 1	10,000	25,000	\$634	\$310	11
Bulk 2	25,001	35,000	\$754	\$394	73
Bulk 3	35,001	50,000	\$828	\$444	69
Bulk 4	50,001	65,000	\$959	\$528	76
Bulk 5	65,001	80,000	\$ 1,054	\$576	47
TOTAL BULK CARRIERS					276
Crude Oil 1	6,000	30,000	\$777	\$441	1
Crude Oil 2	30,001	50,000	\$955	\$565	43
Crude Oil 3	50,001	70,000	\$1,107	\$675	22
Crude Oil 4	70,001	100,000	\$1,259	\$768	170
Crude Oil 5	100,001	130,000	\$1,387	\$837	220
Crude Oil 6	130,001	165,000	\$1,595	\$950	49
TOTAL CRUDE TANKERS					505
Petrochem Tanker 1	3,000	20,000	\$777	\$441	140
Petrochem Tanker 2	20,001	45,000	\$858	\$498	120
Petrochem Tanker 3	45,001	70,000	\$1,107	\$675	202
Petrochem Tanker 4	70,001	100,000	\$1,259	\$768	44
Petrochem Tanker 5	100,001	130,000	\$1,387	\$837	34
Petrochem Tanker 6	130,001	165,000	\$1,595	\$950	2
TOTAL PETROCHEM TANKERS					542
General Cargo 1	3,000	12,000	\$586	\$314	42
General Cargo 2	12,001	20,000	\$719	\$388	41
General Cargo 3	20,001	45,000	\$1,039	\$601	16
TOTAL GENERAL CARGO					99
Heavy Load Carrier	10,000	60,000	\$828	\$444	9
Other	10,000	35,000	\$719	\$388	16
TOTAL DEEP-DRAFT					1,447

Deep-draft vessels have priority over shallow-draft vessels, so in HarborSym these are referred to as “Protocol” vessels. Although deep-draft vessels have priority, they are sometimes delayed by barge traffic. A common occurrence is for the Harbormaster to approve movement of a barge tow through the harbor, considering that the tow will be out of the harbor before the scheduled departure of a tanker, and for the tow to be delayed by various circumstances and cause a delay to the tanker. These events would be reduced by the channel widening and barge shelves, as tows and tankers could then pass in the harbor channel.

Shallow-Draft Vessel Fleet

The Corpus Christi Harbormaster provided a list of all barges that entered the Port of Corpus Christi in 2007. These barges were separated into two barge types based on the type of commodity that they carried, dry barges and tank barges. Dry barges were assumed to have dimensions of 195 feet by 35 feet by 12 feet and tank barges were assumed to have dimensions of 300 feet by 54 feet by 12 feet. Based on the assumption that most barges are transported as tows consisting of multiple barges and one tugboat, barges were combined into tows consisting of one, two, four, or six barges. Each tow contains only one barge type. The number and size of each type of tow is listed in Table 18.

	Dry Barge		Tank Barge		Total
	Number	Size	Number	Size	
1-barge tow	57	195 x 35	436	300 x 54	493
2-barge tow	92	195 x 70	2,226	300 x 108	2,318
4-barge tow	20	390 x 70	381	600 x 108	401
6-barge tow	12	390 x 105	126	600 x 162	138
Total	181		3,169		3,350

This shallow-draft vessel call list remains constant throughout the period of analysis. In HarborSym, vessel classes were determined by the number of barges in the tow. One- and two-barge tows were combined into the first vessel class, and four- and six- barge tows form the second and third vessel classes, respectively. The hourly vessel costs for each vessel class were taken from the 2009 Information Economics “Shallow-Draft/Inland Vessel Operating Costs” and are listed in Table 19.

Vessel Class	Tank Barge		Dry barge	
	In-transit	In-port	In-transit	In-port
1	\$393	\$279	\$343	\$229
2	\$546	\$380	\$446	\$280
3	\$733	\$514	\$583	\$364

It is important to note that the shallow-draft vessel call list is different from the deep-draft vessel call list because the deep-draft vessel call list is a representation of actual events. The data from the Port of Corpus Christi regarding shallow-draft traffic did not provide clear indications of how the individual barges were grouped into tows. However, several sources indicate that an average tow size of two barges is a reasonable representation of actual traffic.

2.4 Vessel Fleet Forecast – Without-Project

The channel widening will not impact the dimensions or sailing drafts of the vessel fleet calling on Corpus Christi. The channel deepening is expected to result in increased sailing drafts for many of the calling vessels, thereby reducing the number of vessel calls as they are loaded more efficiently. To provide more information regarding the benefits of channel widening, two vessel call lists were created, one for each condition – the with-project vessel call list and the without-project vessel call list. The without-project vessel fleet does not take into account channel deepening, and the with-project vessel fleet does.

Base forecasts of inbound and outbound traffic by vessel type and size were completed for the years 2020, 2030 and 2060. The vessel fleet forecasts have been estimated using the actual vessel call list in 2007 as a reference for all commodities. As shown in the commodity forecast section, trade in 2007 was representative of freight traffic in the Port of Corpus Christi since 2000. The future vessel fleet is forecasted assuming that the 2007 vessel fleet distribution will remain constant for all vessel types.

For all vessel call lists in the without- and with-project conditions, the vessel fleet distribution has been constructed by creating categories of homogeneous vessels. The factors included in creating these categories are: vessel type (tanker, bulk carrier, containership), commodity transported (crude oil, petroleum products, agricultural products), traffic flow (inbound or outbound), vessel sizes (according to the EGM Vessel DWT categories), vessel flag (American or Foreign), vessel arrival draft distribution (as such the observed light loading in tankers and bulk carriers has been assumed to remain constant over the forecasted years), and the number of docks visited during calls.

For all vessels, the increase or decrease in the number of vessels is based on the difference between the quantity of commodity in transit at the Port during the 2007 base year and the quantity of commodity forecasted to be handled at the Port in 2020, 2030 and 2060.

Crude Oil

Crude oil is the single most important commodity being shipped at the Port of Corpus Christi. Based upon 2010 Navigation Data Center data, it represented 51 percent of all deep-draft cargo at the Port with 27 million short tons.

Total crude oil imports to the Port are forecasted to increase throughout the period. Small changes are expected in the different trade routes. While the current forecast from the EIA shows

that more of Corpus Christi's crude oil imports are likely to be coming from the Latin America and Caribbean Zone and the Persian Gulf Zone, it is expected that imports from the Africa and Europe Zone will remain stable.

These changes, however, are not likely to impact the size distribution of the vessel fleet. Crude oil from the Latin America and Caribbean Zone is currently being transported through direct shipment from harbor to harbor via Aframax-size tankers (80,000 to 110,000 DWT). Crude oil from the Persian Gulf Zone tends to be shipped in tankers that are lightered, most often Suezmax vessels with a DWT higher than 110,000 DWT, onto shuttle vessels of smaller size. With lightering, the large tankers do not enter the coastal receiving port. Tankers from the Europe and Africa Zone tend to be either directly shipped or lightered.

The base forecast for 2020, 2030 and 2060 is based upon 2007 vessel fleet size distribution. The distribution of the vessel categories and types observed in the 2007 vessel call list has been kept constant.

Petroleum Products

Petroleum products are the second most important commodity in transit at the Port. Similar to crude oil imports, these imports are also forecasted to increase in the future from 8.2 million short tons in 2010 to 42.5 million short tons in 2064. As with crude oil imports, the 2007 vessel fleet size distribution was used for the fleet forecast. It is harder to find specific forecasts by trade route for petroleum products because of the multitude of products the category is composed of, such as gasoline, jet fuels, distillate oil, residual fuels, and others. Therefore, as with crude oil tankers, the vessel size distribution of petroleum product carriers in 2007 was held constant for both imports and exports. The heterogeneity in the vessel categories and types has been preserved.

Bulk Grain

The Corpus Christi commodity forecast includes increased exports of bulk grain due to the Port's domination of sorghum exports. The distribution of the vessel categories and types observed in the 2007 vessel call list remained constant.

Table 20 presents the number of vessels forecasted to call in at the Port by DWT range for each commodity category and traffic flow in 2020, 2030 and 2060. Table 21 displays the total amount of short tons transported within each vessel size category.

Product	Traffic Flow	DWT Range	Representative Dimensions*			Number of Vessels ^{b/}			
		DWT	Design Draft	LOA	Beam	Actual ^{c/}	Base Forecast		
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060
Agricultural Products	Export	less than 15,001	28.1	480.9	72	2	4	4	7
		15,001 to 25,000	31.9	547.3	81.4	6	12	13	21
		25,001 to 35,000	35.2	599.8	89.6	35	68	78	121
		35,001 to 40,000	36.6	622.6	93.2	17	33	38	59
		40,001 to 50,000	39.3	663.2	99.8	12	23	27	42
		50,001 to 60,000	41.6	698.6	105.8	6	12	13	20
		60,001 to 80,000	45.6	758.7	116	15	29	34	52
	Total				93	181	207	322	
Crude Oil	Import	35,001 to 50,000	38.7	653.6	104.9	1	1	1	1
		50,001 to 60,000							
		60,001 to 70,000	42.6	720.5	118.1	9	9	9	9
		70,001 to 80,000	44.6	749.1	123.8	22	20	22	23
		80,001 to 90,000	46.4	775.2	129	3	3	3	3
		90,001 to 110,000	50	821.9	138.4	294	257	273	327
		110,001 to 150,000	56.4	899.1	154.1	68	60	65	74
		150,001 to 165,000	58.6	924.1	159.2	26	23	25	29
	Total				423	373	398	466	

Source: EGM 08-04. The Port of Corpus Christi includes the CCSC and the La Quinta Channel

^{a/} Tankers for crude oil and petroleum products and bulk carriers for agricultural products.

^{b/} In the 2007 vessel call list, some petroleum product tankers are both importing and exporting.

^{c/} Estimation using NDC Data and Corpus Christi Harbormaster file.

*EGM 08-04 dimensions are based on the value of the upper limit of the DWT size ranges.

One Long Ton = 2,240 lbs; One Short Ton = 2000 lbs; One Metric Ton = 2,204.6 lbs.

Table 20 (continued)									
Port of Corpus Christi Number of Vessels^{a/} Forecast, Without-Project Conditions: 2020, 2030, 2060, by Commodity, Traffic Flow and Representative Vessel									
Product	Traffic Flow	DWT Range	Representative Dimensions*			Number of Vessels^{b/}			
		DWT	Design Draft	LOA	Beam	Actual^{c/}	Base Forecast		
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060
Petroleum Products	Export	less than 20,001	32.3	508.5	77.3	13	8	9	11
		20,001 to 25,000	33.4	538.8	82.9	1	1	1	1
		25,001 to 35,000	35.6	590.6	92.7	21	13	15	18
		35,001 to 50,000	38.7	653.6	104.9	158	98	107	130
		50,001 to 60,000	40.7	688.9	111.8	35	22	24	28
		60,001 to 70,000	42.6	720.5	118.1	5	3	4	4
		70,001 to 80,000	44.6	758.7	116	16	11	12	14
		80,001 to 90,000							
		90,001 to 110,000	50	821.9	138.4	2	1	1	2
		Total					251	157	173
Petroleum Products	Import	less than 20,001	32.3	508.5	77.3	7	13	19	47
		20,001 to 25,000							
		25,001 to 35,000	35.6	590.6	92.7	2	4	5	13
		35,001 to 50,000	38.7	653.6	104.9	46	85	122	304
		50,001 to 60,000	40.7	688.9	111.8	17	32	47	115
		60,001 to 70,000	42.6	720.5	118.1	14	27	39	95
		70,001 to 80,000	44.6	749.1	123.8	44	84	121	298
		80,001 to 90,000	46.4	775.2	129	3	6	8	20
		90,001 to 110,000	50	821.9	138.4	46	88	123	309
		110,001 to 150,000	56.4	899.1	154.1	10	20	28	68
150,001 to 165,000	58.6	924.1	159.2	7	14	20	48		
Total					196	373	532	1,317	

Source: EGM 08-04. The Port of Corpus Christi includes the CCSC and the La Quinta Channel

^{a/} Tankers for crude oil and petroleum products and bulk carriers for agricultural products.

^{b/} In the 2007 vessel call list, some petroleum product tankers are both importing and exporting.

^{c/} Estimation using NDC Data and Corpus Christi Harbormaster file.

*EGM 08-04 dimensions are based on the value of the upper limit of the DWT size ranges.

One Long Ton – 2,240 lbs; One Short Ton – 2000 lbs; One Metric Ton – 2,204.6 lbs.

Table 21
Port of Corpus Christi Commodity Forecast (Short Tons), Without-Project Condition: 2020, 2030, 2060,
by Commodity, Traffic Flow and Representative Vessel

Product	Traffic Flow	DWT Range		Representative Dimensions*			Short Tons			
		DWT	Design Draft	LOA	Beam	Actual	Base Forecast			
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060	
Agricultural Products	Export	less than 15,001	28.1	480.9	72	19,576	38,984	41,585	72,829	
		15,001 to 25,000	31.9	547.3	81.4	109,500	218,065	251,997	407,378	
		25,001 to 35,000	35.2	599.8	89.6	780,904	1,512,033	1,847,775	2,868,257	
		35,001 to 40,000	36.6	622.6	93.2	446,378	862,801	1,059,811	1,646,731	
		40,001 to 50,000	39.3	663.2	99.8	377,062	719,617	901,126	1,402,805	
		50,001 to 60,000	41.6	698.6	105.8	211,628	421,450	486,875	749,529	
		60,001 to 80,000	45.6	758.7	116	838,951	1,615,050	2,019,830	3,091,472	
		Total				2,784,000	5,388,000	6,609,000	10,239,001	
Crude Oil	Import	35,001 to 50,000	38.7	653.6	104.9	6,051	5,719	5,777	5,879	
		50,001 to 60,000								
		60,001 to 70,000	42.6	720.5	118.1	402,823	380,761	384,580	391,413	
		70,001 to 80,000	44.6	749.1	123.8	1,212,851	1,031,876	1,157,922	1,247,111	
		80,001 to 90,000	46.4	775.2	129	245,104	231,680	234,004	238,161	
		90,001 to 110,000	50	821.9	138.4	23,846,772	19,702,744	21,151,564	25,776,406	
		110,001 to 150,000	56.4	899.1	154.1	5,602,958	4,690,957	5,084,863	5,919,251	
		150,001 to 165,000	58.6	924.1	159.2	2,203,440	1,859,262	2,013,291	2,370,778	
		Total				33,520,000	27,903,001	30,032,001	35,948,999	
Petroleum Products	Export	less than 20,001	32.3	508.5	77.3	76,966	67,536	80,249	102,637	
		20,001 to 25,000	33.4	538.8	82.9	2,180	3,179	3,336	3,458	
		25,001 to 35,000	35.6	590.6	92.7	340,406	290,989	362,180	459,203	
		35,001 to 50,000	38.7	653.6	104.9	2,471,493	2,235,683	2,578,917	3,228,169	
		50,001 to 60,000	40.7	688.9	111.8	772,790	722,834	806,620	981,066	
		60,001 to 70,000	42.6	720.5	118.1	56,731	50,943	70,136	72,700	
		70,001 to 80,000	44.6	758.7	116	398,942	392,517	456,291	540,744	
		80,001 to 90,000								
		90,001 to 110,000	50	821.9	138.4	26,492	19,318	20,271	42,024	
				Total				4,146,000	3,783,000	4,378,000
Petroleum Products	Import	less than 20,001	32.3	508.5	77.3	68,331	133,971	196,529	498,521	
		20,001 to 25,000								
		25,001 to 35,000	35.6	590.6	92.7	48,815	103,652	130,315	345,847	
		35,001 to 50,000	38.7	653.6	104.9	1,338,347	2,640,442	3,827,933	9,754,188	
		50,001 to 60,000	40.7	688.9	111.8	541,477	1,098,217	1,598,233	3,992,157	
		60,001 to 70,000	42.6	720.5	118.1	581,875	1,191,529	1,731,021	4,303,832	
		70,001 to 80,000	44.6	749.1	123.8	1,956,749	3,944,989	5,737,348	14,450,871	
		80,001 to 90,000	46.4	775.2	129	151,592	321,883	424,628	1,094,359	
		90,001 to 110,000	50	821.9	138.4	2,229,872	4,518,948	6,378,657	16,331,135	
		110,001 to 150,000	56.4	899.1	154.1	419,081	889,856	1,261,170	3,114,473	
		150,001 to 165,000	58.6	924.1	159.2	492,860	1,046,514	1,477,166	3,656,616	
		Total				7,829,000	15,890,000	22,762,999	57,541,998	

Source: FGM 08-04. The Port of Corpus Christi includes the Corpus Christi Shipping Channel and the La Quinta Channel.

*FGM 08-04 dimensions are based on the value of the upper limit of the DWT size ranges.

One Long Ton = 2,240 lbs; One Short Ton = 2000 lbs; One Metric Ton = 2,204.6 lbs.

2.5 Vessel Fleet Forecast – With-Project

With-project vessel fleet forecasts were created for inbound and outbound traffic for 2020, 2030 and 2060 by vessel type and size category. The improvement project includes deepening the main channel from 45 feet to 52 feet. With the deepening of the channel, vessels with higher sailing drafts will be able to call in at the Port. As such the with-project fleet should contain fewer vessels than the without-project fleet.

The future vessel fleet in the with-project condition was forecasted to carry the same quantity of cargo as in the without-project condition. The 2007 vessel call list was used as a basis to forecast the vessel fleet in 2020, 2030 and 2060.

The number of forecasted vessels with an arrival draft lower than 42 feet is lower in the with-project condition because the total quantity of cargo carried in the with- and without-project conditions are identical. An identical percentage reduction of the number of vessels was applied to all vessels with an arrival draft lower than 42 feet deep.

Table 22 presents the number of vessels forecasted to call in at the Port if the channel is deepened to 52 feet. The vessel fleet is presented by vessel classes and traffic flow in 2020, 2030 and 2060. Table 23 displays the total amount of short tons transported within each vessel size category.

Product	Traffic Flow	DWT Range	Representative Dimensions*			Number of Vessels ^{bv}				
		DWT	Design Draft	LOA	Beam	Actual ^c	Base Forecast			
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060	
Agricultural Products	Export	less than 15,001	28.1	480.9	72	2	4	4	7	
		15,001 to 25,000	31.9	547.3	81.4	6	12	13	21	
		25,001 to 35,000	35.2	599.8	89.6	35	68	78	121	
		35,001 to 40,000	36.6	622.6	93.2	17	33	38	59	
		40,001 to 50,000	39.3	663.2	99.8	12	23	27	42	
		50,001 to 60,000	41.6	698.6	105.8	6	12	13	20	
		60,001 to 80,000	45.6	758.7	116	15	29	34	52	
	Total				93	181	207	322		
Crude Oil	Import	35,001 to 50,000	38.7	653.6	104.9	1	1	1	1	
		50,001 to 60,000								
		60,001 to 70,000	42.6	720.5	118.1	9	9	9	9	
		70,001 to 80,000	44.6	749.1	123.8	22	17	19	19	
		80,001 to 90,000	46.4	775.2	129	3	3	3	3	
		90,001 to 110,000	50	821.9	138.4	294	231	247	296	
		110,001 to 150,000	56.4	899.1	154.1	68	57	60	67	
150,001 to 165,000	58.6	924.1	159.2	26	21	23	26			
	Total				423	339	362	421		
Petroleum Products	Export	less than 20,001	32.3	508.5	77.3	13	8	9	11	
		20,001 to 25,000	33.4	538.8	82.9	1	1	1	1	
		25,001 to 35,000	35.6	590.6	92.7	21	13	15	18	
		35,001 to 50,000	38.7	653.6	104.9	158	97	107	129	
		50,001 to 60,000	40.7	688.9	111.8	35	22	24	28	
		60,001 to 70,000	42.6	720.5	118.1	5	3	4	4	
		70,001 to 80,000	44.6	758.7	116	16	11	12	14	
80,001 to 90,000										
90,001 to 110,000	50	821.9	138.4	2	1	1	2			
	Total				251	156	173	207		
Petroleum Products	Import	less than 20,001	32.3	508.5	77.3	7	11	16	41	
		20,001 to 25,000								
		25,001 to 35,000	35.6	590.6	92.7	2	4	5	13	
		35,001 to 50,000	38.7	653.6	104.9	46	75	106	264	
		50,001 to 60,000	40.7	688.9	111.8	17	30	41	101	
		60,001 to 70,000	42.6	720.5	118.1	14	26	36	88	
		70,001 to 80,000	44.6	749.1	123.8	44	82	115	284	
		80,001 to 90,000	46.4	775.2	129	3	6	8	20	
		90,001 to 110,000	50	821.9	138.4	46	88	123	309	
		110,001 to 150,000	56.4	899.1	154.1	10	20	28	68	
150,001 to 165,000	58.6	924.1	159.2	7	14	20	48			
	Total				196	356	498	1,236		

Source: EGM 08-04. The Port of Corpus Christi includes the Corpus Christi Shipping Channel and the La Quinta Channel.

^{af} Tankers for crude oil and petroleum products and bulk carriers for agricultural products.

^{bv} In the 2007 vessel call list, some petroleum product tankers are both importing and exporting.

^c Estimation using NDC Data and Corpus Christi Harbormaster file.

*EGM 08-04 dimensions are based on the value of the upper limit of the DWT size ranges.

One Long Ton = 2,240 lbs; One Short Ton = 2000 lbs; One Metric Ton = 2,204.6 lbs.

Table 23
Port of Corpus Christi Commodity Forecast (Short Tons), With-Project Condition: 2020, 2030, 2060
by Commodity, Traffic Flow and Representative Vessel

Product	Traffic Flow	DWT Range	Representative Dimensions*			Short Tons			
			DWT	Design Draft	LOA	Beam	Actual	Base Forecast	
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060
Agricultural Products	Export	less than 15,001	28.1	480.9	72	19,576	38,984	41,585	72,829
		15,001 to 25,000	31.9	547.3	81.4	109,500	218,065	251,997	407,378
		25,001 to 35,000	35.2	599.8	89.6	780,904	1,512,033	1,847,775	2,868,257
		35,001 to 40,000	36.6	622.6	93.2	446,378	862,801	1,059,811	1,646,731
		40,001 to 50,000	39.3	663.2	99.8	377,062	719,617	901,126	1,402,805
		50,001 to 60,000	41.6	698.6	105.8	211,628	421,450	486,875	749,529
		60,001 to 80,000	45.6	758.7	116	838,951	1,615,050	2,019,830	3,091,472
		Total				2,784,000	5,388,000	6,609,000	10,239,001
Crude Oil	Import	35,001 to 50,000	38.7	653.6	104.9	6,051	5,778	5,848	5,970
		50,001 to 60,000							
		60,001 to 70,000	42.6	720.5	118.1	402,823	387,813	392,464	400,658
		70,001 to 80,000	44.6	749.1	123.8	1,212,851	916,264	1,048,404	1,070,292
		80,001 to 90,000	46.4	775.2	129	245,104	237,482	240,330	245,348
		90,001 to 110,000	50	821.9	138.4	23,846,772	19,116,574	20,657,342	25,296,281
		110,001 to 150,000	56.4	899.1	154.1	5,602,958	5,207,312	5,494,427	6,362,062
		150,001 to 165,000	58.6	924.1	159.2	2,203,440	2,031,776	2,193,185	2,568,389
		Total			33,520,000	27,903,000	30,032,000	35,948,999	
Petroleum Products	Export	less than 20,001	32.3	508.5	77.3	76,966	67,724	80,027	102,853
		20,001 to 25,000	33.4	538.8	82.9	2,180	3,188	3,326	3,465
		25,001 to 35,000	35.6	590.6	92.7	340,406	291,798	361,177	460,170
		35,001 to 50,000	38.7	653.6	104.9	2,471,493	2,219,757	2,571,772	3,210,899
		50,001 to 60,000	40.7	688.9	111.8	772,790	724,844	804,385	983,132
		60,001 to 70,000	42.6	720.5	118.1	56,731	51,084	69,941	72,853
		70,001 to 80,000	44.6	758.7	116	398,942	405,232	467,156	554,516
		80,001 to 90,000							
		90,001 to 110,000	50	821.9	138.4	26,492	19,372	20,215	42,112
		Total			4,146,000	3,783,000	4,378,000	5,430,000	
Petroleum Products	Import	less than 20,001	32.3	508.5	77.3	68,331	102,728	152,421	400,974
		20,001 to 25,000							
		25,001 to 35,000	35.6	590.6	92.7	48,815	95,299	121,875	322,482
		35,001 to 50,000	38.7	653.6	104.9	1,338,347	2,151,878	3,100,455	7,881,467
		50,001 to 60,000	40.7	688.9	111.8	541,477	962,339	1,349,313	3,377,174
		60,001 to 70,000	42.6	720.5	118.1	581,875	1,055,054	1,494,752	3,718,260
		70,001 to 80,000	44.6	749.1	123.8	1,956,749	3,711,610	5,354,158	13,484,943
		80,001 to 90,000	46.4	775.2	129	151,592	359,047	478,699	1,234,853
		90,001 to 110,000	50	821.9	138.4	2,229,872	5,267,565	7,576,758	19,382,820
		110,001 to 150,000	56.4	899.1	154.1	419,081	974,889	1,406,495	3,461,504
		150,001 to 165,000	58.6	924.1	159.2	492,860	1,209,592	1,728,076	4,277,523
		Total			7,829,000	15,890,000	22,763,001	57,541,999	

Source: EGM 08-04, The Port of Corpus Christi includes the Corpus Christi Shipping Channel and the La Quinta Channel

*EGM 08-04 dimensions are based on the value of the upper limit of the DWT size ranges

One Long Ton = 2,240 lbs; One Short Ton = 2,000 lbs; One Metric Ton = 2,204.6 lbs.

The final deep-draft with- and without-project vessel fleets for 2020, 2030, and 2060, which were used for the HarborSym vessel call lists, are shown in Table 24.

Vessel Class	DWT		2007	Without Project			With Project		
	Min	Max		2020	2030	2060	2020	2030	2060
Bulk Carriers 1	10,000	25,000	11	19	20	31	19	20	31
Bulk Carriers 2	25,001	35,000	73	108	119	162	108	119	162
Bulk Carriers 3	35,001	50,000	69	102	113	153	102	113	153
Bulk Carriers 4	50,001	65,000	76	83	85	96	83	85	96
Bulk Carriers 5	65,001	80,000	47	72	78	97	72	77	97
Total Bulk Carriers			276	384	415	539	384	414	539
Crude Tankers 1	6,000	30,000	1	1	1	1	1	1	1
Crude Tankers 2	30,001	50,000	43	34	42	75	34	42	75
Crude Tankers 3	50,001	70,000	22	31	42	86	30	39	79
Crude Tankers 4	70,001	100,000	170	71	87	165	65	79	152
Crude Tankers 5	100,001	130,000	220	329	368	532	303	341	498
Crude Tankers 6	130,001	165,000	49	47	57	93	45	54	89
Total Crude Tankers			505	513	597	952	478	556	894
Petrochem 1	3,000	20,000	140	20	27	57	18	24	51
Petrochem 2	20,001	45,000	120	105	128	240	98	120	219
Petrochem 3	45,001	70,000	202	111	144	291	105	130	257
Petrochem 4	70,001	100,000	44	73	99	220	71	95	212
Petrochem 5	100,001	130,000	34	58	79	189	58	79	189
Petrochem 6	130,001	165,000	2	3	4	8	3	4	8
Total Petrochem Tankers			542	370	481	1,005	353	452	936
General Cargo 1	3,000	12,000	42	42	42	42	42	42	42
General Cargo 2	12,001	20,000	41	40	40	40	40	40	40
General Cargo 3	20,001	45,000	16	16	16	16	16	16	16
Total General Cargo			99	98	98	98	98	98	98
Heavy Load Carrier	10,000	60,000	9	9	9	9	9	9	9
Other	10,000	35,000	16	16	16	16	16	16	16
Total Heavy Load Carrier & Other			25	25	25	25	25	25	25
TOTAL DEEP-DRAFT			1,447	1,390	1,616	2,719	1,338	1,545	2,492

These vessel fleet forecasts were combined with the vessel fleets that remained constant throughout the period of analysis – bulk carriers carrying commodities other than agricultural commodities, general cargo vessels, heavy load vessels, and “other” vessels.

2.6 Sensitivity Analysis

High and low forecasts of inbound and outbound traffic by vessels type and size were created for the years 2020, 2030 and 2060 to perform a sensitivity analysis. The high and low vessel fleet forecast included tankers importing crude oil, tankers importing and exporting petroleum products, and bulk carriers exporting bulk grain.

Table 25 presents the lower case number of vessels forecasted to call in at the Port in the with-project condition. It is sorted by the DWT range for each commodity category and traffic flow in 2020, 2030 and 2060. Table 26 presents the upper case number of vessels forecasted to call in at the Port in the with-project condition. It is sorted by the DWT range for each commodity category and traffic flow in 2020, 2030 and 2060.

Sensitivity Analysis Assumptions

The sensitivity analysis for the vessel fleet forecast is based entirely on the high and low commodity forecasts.

Product	Traffic Flow	DWT Range	Representative Dimensions*			Number of Vessels ^b			
		DWT	Design Draft	LOA	Beam	Actual ^c		Low Case Forecast	
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060
Agricultural Products	Export	less than 15,001	28.1	480.9	72	2	4	4	4
		15,001 to 25,000	31.9	547.3	81.4	6	12	12	12
		25,001 to 35,000	35.2	599.8	89.6	35	68	68	68
		35,001 to 40,000	36.6	622.6	93.2	17	33	33	33
		40,001 to 50,000	39.3	663.2	99.8	12	23	23	23
		50,001 to 60,000	41.6	698.6	105.8	6	12	12	12
		60,001 to 80,000	45.6	758.7	116	15	29	29	29
	Total				93	181	181	181	
Crude Oil	Import	35,001 to 50,000	38.7	653.6	104.9	1	1	1	1
		50,001 to 60,000							
		60,001 to 70,000	42.6	720.5	118.1	9	9	9	9
		70,001 to 80,000	44.6	749.1	123.8	22	17	17	17
		80,001 to 90,000	46.4	775.2	129	3	3	3	3
		90,001 to 110,000	50	821.9	138.4	294	209	211	211
		110,001 to 150,000	56.4	899.1	154.1	68	51	52	52
		150,001 to 165,000	58.6	924.1	159.2	26	20	20	20
	Total				423	310	313	313	
Petroleum Products	Export	less than 20,001	32.3	508.5	77.3	13	8	8	10
		20,001 to 25,000	33.4	538.8	82.9	1	1	1	1
		25,001 to 35,000	35.6	590.6	92.7	21	12	13	15
		35,001 to 50,000	38.7	653.6	104.9	158	89	97	118
		50,001 to 60,000	40.7	688.9	111.8	35	20	21	26
		60,001 to 70,000	42.6	720.5	118.1	5	3	3	4
		70,001 to 80,000	44.6	758.7	116	16	11	11	13
		80,001 to 90,000							
		90,001 to 110,000	50	821.9	138.4	2	1	1	1
	Total				251	145	155	188	
Petroleum Products	Import	less than 20,001	32.3	508.5	77.3	7	7	11	32
		20,001 to 25,000							
		25,001 to 35,000	35.6	590.6	92.7	2	2	4	11
		35,001 to 50,000	38.7	653.6	104.9	46	44	76	212
		50,001 to 60,000	40.7	688.9	111.8	17	15	30	79
		60,001 to 70,000	42.6	720.5	118.1	14	13	26	68
		70,001 to 80,000	44.6	749.1	123.8	44	44	82	221
		80,001 to 90,000	46.4	775.2	129	3	3	6	16
		90,001 to 110,000	50	821.9	138.4	46	51	88	245
		110,001 to 150,000	56.4	899.1	154.1	10	10	20	52
150,001 to 165,000	58.6	924.1	159.2	7	7	14	36		
	Total				196	196	357	972	

Source: EGM08-04. The Port of Corpus Christi includes the Corpus Christi Shipping Channel and the La Quinta Channel

^a Tankers for crude oil and petroleum products and bulk carriers for agricultural products

^b In the 2007 vessel call list, petroleum products tankers can be importing and exporting at the Port.

^c Estimation using NDC Data and Corpus Christi Harbormaster file.

*EGM08-04 dimensions are based on the value of the upper limit of the DWT size ranges
1 Long Ton – 2,240 lbs; 1 Short Ton – 2000 lbs; 1 Metric Ton – 2,204.6 lbs.

Product	Traffic Flow	DWT Range	Representative Dimensions ^a			Number of Vessels ^b			
		DWT	Design Draft	L.O.A	Beam	Actual ^c	High Case Forecast		
		(long tons)	(feet)	(feet)	(feet)	2007	2020	2030	2060
Agricultural Products	Export	less than 15,001	28.1	480.9	72	2	4	6	17
		15,001 to 25,000	31.9	547.3	81.4	6	13	17	52
		25,001 to 35,000	35.2	599.8	89.6	35	75	100	306
		35,001 to 40,000	36.6	622.6	93.2	17	36	49	149
		40,001 to 50,000	39.3	663.2	99.8	12	26	34	105
		50,001 to 60,000	41.6	698.6	105.8	6	13	17	53
		60,001 to 80,000	45.6	758.7	116	15	32	43	131
	Total				93	199	266	813	
Crude Oil	Import	35,001 to 50,000	38.7	653.6	104.9	1	1	1	1
		50,001 to 60,000							
		60,001 to 70,000	42.6	720.5	118.1	9	9	9	12
		70,001 to 80,000	44.6	749.1	123.8	22	19	19	25
		80,001 to 90,000	46.4	775.2	129	3	3	3	4
		90,001 to 110,000	50	821.9	138.4	294	256	286	385
		110,001 to 150,000	56.4	899.1	154.1	68	62	66	86
150,001 to 165,000	58.6	924.1	159.2	26	24	25	34		
	Total				423	374	409	547	
Petroleum Products	Export	less than 20,001	32.3	508.5	77.3	13	9	10	12
		20,001 to 25,000	33.4	538.8	82.9	1	1	1	1
		25,001 to 35,000	35.6	590.6	92.7	21	15	15	19
		35,001 to 50,000	38.7	653.6	104.9	158	107	116	142
		50,001 to 60,000	40.7	688.9	111.8	35	24	25	33
		60,001 to 70,000	42.6	720.5	118.1	5	4	4	5
		70,001 to 80,000	44.6	758.7	116	16	12	13	15
80,001 to 90,000									
90,001 to 110,000	50	821.9	138.4	2	1	1	2		
	Total				251	173	185	229	
Petroleum Products	Import	less than 20,001	32.3	508.5	77.3	7	16	20	49
		20,001 to 25,000							
		25,001 to 35,000	35.6	590.6	92.7	2	5	7	16
		35,001 to 50,000	38.7	653.6	104.9	46	105	136	324
		50,001 to 60,000	40.7	688.9	111.8	17	41	49	120
		60,001 to 70,000	42.6	720.5	118.1	14	36	42	104
		70,001 to 80,000	44.6	749.1	123.8	44	114	138	338
		80,001 to 90,000	46.4	775.2	129	3	8	10	24
		90,001 to 110,000	50	821.9	138.4	46	120	156	372
110,001 to 150,000	56.4	899.1	154.1	10	28	32	80		
150,001 to 165,000	58.6	924.1	159.2	7	20	22	56		
	Total				196	477	592	1434	

Source: EGM08-04. The Port of Corpus Christi includes the Corpus Christi Shipping Channel and the La Quinta Channel

^a Tankers for crude oil and petroleum products and bulk carriers for agricultural products

^b In the 2007 vessel call list, petroleum products tankers can be importing and exporting at the Port.

^c Estimation using NDC Data and Corpus Christi Harbormaster file.

*EGM08-04 dimensions are based on the value of the upper limit of the DWT size ranges

1 Long Ton – 2,240 lbs; 1 Short Ton – 2000 lbs; 1 Metric Ton – 2,204.6 lbs.

2.7 HarborSym Widening Analysis

The Corpus Christi HarborSym application was designed based on the framework of the Corpus Christi Navigation Channel. The CCSC is a 34-mile long, deep-draft ship channel that stretches from the 47-foot contour of the Gulf of Mexico through Corpus Christi Bay to the Port of Corpus Christi, Texas. The Aransas Pass entrance, which connects the Gulf of Mexico to Corpus Christi Bay, passes between the southern end of San Jose Island and the northern end of Mustang Island. The entrance channel is approximately 600 feet wide, 47 feet deep and 4 nautical miles long, ending at Harbor Island and Port Aransas. From Harbor Island to the Inner Harbor, the CCSC is divided into two sections – Lower Bay and Upper Bay, also referred to as Cut A and Cut B (shown previously in Section 1.1, Figure 2). Cut A stretches from Harbor Island to the La Quinta Junction, approximately 10 nautical miles; it is 500 feet wide and 45 feet deep. Cut B stretches from the La Quinta Junction to the Inner Harbor, approximately 9.6 nautical miles; it is 400 feet wide and 45 feet deep. The La Quinta Junction refers to the intersection between the CCSC and the La Quinta Channel. The La Quinta Channel is 300 to 400 feet wide and 45 feet deep, and leads northward 5.5 nautical miles to the La Quinta turning basin.

Several shallow-draft channels intersect Cut A. The Lydia Ann and Aransas Channels both meet the CCSC at Harbor Island. The Lydia Ann Channel is an alternate route of the GIWW. It starts at the GIWW Mile 522, travels southeasterly between Harbor Island and San Jose Island, and meets the CCSC at Harbor Island. The Aransas Channel extends approximately 6.3 miles northwest from Harbor Island to the community of Aransas Pass, where it intersects the GIWW. The main route of the GIWW intersects the CCSC 1.5 miles before the La Quinta Junction and extends north to Galveston and south to Brownsville. The Lydia Ann Channel and the GIWW are 125 feet wide by 12 feet deep, and the Aransas Channel is 100 feet wide by 12 feet deep. The Ingleside community and the Ingleside Naval Station are situated along Cut A between the GIWW and the La Quinta turnoff.

The GIWW is a shallow-draft waterway that stretches along the Gulf Coast from Brownsville, Texas to Apalachicola, Florida. Although it does extend to the north and south of the CCSC, most of the traffic in this section of the GIWW is southbound and terminates at Corpus Christi. There is very little through-traffic that simply passes through Corpus Christi on its way to or from the Port of Brownsville, thus this cross-traffic was not included in the analysis.

Approximately half a mile after the La Quinta turnoff, the Encinal Channel extends southerly for a distance of 6.1 miles, where it ends at a turning basin at the Navy Seaplane Base on Encinal Peninsula. The docks along this waterway are not used and are not included in this analysis.

The Rincon Canal extends northwesterly from Cut B to the Rincon Industrial Park on the south shore of Nueces Bay. Due to the small number of vessel calls, the canal was not included in this analysis.

The Jewell Fulton Canal extends northeastward from the La Quinta Channel for one mile. It ends at a small turning basin. Similarly, due to the small number of vessel calls, this canal was also not included in this analysis.

The Harbor Bridge spans the CCSC at the entrance to the Inner Harbor and has a vertical clearance of 138 feet at mean high water (MHW). This is the only bridge crossing the CCSC. The Port Authority considers this bridge a potential impediment to navigation, but this analysis does not evaluate or consider the impact of the Harbor Bridge.

The Inner Harbor is eight nautical miles long, and includes the majority of the docks along the CCSC. It is 45 feet deep, and varies in width from 300 to 400 feet wide. It includes five turning basins: Corpus Christi, Avery Point, Chemical, Tule Lake, and Viola. The dimensions of these turning basins range from 300 to 1,200 feet wide and 0.3 to 1.21 nautical miles long. The Viola turning basin is the western terminus of the CCSC, and is approximately 33.6 nautical miles from the sea bar channel entrance.

Aransas Pass has a diurnal tidal range of 1.4 feet. Within Corpus Christi Bay, the tidal range is insignificant. Currents can have velocities as high as 2.5 knots in Aransas Pass. When currents are reinforced by strong winds, the drift can be as high as four knots along the jetties. Corpus Christi has an average of 30 inches of rain and 29 heavy fog days each year.

Model Application

In the existing condition, Cut A is 500 feet wide and Cut B is 400 feet wide. In the channel widening alternative, both Cuts A and B are 530 feet wide. The barge shelf alternative was more complex, because HarborSym does not have barge shelves as an available project feature. In this alternative, 200 feet were added to each side of Cut B, producing widths of 530 feet in Cut A and 930 feet in Cut B. Therefore, these results reflect the maximum benefits of channel widening and barge shelf additions. Each alternative was run using the 2007 vessel call list, as well as low, medium, and high forecasts for the with- and without- project vessel call lists for 2020, 2030, and 2060. The anticipated effect of the channel widening is that larger vessels will be able to pass each other, thereby reducing wait times for all traffic. The anticipated effects of the barge shelves are that barge traffic will not delay deep-draft traffic and deep-draft traffic will not delay barge traffic, resulting in reduced wait times for both vessel types. The average wait times for each alternative are shown in Tables 27 and 28.

Table 27
Average Vessel Wait Times (Hours) With- and Without-Project Conditions Without-Deepening Project Vessel Fleet

DEEP-DRAFT												
Average Time	2007			2020			2030			2060		
	Without Project	With		Without Project	With		Without Project	With		Without Project	With	
		Channel Widening	Barge Shelves									
System	20.53	20.24	20.24	24.19	23.84	23.84	23.83	23.43	23.43	22.87	22.47	22.47
Reaches	6.32	6.32	6.32	6.69	6.70	6.70	6.73	6.73	6.73	6.82	6.82	6.82
Turning	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
At Dock	12.35	12.34	12.34	15.42	15.41	15.41	14.93	14.92	14.92	13.71	13.70	13.70
Waiting	0.43	0.43	0.43	0.43	0.43	0.43	0.44	0.44	0.44	0.46	0.46	0.46
Wait Entry	0.08	0.00	0.00	0.20	0.07	0.07	0.23	0.10	0.10	0.25	0.11	0.11
Wait Dock	0.27	0.18	0.18	0.26	0.26	0.26	0.29	0.26	0.26	0.39	0.36	0.36
Wait FN	0.14	0.00	0.00	0.24	0.02	0.02	0.25	0.01	0.01	0.24	0.01	0.01

SHALLOW DRAFT

Average Time	2007			2020			2030			2060		
	Without Project	With		Without Project	With		Without Project	With		Without Project	With	
		Channel Widening	Barge Shelves									
System	9.05	8.89	8.89	9.04	8.89	8.89	9.06	8.89	8.89	9.10	8.89	8.89
Reaches	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38
Turning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
At Dock	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98
Waiting	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
Wait Entry	0.05	0.00	0.00	0.05	0.00	0.00	0.05	0.00	0.00	0.07	0.00	0.00
Wait Dock	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.02	0.00	0.00
Wait FN	0.10	0.00	0.00	0.10	0.00	0.00	0.10	0.00	0.00	0.12	0.00	0.00

Table 28
Average Vessel Wait Times (Hours) With- and Without-Project Conditions With-Deepening Project Vessel Fleet

DEEP-DRAFT

Average Time	2007			2020			2030			2060		
	Without Project	With		Without Project	With		Without Project	With		Without Project	With	
		Channel Widening	Barge Shelves									
System	20.53	20.24	24.19	23.84	23.38	23.43	22.87	22.47	22.47	22.87	6.82	6.82
Reaches	6.32	6.32	6.69	6.70	6.73	6.73	6.82	6.82	6.82	6.82	0.25	0.25
Turning	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	13.70	13.70
At Dock	12.34	12.34	15.42	15.41	14.93	14.92	13.71	13.70	13.70	13.71	0.46	0.46
Waiting	0.43	0.43	0.43	0.43	0.44	0.44	0.46	0.46	0.46	0.46	0.11	0.11
Wait Entry	0.08	0.00	0.20	0.07	0.23	0.10	0.25	0.11	0.11	0.25	0.36	0.36
Wait Dock	0.26	0.18	0.26	0.26	0.29	0.26	0.39	0.36	0.36	0.39	0.01	0.01
Wait FN	0.14	0.00	0.24	0.02	0.02	0.01	0.24	0.01	0.01	0.24	0.01	0.01

SHALLOW DRAFT

Average Time	2007			2020			2030			2060		
	Without Project	With		Without Project	With		Without Project	With		Without Project	With	
		Channel Widening	Barge Shelves									
System	9.05	8.89	9.04	8.89	9.06	8.89	9.10	8.89	8.89	9.10	6.38	6.38
Reaches	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	6.38	0.00	0.00
Turning	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.98	1.98
At Dock	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98	0.26	0.26
Waiting	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.00	0.00
Wait Entry	0.05	0.00	0.05	0.00	0.05	0.00	0.07	0.00	0.00	0.07	0.00	0.00
Wait Dock	0.01	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.00	0.02	0.00	0.00
Wait FN	0.10	0.00	0.10	0.00	0.10	0.00	0.12	0.00	0.00	0.12	0.00	0.00

Average time at dock includes the time spent docking, loading or unloading commodity, and undocking. It does not include time spent waiting at the dock. Time waiting includes time waiting at the entrance, docks, and facility nodes. The total time in system includes the time spent waiting, time spent at dock, time spent turning, and time spent in reaches.

The HarborSym model was run for the existing condition, channel widening, and channel widening with barge shelves alternatives. The channel includes several turning basins. In HarborSym, turning basins, also referred to as facility nodes, are added to the node network very close to the Corpus Christi, Avery Point, Chemical, and Tule Lake turning basins. Although vessels are not actually allowed to drop anchor anywhere in the Inner Harbor, vessels are timed to meet in the turning basins so that they can pass. This is the equivalent of having an anchorage in the HarborSym model. Because a node in the HarborSym node network has to be either an anchorage or a turning basin, and cannot act as both, the capacities of the anchorages and turning basins are overstated. In the model, one vessel could be waiting at the anchorage while another turns in the turning basin. This would not be possible in reality. However, this difference between the actual use of turning basins and the HarborSym capabilities was deemed insignificant to this analysis because the turning basins are clustered in the Inner Harbor, which does not change in the with-project condition.

The USACE Port Series Number 25 book, *Port of Corpus Christi, Texas*, lists 112 piers, wharves, and docks along the CCSC and its connecting channels. The Corpus Christi Pilots Association lists 94 docks in its 2007 vessel call list. These Corpus Christi docks were aggregated into 14 HarborSym docks. The aggregation was based upon location and traffic volume, and was done in order to simplify the development of the HarborSym node network and vessel call lists. The HarborSym docks, with their locations and 2007 deep- and shallow-draft vessel calls, are listed in Table 29.

Although in actuality pilots have discretion in choosing turning basins, in HarborSym vessels visiting each dock were assigned to the closest turning basin. Also, all vessels turn when they are lightest. Docks were given very large capacities in HarborSym, so as not to capture wait times related to dock capacity and tug availability.

The Port of Corpus Christi Harbormaster controls all traffic in the Harbor. Movements are timed to expedite traffic but vessels are not convoyed through the Harbor. For example, the Harbormaster will time the movements of an inbound ship and an outbound ship so that they can meet each other at a turning basin in the Inner Harbor. However, the Harbormaster does not force inbound ships to wait until a convoy can be formed. Pilots are dispatched to ships as requested to begin movement through the harbor as soon as practicable. The diverse nature of the Port traffic

and the tenant base of the Port are not conducive to convoys. Nevertheless, the Port Authority believes that the Harbormaster expedites the movement of traffic through the Harbor as much as possible.

Dock #	Dock Name	Location	Nautical Miles from Sea Buoy	2007 Vessel Calls		
				Deep	Shallow	Total
1	KGSI Ingleside	Ingleside	13.4	150	34	184
2	Occidental Chemical	La Quinta	18.4	144	43	187
3	Sherwin Alumina	La Quinta	19.6	114	25	139
4	Cargo 9 & 10	Inner Harbor	24.7	25	11	36
5	Oil 1 & Cargo 8	Inner Harbor	25.0	147	204	351
6	TX Lehigh & Flint	Inner Harbor	26.0	130	344	474
7	Citgo 1	Inner Harbor	26.3	64	377	441
8	Oil 4	Inner Harbor	27.0	102	692	794
9	Oil 7 & 11	Inner Harbor	27.1	176	211	387
10	Interstate Grain, Bulk 1 & 2	Inner Harbor	28.5	100	70	170
11	Valero 3	Inner Harbor	29.5	124	126	250
12	Valero 2	Inner Harbor	30.5	83	124	207
13	Citgo 3 & Bay Ltd	Inner Harbor	31.5	145	492	637
14	Oil 8 & 9	Inner Harbor	33.5	100	597	697

Based on interviews with the Aransas-Corpus Christi Pilots Association, several operational changes will occur once the channel is widened to 530 feet. First, the maximum combined beam widths will increase to 329 feet in both Cut A and Cut B, compared to the current maximum combined beam widths of 310 feet in Cut A and 251 feet in Cut B. Additionally, maximum vessel speeds will increase approximately one knot from the channel entrance through Cut A. Perhaps the most important operational change that would result from a wider channel is the elimination of the one-way traffic restriction in Cut B. Currently, all two-pilot ships are restricted to one-way traffic in Cut B. Two-pilot ships include those vessels with LOAs greater than 900 feet or DWTs greater than 130,000. In the 2007 vessel call list, this includes 61 vessel calls. This is particularly significant because Cut B is 9.6 nautical miles, and accounts for over 26 percent of the entire channel length. The widened Cut B will also affect the daylight restriction for two-pilot ships. Currently, two-pilot ships cannot move anywhere in the harbor after nightfall. With the widened Cut B, these vessels will only be daylight restricted within the Inner Harbor. This will allow vessels to enter the harbor approximately two to three hours before daybreak. It will also allow vessels to leave the dock later, as they will only have to clear the Harbor Bridge before nightfall, as opposed to the jetties.

The with-project condition also includes deepening the ship channel to 52 feet. Although this analysis focuses on the benefits of widening the channel, the impact of the deepened channel on the vessel fleet forecast was considered. The only rule that the deepening affects is the combined draft limit, which will increase from 80 feet to either 90 or 94 feet.

The time-saving benefits of the two project alternatives translate into cost savings based on the hourly vessel operating costs shown in Tables 30 and 31. The total vessel costs and project benefits for the without-project vessel fleets are shown in Table 30. The total vessel costs and project benefits for the with-project vessel fleets are shown in Table 31.

		Total Vessel Costs			Benefits		
		Without Project	Channel Widening	Barge Shelves	Channel Widening	Barge Shelves	Total
2007	Base	\$39,797,980	\$39,190,160	\$39,186,180	\$607,820	\$3,980	\$611,800
2020	Base	\$40,683,920	\$40,152,310	\$40,152,310	\$531,610	\$0	\$531,610
2030	Base	\$46,637,310	\$45,885,520	\$45,884,330	\$751,790	\$1,190	\$752,980
2060	Base	\$71,780,130	\$70,807,880	\$70,807,860	\$972,250	\$20	\$972,270

		Total Vessel Costs			Benefits		
		Without Project	Channel Widening	Barge Shelves	Channel Widening	Barge Shelves	Total
2007	Base	\$39,793,120	\$39,186,220	\$39,186,160	\$606,900	\$60	\$606,960
2020	Base	\$40,683,920	\$40,152,310	\$40,152,310	\$531,610	\$0	\$531,610
2030	Base	\$46,637,320	\$45,884,330	\$45,884,330	\$752,990	\$0	\$752,990
2060	Base	\$71,779,120	\$70,807,860	\$70,807,860	\$971,260	\$0	\$971,260

Summary of Widening Benefits

Table 32 displays the average annual benefits for the barge shelves.

Year	Barge Shelves (without deepening vessel call lists)	Barge Shelves (with deepening vessel call lists)
2014	\$1,837	\$28
2024	\$476	\$0
2034	\$1,034	\$0
2044	\$644	\$0
2054	\$254	\$0
2064	\$-136	\$000
Average Annual	\$734	\$4

2.8 Deepening Analysis

The transportation costs and the savings associated with the proposed project depth increase were calculated using commodity-specific vessel class and trade route distributions. Transportation costs were calculated based on the channel depth alternatives and variables associated with vessel design and loaded drafts, maximum feet of light-loading, mileage traveled, underkeel clearance, and the number of hours to load and unload. Deepening benefits were calculated for crude petroleum imports, petroleum product imports, petroleum product exports, and grain exports. Determination of the percentage of these commodities used for the channel deepening calculations was made based on the existing vessel utilization data, including the percentage of recent historical tonnage loaded to vessel drafts of 42 feet or more. Other considerations included the sizes of vessels presently used and foreign ports of origin and destination and 2015 completion of the Panama Canal expansion. Completion of the Panama Canal expansion, from its present width restriction of 106 feet and approximate loaded draft limit of 39.6 feet, in the year 2015, will allow for more fully loaded vessel movements from deepwater ports in Western Mexico, South America, and the Far East. The canal expansion will accommodate maximum loaded drafts of 48 feet. The Panama Canal is one example of a trade route, while other trade routes or junction points and the representative round-trip mileages are displayed in Table 33. These are used in the transportation cost computations for channel deepening benefits.

Coatzacoalcos, Mexico	1,234
U.S. Gulf Coast Lightering/Lightening Zone	160
Venezuela (Puerto La Cruz)	4,276
Panama Canal (Almirante)	3,078
Sao Luis, Brazil	7,202
Rotterdam, Netherlands	10,222
Bergen, Norway	10,132
North Africa, Algiers	10,478
West Africa (Lagos, Nigeria and Porto Saco, Angola)	12,858
Djibouti via Suez Canal	16,324
Persian Gulf and Indian Subcontinent via Suez Canal	19,804
Persian Gulf and Indian Subcontinent via Cape of Good Hope	25,090
Singapore via Panama Canal	24,248
Singapore via Cape of Good Hope	26,304
Regions	
South America (Weighted)	4,382
Africa/Europe (Weighted)	11,668
Mideast and Far East (Weighted)	22,026
Africa/Europe for Grain (Weighted)	13,228

Source: Sea Distances-Voyage Calculator (nautical miles) (<http://e-ships.net/dist.htm>).

The channel deepening benefits were calculated using foreign flag tanker and bulk carriers. The tankers were used for the crude petroleum and petroleum product, and bulk carriers were used for the grain exports. Tables 34 and 35 present the hourly operating costs for tankers and dry bulk carriers. In comparison to the widening model which utilizes aggregated vessel class groups (shown earlier in Tables 5 and 6), the deepening model calculations are prepared utilizing specific vessels.

Vessel	Design Draft	Immersion	Hourly Cost	
			At Sea	In Port
DWT	(feet)	Factor		
20,000	32.3	78.7	\$846	\$463
25,000	33.4	90.8	\$903	\$500
35,000	35.6	112.6	\$1,020	\$578
50,000	38.7	141.4	\$1,164	\$660
60,000	40.7	158.9	\$1,321	\$780
70,000	42.6	175.4	\$1,403	\$823
80,000	44.6	191.0	\$1,487	\$865
90,000	46.4	205.9	\$1,568	\$906
110,000	50.0	234.1	\$1,714	\$971
150,000	56.4	285.4	\$1,997	\$1,093
165,000	58.6	303.4	\$2,113	\$1,148
175,000	59.8	314.1	\$2,186	\$1,181
265,000	70.3	410.7	\$2,845	\$1,475
320,000	74.5	463.3	\$3,223	\$1,628

Source: Application of USACE, July 2011 Foreign Flag Tanker Costs presented in Economic Guidance Memo #11-05, Deep-Draft Vessel Operating Cost FY 2011, July 2011.

Vessel	Design	Immersion	Hourly Cost	
			At Sea	In Port
DWT	Draft (feet)	Factor		
60,000	41.6	153.5	\$1,104	\$622
70,000	43.6	168.6	\$1,159	\$641
80,000	45.6	183.7	\$1,213	\$660
90,000	47.5	197.4	\$1,279	\$693
100,000	49.4	211.1	\$1,344	\$725

Source: USACE, July 2011 Foreign Flag Tanker Costs presented in Economic Guidance Memo #11-05, Deep-Draft Vessel Operating Cost FY 2011, July 2011.

Table 36 displays the maximum cargo tons by vessel size and channel depth alternatives for representative tankers and bulk carriers vessels used for the deepening analyses. The maximum loads shown are based on application of one foot of underkeel clearance.

Table 36
Maximum Cargo by Vessel Size and Channel Depth (feet)^{a/}

		Tankers				Bulk Carriers			
Vessel DWT	Design Draft (feet)	Immersion Factor	Maximum Cargo (Short Tons)		Design Draft (feet)	Immersion Factor	Maximum Cargo (Short Tons)		
			45	52			45	52	
35,000	36	113	35,420	35,420	35	109.7	35,420	35,420	
50,000	39	141	50,600	50,600	40	137.0	50,600	50,600	
60,000	41	159	60,720	60,720	42	154	62,700	62,700	
70,000	43	175	73,150	73,150	44	169	73,150	73,150	
80,000	44	191	83,600	83,600	46	184	78,750	83,600	
90,000	46	206	88,614	94,050	48	197	84,930	94,050	
100,000	48	220	93,324	104,940	49	211	90,567	104,500	
110,000	50	234	97,619	116,160	51	224	95,748	114,950	
120,000	52	247	103,268	126,084	52	237	103,066	124,918	
135,000	54	266	108,912	133,505	54	254	110,497	133,981	
150,000	56	285	113,336	139,707	56	272	116,997	142,111	
165,000	59	303	117,584	145,618	58	286	125,179	151,559	
175,000	60	314	121,334	150,360	59	299	127,483	155,129	

^{a/}Estimated short tons $\cong ((DWT * \text{Maximum \% Load}) - (\text{Immersion Factor} * 12 \text{ inches per ton} * \text{number of feet light-loaded}))$.

Transportation Cost Calculation Procedures

The basic procedure used to calculate transportation costs, using an 110,000 DWT foreign flag tanker as an example, is illustrated in Table 37. Similar computations were made for appropriate distances and vessel sizes for each of the channel depth alternatives. The resulting costs per ton computations were calculated over the relevant range of vessels projected for each channel depth improvement. The associated savings per ton were measured using the net differences in costs between the existing 45-foot channel and the depth alternative.

Tanker Fleet and Methods of Shipment

The maximum size tankers using the CCSC on a regular basis are in the 150,000 to 165,000 DWT range. Tankers in the 165,000 DWT and larger group do not come into Corpus Christi but lighter offshore on to shuttle tankers. The shuttle tankers are generally in the 90,000 to 110,000 DWT range. The three methods of shipping crude include direct, lightered, and lightened. Direct shipment is the transfer of tonnage by vessel between two coastal ports. Lightering is defined as the process involving ship-to-ship transfer of oil cargo. Lightering is noted to be extremely cost effective for long-haul freight. U.S. Gulf Coast lightering occurs in the international waters of the Gulf of Mexico and involves the transfer of tonnage from a larger vessel, called a VLCC (Very Large Crude Carrier), onto one or more shuttle vessels. A representative VLCC size is 320,000 DWT. For Corpus Christi's existing project depth of 45 feet, three shuttles are needed to

completely offload a 320,000 DWT VLCC, and the use of these shuttles is routine and optimal as it allows for the least number of shuttles based on a 45-foot channel depth.

Vessel Deadweight Tons	110,000	110,000
Channel Depth	45	52
Design Draft (ft)	50	50
Cargo Capacity (%)	96	96
Cargo Capacity by Channel Depth (short tons) ^a	97,619	116,160
Immersion Factor (tons per inch)	234.1	234.1
Hourly Cost at Sea (from EGM)	\$1,714	\$1,714
Hourly Cost in Port (from EGM)	\$971	\$971
Underkeel Clearance (ft)	1	1
Round Trip Milcage from S America	4,382	4,382
Speed (Knots)	14.9	14.9
Total Voyage Cost	\$581,993	\$582,411
Loading/Unloading Rate (short tons/hour)	5,250	5,250
Hours in Port	22	22
Loading and Unloading Cost	\$39,994	\$46,852
Pilot and Tug Costs	\$19,656	\$20,074
Total Cost Per Ton	\$5.96	\$5.01

^a *Estimated short tons = ((DWT * Maximum % Load*1.1) - (Design Draft-(Channel Depth-1))*(Immersion Factor * 12 inches per ton * 1.1)).*

The transportation costs prepared for this report are based on optimal shuttle sizes and turnaround times. It was found that the efficiencies of offshore transfers are great and have increased in the last 10 to 15 years, and therefore the assumption of optimal efficiencies is reasonable. Offshore off-loading rates are similar to dockside rates, and they range from 4,000 to 5,500 short tons per hour. Given an unloading rate of 4,000 to 5,500, it would take 57 to 78 hours to offload a 320,000 DWT vessel. The maximum cargo capacity for a 320,000 DWT vessel is approximately 341,440 short tons. Information obtained from industry discussion indicates that the set-up time and finishing time would add a few hours. Shuttle vessels are loaded one-at-a-time and sequencing of shuttle vessel arrivals and departures are subject to variances. Table 38 shows the number of shuttle vessels by channel depth alternatives necessary to offload a VLCC.

DWT	Channel Depth (ft)	
	45	52
42,500	8	8
50,000	7	7
70,000	5	5
80,000	5	5
85,000	4	4
90,000	4	4
110,000	4	3
115,000	4	3
120,000	4	3
125,000	4	3
130,000	4	3
135,000	4	3
150,000	4	3
165,000	3	3

In the 2003 Feasibility Report, the transportation savings benefits for crude petroleum were calculated for 50 percent of the future import tonnage. For the current analysis, 70 percent of Corpus Christi's future crude petroleum imports were used for the channel deepening calculations until 2024, at which time there was a five percentage increase every 10 years, leading to 85 percent in 2064. For the 2003 Feasibility Report, benefits were calculated for 30 percent of 2005-56 petroleum product imports and 10 percent of export tonnage. Current vessel utilization data (2008-2010), world fleet data, and trade routings suggested that 30-60 percent of petroleum product imports and approximately nine percent of petroleum product exports would utilize channel depth over 45 feet. Corpus Christi's current product imports largely consist of distillate and residual fuel oil and gasoline, with over 50 percent of imports comprised of distillate. Distillate is transported in the exact same fleet of vessels as crude oil.

Crude Petroleum Imports Transportation Savings Benefits

Transportation savings benefits from reductions in the vessel operating costs were calculated based on the relative difference in transportation costs between the without-project and with-project conditions. Table 39 summarizes the transportation cost by trade route used for the with- and without-project future condition calculations. The results of the analysis showed that for an increase in channel depth from 45 to 52 feet tonnage from Mexico and South America would continue to be shipped by direct shipment. The results of the analysis showed that for an increase in channel depth from 45 to 52 feet tonnage from Africa and North Sea would continue to be lightered. For shipments from the Middle East, lightering remains the least cost shipment

method at both the 45- and 52-foot channel depth. The transportation costs shown in Table 39 were applied to Corpus Christi's 2014–2064 tonnage forecast. Table 40 displays Corpus Christi's crude petroleum trade route distribution.

	Mexico		South America		Africa and North Sea		Middle East	
	45 feet	52 feet	45 feet	52 feet	45 feet	52 feet	45 feet	52 feet
	Direct Shipment	Direct Shipment	Direct Shipment	Direct Shipment	Lightered	Lightered	Lightered	Lightered
Cost/Ton	\$2.21	\$1.81	\$5.85	\$4.80	\$10.58	\$10.31	\$17.10	\$16.83
Savings/Ton		\$0.40		\$1.06		\$0.27		\$0.27

Trade Route/Country	Corpus Christi
	2008-2010
Mexico and Canada	21%
South America	45%
Europe, Africa, Mediterranean	24%
Middle East & Asia	10%
Total	100%

Table 41 displays comparison of the 2003 feasibility report average annual benefits with the current benefits.

Year	2003 Feasibility Report	Year	Current Benefits
2006	\$6,539	2014	\$14,737
2016	\$8,020	2024	\$20,115
2026	\$8,954	2034	\$26,007
2036	\$9,609	2044	\$33,274
2046	\$10,456	2054	\$38,595
2056	\$11,516	2064	\$43,852
Interest Rate	5.875%		3.750%
Equivalent Annual Savings	\$8,419		\$24,771

Petroleum Product Imports and Exports Transportation Savings Benefits

Reductions in the vessel operating costs for CCSC's foreign petroleum product imports and exports were calculated based on the relative difference in transportation costs between the without-project and with-project conditions. As with crude petroleum, transportation costs and savings for product carriers were calculated for vessels that minimize transportation costs given trade route constraints.

The largest petroleum product carriers used for imports are presently 165,000 DWT. The maximum DWT for petroleum product exports is 100,000 DWT. Table 42 displays comparison of the 2003 Feasibility Report average annual benefits for petroleum product imports with the current benefits while Table 43 displays comparison of the 2003 Feasibility Report average annual benefits for exports with the current benefits.

Table 42			
Corpus Christi Petroleum Product Imports			
Comparison of 2003 Feasibility Report and Current Benefits (In \$1,000's)			
Year	2003 Feasibility Report	Year	Current Benefits
2006	\$10,130	2014	\$8,214
2016	\$17,554	2024	\$12,373
2026	\$25,695	2034	\$18,999
2036	\$36,013	2044	\$28,926
2046	\$49,679	2054	\$43,599
2056	\$68,007	2064	\$65,172
Interest Rate	5.875%		3.750%
Equivalent Annual Savings	\$22,670		\$20,223

Table 43			
Corpus Christi Petroleum Product Exports			
Comparison of 2003 Feasibility Report and Current Benefits (In \$1,000's)			
Year	2003 Feasibility Report	Year	Current Benefits
2006	\$323	2014	\$1,026
2016	\$448	2024	\$1,251
2026	\$487	2034	\$1,395
2036	\$529	2044	\$1,541
2046	\$574	2054	\$1,703
2056	\$624	2064	\$1,881
Interest Rate	5.875%		3.750%
Equivalent Annual Savings	\$454		\$1,342

Grain Exports and the Bulk Carrier Fleet Transportation Savings Benefits

Corpus Christi's grain exports consist nearly exclusively of sorghum and wheat. In 2010, the Port's sorghum exports represented an average of 20 percent of U.S. sorghum exports and its wheat exports represented an average of 7 percent of the U.S. total. Table 44 displays Corpus Christi's 2008-2010 grain exports by shipment region. As shown the primary regional destinations are Europe, Africa, Mediterranean, Middle East, and Far East locations.

Region/Year	2008	2009	2010	Average
Canada	0.0%	0.0%	0.0%	0.0%
Eastern South America & Mexico	10.3%	20.4%	13.9%	14.9%
Western South America	0.0%	0.0%	1.3%	0.3%
Europe, Africa, & Mediterranean	59.1%	66.5%	72.1%	65.9%
Middle East/ Far East	30.6%	13.1%	12.7%	18.9%
Grand Total	100.0%	100.0%	100.0%	100%

(Source: U.S. Army Corps of Engineers, Waterborne Commerce of the U.S., 2008-10, detailed files.)

Table 45 provides comparison of 2008-2010 grain exports with the 1998-2000 tonnage volumes current at the time of the 2003 Feasibility Report.

Table 45			
Corpus Christi and U.S. Sorghum and Wheat Exports			
1998-2000 and 2008-2010			
(1,000's of short tons)			
Corpus Christi			
Year	Wheat	Sorghum	Total
1998	976	294	1,270
1999	1,001	547	1,548
2000	946	529	1,475
2008	2,665	2,020	4,685
2009	1,668	277	1,945
2010	2,040	659	2,699
U.S. Total (Waterborne)			
Year	Wheat	Sorghum	Total
1998	29,656	3,394	33,050
1999	31,747	4,179	35,926
2000	30,378	4,494	34,872
2008	31,034	4,253	35,287
2009	22,947	2,633	25,580
2010	28,993	3,322	32,315
Corpus Christi % of U.S. Total			
1998	3.3%	8.7%	3.8%
1999	3.2%	13.1%	4.3%
2000	3.1%	11.8%	4.2%
2008	8.6%	47.5%	13.3%
2009	7.2%	10.5%	7.6%
2010	7.0%	19.8%	8.3%
2008-10 Average	7.6%	25.9%	9.7%

(Source: U.S. Army Corps of Engineers, Waterborne Commerce of the U.S., 2008 10, detailed files.)

Table 46 displays Corpus Christi's grain exports tonnage percentage shipped in vessels with loaded drafts of 42 feet or higher. The specific type of bulk carriers used for grain is "load-on/load-off" or "LoLo" vessels. The current maximum DWT for this type of vessel used for Corpus Christi grain exports is in the 70,000 to 100,000 DWT range. The corresponding design draft range for this class is between 44 and 47 feet. The vessels in the group using Corpus Christi primarily were generally constructed after 2001. At the time of the 2003 Feasibility Report, the median year of construction for the range of vessels used was 1985. Bulk carrier construction trends aggregated for other Texas Gulf Coast port studies indicated transitions to larger vessels was occurring.

Year	Percent
1998	2%
1999	3%
2000	0%
2007	25%
2008	35%
2010	10%

**In 2009, the Port did not have any grain exports on vessels with loaded drafts \geq 42 feet, but based on historical evidence, this was an anomaly. Therefore, 2009 was removed from the analysis, with a focus on 2007-2008 and 2010.*

Table 47 displays the distributions of the world bulk carrier fleet for vessels constructed between 1990-99 and 2000-09. Comparison of the 1990-99 with the 2000-09 series for vessels between 74,000 and 99,999 DWT shows a relatively significant increase in the concentration of DWT tonnage for the more recent period. Comparison of the decade series data also shows large concentrations in the 45,000 to 64,999 and 170,000 to 260,000 DWT classes. The 45,000 to 64,999 DWT class includes vessels used to transport Corpus Christi grain exports and other bulk commodities. The 170,000 to 260,000 DWT class is generally associated with the Asian coal and iron ore markets and does not presently include vessels using Corpus Christi or other Texas Gulf Coast ports.

The transportation savings benefits for Corpus Christi grain exports were calculated based on 20 percent of grain exports loaded to drafts over 42 feet, gradually doubling to 40 percent by 2064. For the 2003 Feasibility Report, 12 percent of 2006-56 grain export tonnage was projected to use vessels with loaded drafts in excess of 45 feet. World port depth availability, trade route, recent vessel utilization data, and trade route changes associated with completion of the Panama Canal expansion include considerations used to identify the percentage of grain exports tonnage anticipated to benefit from an increase in channel depth. Table 48 displays comparison of the 2003 Feasibility Report average annual benefits for grain with the current benefits.

Table 47
World Bulk Carrier Fleet as of October 2009

Built Between 1990 - 1999					
DWT Range	Total DWT	Percent DWT	Median DWT	Design Draft (feet)	Year Built
<25000	4,922,952	4%	6,621	23	1994
25,000 to 44,000	14,281,713	12%	32,577	33	1995
45,000 to 64,999	14,095,874	12%	46,681	38	1996
65,000 to 73,999	25,982,229	22%	71,369	44	1996
74,000 to 89,999	6,760,623	6%	75,363	46	1998
90,000 to 99,999	1,509,601	1%	95,041	44	1992
100,000 to 106,999	873,482	0%	96,772	47	1991
107,000 to 169,999	34,149,255	28%	151,123	57	1994
170,000 to 260,000	17,740,705	15%	172,940	58	1996
Total	120,316,434	100%			
Built Between 2000 - 2009					
DWT Range	Total DWT	Percent DWT	Median DWT	Design Draft	Year Built
<25000	4,517,019	2%	11,356	24	2007
25,000 to 44,000	22,651,446	9%	31,883	32	2008
45,000 to 64,999	60,925,098	23%	53,565	41	2006
65,000 to 73,999	7,668,159	3%	73,358	46	2002
74,000 to 89,999	56,452,974	22%	76,500	47	2006
90,000 to 99,999	7,320,802	3%	92,500	48	2009
100,000 to 106,999	1,261,183	0%	105,712	46	2007
107,000 to 169,999	4,999,300	2%	164,681	58	2002
170,000 to 260,000	92,258,503	36%	177,036	59	2006
Total	258,054,484	100%			

Source: Compiled from Lloyds / Fairplay On-Line Vessel Register as of October 2009.

Table 48
Corpus Christi Grain Exports
Comparison of 2003 Feasibility Report and Current Benefits

Year	2003 Feasibility Report	Year	Current Benefits
2006	\$151	2014	\$2,059
2016	\$221	2024	\$3,685
2026	\$256	2034	\$4,888
2036	\$316	2044	\$6,222
2046	\$445	2054	\$7,858
2056	\$462	2064	\$9,859
Interest Rate	5.875%		3.750%
Equivalent Annual Savings	\$244		\$4,588

Summary of Channel Deepening Benefits

Table 49 displays comparison of the 2003 Feasibility Report average annual benefits for the 52-foot channel deepening with the current benefits of deepening.

Year	2003 Feasibility Report	Year	Current Benefits
2006	\$17,1423	2014	\$26,036
2016	\$26,243	2024	\$37,423
2026	\$35,392	2034	\$51,289
2036	\$46,467	2044	\$69,964
2046	\$61,154	2054	\$91,755
2056	\$80,609	2064	\$120,764
Interest Rate	5.875%		3.750%
Equivalent Annual Savings	\$31,787		\$50,924

2.9 Corpus Christi Ship Channel Benefit-Cost Summary

Table 50 shows the current project benefits and costs for the Corpus Christi Main Channel and Barge Shelves. The Remaining Benefit Remaining Cost Ratios (RBRCRs) represent the current benefits and costs for the project that has yet to be constructed, which includes the widening and deepening of the main channel and the barge shelves.

Item	Widening & Deepening Economic Update	Barge Shelves Economic Update
Project Cost	\$285,428,000	\$524,000
Associated Costs	\$61,643,000	\$0
Months to Construct	94	1
Interest During Construction	\$55,630,000	\$0
NED Investment Cost	\$402,701,000	\$524,000
Total Annual Cost including O&M	\$23,655,000	\$39,000
Average Annual Benefits	\$51,943,000	\$742,000
Net Excess Benefits	\$28,288,000	\$703,000
RBRC Ratio	2.2	18.9

The transportation savings benefits shown previously in Tables 48 and 49 consist of transportation savings of \$742,000 for the Barge Shelves and \$51,943,000 for the Main Channel, respectively and the economic analysis is based on a 50-year period of analysis (2014-2064). Average annual values are calculated at the Federal discount rate of 3.75 percent. The current total annual costs for the main channel are estimated to be \$23,655,800 and the RBRCR is estimated to be 2.2. The total annual costs for the barge shelves are estimated to be \$39,000 and the RBRCR is estimated to be 18.9. The recommended project from the 2003 Feasibility Report remains justified under current conditions.

Table 51 presents the updated costs and benefits at 7.0 percent, as required for annual budgeting purposes and are presented as the RBRCR.

Item	Widening and Deepening Economic Update at 7%	Barge Shelves Economic Update at 7%
Project First Cost ¹	\$347,070,000	\$524,000
Interest During Construction	\$113,475,000	\$0
Total Annual Cost ²	\$39,085,000	\$53,000
Annual Benefits	\$43,971,000	\$812,000
Net Benefits	\$4,886,000	\$759,000
RBRC Ratio	1.1	15.4

¹Including Associated Costs

²Including Average Annual Cost and Average Annual O&M.

Note: Benefits and costs at 7% are presented for annual budget purposes only.

3.0 ENVIRONMENTAL UPDATE

NEPA Documentation for Navigation Improvements and Ecosystem Restoration

The Feasibility Report/Draft Environmental Impact Statement (DEIS) was published by the Galveston District in April 2003. The 2003 Feasibility Report/DEIS indicated that proposed project actions would not result in any adverse impacts to the Corpus Christi Bay system. The Record of Decision (ROD) was signed on October 1, 2007. The ROD concluded that the plan detailed in the Chief's Report dated June 2, 2003 is technically feasible, economically justified, in accordance with environmental statutes, and in the public interest. There have been no significant changes in the project area or sensitive resources that would result in impacts to resources not previously considered and accounted for in the Final EIS (2003 FEIS). Based on this consideration, the ROD remains applicable to the recommended plan. The following is a brief summary of the recommended plan on significant environmental resources of Corpus Christi Bay as presented in the Executive Summary of the 2003 FEIS.

Water Quality

A Hydrodynamic and Salinity Model for Corpus Christi Bay developed by the Texas Water Development Board, evaluated water exchange and salinity impacts. The model results concluded that changes in tidal amplitude of 0.06 feet or less are expected in the project area, and that changes in salinity may seasonally and locally decrease by up to 4 parts per thousand (ppt) or increase up to 0.38 ppt. Testing of maintenance material elutriates with chemical analyses and water column bioassays has indicated no cause for concern. No significant increase or decrease in ballast water introductions is expected. As a result, no net adverse direct or indirect impacts from water quality are expected as a result of the recommended plan.

Sediment Quality

The results of sediment analyses demonstrated that new work and maintenance dredged material are acceptable for beneficial uses with two exceptions. Sediments from the Inner Harbor will be placed in several upland confined placement areas, and the fine material from the Upper Bay will continue to go into open-bay, unconfined placement areas.

Community Types

Five acres of submerged aquatic vegetation will be directly impacted by the recommended plan. This loss will be mitigated by planting 15 acres of seagrass within a 200-acre shallow water

beneficial use site. The beneficial use plan will protect and create submerged aquatic vegetation habitat areas, wetlands, and coastal shore areas.

Fish and Wildlife Resources

No significant adverse impacts to finfish, shellfish, recreational and commercial species, aquatic communities, essential fish habitat, and wildlife resources are expected to occur from the recommended plan. Temporary impacts to fish and wildlife resources may be experienced from dredging and resulting suspended solids (turbidity). However, the beneficial use plan will create new habitat to be used by these species.

Because there have been no changes in project area or potential impacts to ecological resources, only a brief description of the resources and project impacts will be provided as background information. More detailed descriptions of changes or updates to environmental clearances (e.g., Endangered Species Act) are provided below. The 2003 Feasibility Report and FEIS should be reviewed for detailed information not provided in this report. The 2003 Feasibility Report and FEIS can be accessed on the internet at <http://ww3.swg.usace.army.mil/pe/Corpus/>.

Impact Studies and Concerns

Ecological Resources

The CCSC study area lies within the southeastern portion of the Gulf Prairies and Marshes vegetational region. The region is characterized by a nearly level plain less than 250 feet in elevation, covering approximately 10 million acres. The region is subdivided into two vegetation units: low marshes with tidal influence and prairies or grasslands farther inland. The marine system in the study area consists of Corpus Christi Bay, Nueces Bay, and Redfish Bay. These bays are separated from the Gulf of Mexico by sandy barrier islands; namely, North Padre Island, Mustang Island, and San Jose Island. The Laguna Madre, a shallow high salinity lagoon, extends from the southern end of Corpus Christi Bay down to South Bay very near to the Texas-Mexico border.

Terrestrial and Aquatic Resources

Impacts to terrestrial and aquatic resources within the study area will be minimal, as described in the 2003 FEIS. Proposed project activities will occur within the existing CCSC Channel. Indirect impacts include increased turbidity from dredging and placement which could potentially reduce availability of food for birds locally. However, these impacts are expected to be temporary.

Noise and increased human activity will temporarily disturb birds and local wildlife during the breeding season. However, these impacts will be reduced by keeping the activities at least 1,500 feet away from bird rookeries. Impacts to plankton and benthic organisms from dredging and placement operations will be temporary, minimal, and localized. These impacts have not changed since publication of the 2003 FEIS.

Threatened and Endangered Species

The Endangered Species Act (ESA) (16 U.S.C. 1531 et Seq.) of 1973, as amended, was enacted to provide a program for the preservation of threatened and endangered (T&E) species and to provide protection of ecosystems upon which these species depend for their survival. All Federal agencies are required to implement protection programs for these designated species and to use their authorities to further the purposes of the act. USFWS and the National Marine Fisheries Service (NMFS) are the primary agencies responsible for implementing the ESA.

The requirements of the ESA were satisfied for the CCSC Channel Improvement Project during the feasibility study when coordination with the USFWS and NMFS during Section 7 consultation was completed and the results documented in the 2003 FEIS in April 2003. In 2008, it was determined that the T&E species list should be updated for project compliance with the ESA as five years had passed since Section 7 consultation was completed for the channel improvement project. In November 2008, USFWS and NMFS were contacted for a new Federal list of T&E species that may occur in the project area. The updated lists were included in the La Quinta Channel/Ingleside Breakwater Economic/Environmental Update LRR (La Quinta LRR) that was completed in November 2009. Copies of the letters and attachments sent to USFWS and NMFS requesting the updates in 2008 can be found in Appendix B and Appendix C, respectively, along with each agency's reply.

In a letter dated December 5, 2008 (Appendix B), USFWS replied that the northern aplomado falcon, mountain plover, and Eskimo curlew were no longer on the T&E list for San Patricio and Nueces County. However, the whooping crane had been added to the 2008 listings for Nueces County. The whooping crane remained listed in San Patricio County as discussed in the 2003 Biological Assessment (BA). USFWS also reported that the bald eagle had been removed from the Federal list of T&E species, but remained protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. There was no new designated critical habitat identified in the USFWS letter. Also, USFWS did not describe any changes in the status of their concurrence with the conclusion of Section 7 consultation in the 2003 FEIS.

USACE policy requires that ESA coordination be updated every three years. In November 2011, three years had passed since 2008 coordination with USFWS and NMFS. Review of the current

species listings at the USFWS and NMFS websites revealed two changes between the 2008 and 2011 listings; the brown pelican was delisted as an endangered species and the white marlin was delisted as a species of concern. A letter was sent to both USFWS (Appendix B) and NMFS (Appendix C) on November 30, 2011. The letters stated that coordination and conclusions of the 2008 ESA consultation remain valid and that further consultation is not necessary, as the changes to species listings are not significant and because there have been no changes to the proposed project. The Services have not responded to this coordination.

Table 52 shows the T&E species and changes that have occurred since the 2003 Feasibility Report and FEIS were published in April 2003 and notes the deletion of the brown pelican from the endangered species list after the La Quinta LRR was completed.

Table 52
Federal List of Endangered and Threatened Species of Potential Occurrence
in the Corpus Christi Ship Channel Improvements Project Area
in Nueces and San Patricio Counties, Texas
Under the Jurisdiction of USFWS, 2011

Common Name	Scientific Name	Status ¹
South Texas ambrosia	<i>Ambrosia cheiranthifolia</i>	Endangered
Slender rush-pea	<i>Hoffmannseggia tenella</i>	Endangered
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Green sea turtle	<i>Chelonia mydas</i>	Threatened
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened
Hawksbill sea turtle	<i>Eretmochelys imbricate</i>	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Brown pelican ²	<i>Pelecanus occidentalis</i>	Delisted ⁶
Bald eagle ³	<i>Haliaeetus leucocephalus</i>	Delisted
Whooping crane ⁴	<i>Grus Americana</i>	Endangered
Northern aplomado falcon ⁵	<i>Falco femoralis septentrionalis</i>	Endangered
Piping plover	<i>Charadrius melodus</i>	Threatened
Mountain plover ⁵	<i>Charadrius montanus</i>	Proposed ⁷
Eskimo Curlew ⁵	<i>Numenius</i>	Endangered
Ocelot	<i>Leopardus pardalis</i>	Endangered
Jaguarundi	<i>Herpailurus yagouaroundi</i>	Endangered
West Indian manatee	<i>Trichechus manatus</i>	Endangered

¹ According to USFWS, 2011

² Delisted on December 17, 2009 in a determination published in the November 17, 2009 Federal Register.

³ Delisted on August 8, 2007 in a determination published in the July 9, 2007 Federal Register.

⁴ Added to 2008 listings for Nueces County. Remains on 2011 listings.

⁵ Removed from consideration in 2008 listings.

⁶ Denotes a delisted taxon which has recovered and is being monitored for the first five years.

⁷ Denotes species as being proposed for listing as threatened.

The BA included in the 2003 FEIS notes that the only remaining natural wild population of whooping cranes winters in the prairies, salt marshes, and bays along a narrow section of the Texas coast centered around the Aransas National Wildlife Refuge. The whooping crane has been recorded from counties within the study area (now including Nueces County), but is generally restricted to home territories in Aransas, Refugio, and Calhoun counties. A few individuals have been sighted in Nueces County near the Naval Air Station and near Oso Bay. Although suitable winter habitat is found nearest to the ship channel on the leeward side and interior Padre Island, they have not been reported there and are unlikely to occur close to the ship channel.

Although the brown pelican is no longer on the endangered species list, USACE will continue to honor the agreements coordinated with the USFWS during Section 7 consultation in 2002 to ensure project impacts do not have a cumulative effect that could contribute to a USFWS determination that the species should be relisted. The coordinated measures designed to protect the T&E species listed in Table 52 can be found in a USFWS letter dated November 27, 2002 in Appendix B. For the brown pelican, the USACE agreed to:

1.
 - a. Armor the northeast corner of Pelican Island again to prevent erosion, but pull the armoring away from the bluff and put it onto the beach or in the water.
 - b. Coordinate with the USFWS and National Audubon Society (NAS) (the caretaker of Pelican Island) on the location and design of the armoring system during the design phase of the project.
 - c. Determine the engineering feasibility of several armoring designs and the foundation conditions that could limit the armoring locations and present these to the service.
 - d. Continue to coordinate the dredged material disposal locations on Pelican Island with the USFWS and NAS prior to disposal.
2.
 - a. Extend bayward from the east end of Pelican Island a 2,200 linear foot hydraulically filled embankment, protected by geotube and/or riprap, to prevent filling of a channel between Pelican Island and Point of Mustang.
 - b. Coordinate this embankment alternative with the USFWS during the design phase.

USACE has continued to meet its obligations under this agreement throughout the project design phase. However, after the 2003 coordination was completed, new information and other construction on Pelican Island occurred resulting in the need for additional coordination with USFWS. As a result of this coordination, it was determined that Measure No. 2, a 2,200 foot levee extending south from the east end of Pelican Island that was designed to prevent dredged material from flowing east into the channel between Pelican Island and Point of Mustang, was not needed. Surveys showed that dredged material was not filling in the channel, which would have made it easier for predators to cross the water from Point of Mustang to raid the nests of pelicans and colonial waterbirds at the rookery site on Pelican Island. Therefore, at a meeting on November 28, 2005, USACE requested that the USFWS remove Measure No. 2 from the list. USFWS concurred with the USACE assessment and agreed to remove the measure in a letter dated April 5, 2006 (Appendix B).

For Measure No. 1, the USACE developed plans for a stone revetment and stone breakwater to protect approximately 4,000 feet of shoreline along the eastern half of the north side of Pelican Island from erosion. However, in order to reduce loss of habitat and protect young pelicans, prior to Federal project construction, Port of Corpus Christi Authority (POCCA) applied for Coastal Impact Assistance Program (CIAP) funds to construct a stone breakwater along a shorter section of beach. POCCA was awarded funds to construct a 1,350-foot breakwater and construction was completed in October 2009. Although smaller, the CIAP breakwater has reduced shoreline erosion along the most critical part of the north shore.

On April 22, 2010, POCCA and USACE met with USFWS to determine if the smaller CIAP breakwater would be an acceptable substitute for the USACE design in protecting nesting habitat and fledgling pelicans. USFWS agreed that the CIAP funded breakwater was protecting a critical part of the shoreline, but requested that the armoring be extended to the full design length coordinated originally for project construction. USFWS stated the additional armoring was needed to protect shallow seagrass habitat behind a narrow isthmus connecting two lobes of Pelican Island to the west and to more fully protect the high bluff and trees used for nesting to the east. USACE agreed to redesign the armoring protection to include the CIAP breakwater, which will allow some savings in construction while extending the erosion protection along a greater length of shoreline.

In an email chain dated December 2008 (Appendix C), NMFS provided an explanation of USACE's responsibilities and an updated list of T&E species that could be found in the project area. The list included one new endangered species for consideration, the smalltooth sawfish, listed in 2003. No designated critical habitat was identified in the new species list. Table 53 shows the T&E species under the jurisdiction of NMFS and changes that have occurred since the 2003 Feasibility Report and FEIS were published.

Listed Species	Scientific Name	Status
Blue whale	<i>Balaenoptera musculus</i>	Endangered
Finback whale	<i>Balaenoptera physalus</i>	Endangered
Humpback whale	<i>Megaptera novaeangliae</i>	Endangered
Sei whale	<i>Balaenoptera borealis</i>	Endangered
Sperm whale	<i>Physeter macrocephalus</i>	Endangered
Green sea turtle	<i>Chelonia mydas</i>	Threatened ¹
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered
Loggerhead sea turtle	<i>Caretta caretta</i>	Threatened
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered
Dusky shark	<i>Carcharhinus obscurus</i>	Species of Concern ²
Largetooth sawfish	<i>Pristis pristis</i>	Candidate Species ³
Night shark	<i>Carcharhinus signatus</i>	Species of Concern
Saltmarsh topminnow	<i>Fundulus jenkinsi</i>	Species of Concern
Sand tiger shark	<i>Odontaspis taurus</i>	Species of Concern
Smalltooth sawfish ⁴	<i>Pristis pectinata</i>	Endangered
Speckled hind	<i>Epinephelus drummondhayi</i>	Species of Concern
Warsaw grouper	<i>Epinephelus nigritus</i>	Species of Concern
White marlin ⁵	<i>Tetrapturus albidus</i>	Species of Concern
Ivory bush coral	<i>Oculina varicosa</i>	Species of Concern

¹ Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

² Species of Concern are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.

³ The Candidate Species List has been renamed the Species of Concern List. The term "candidate species" is limited to species that are the subject of a petition to list and for which the NMFS has determined that listing may be warranted (69 FR 19975).

⁴ Added to 2008 listings.

⁵ Removed from 2011 listings.

The smalltooth sawfish inhabits shallow coastal waters of tropical seas and estuaries and are usually found in shallow waters very close to shore over muddy and sandy bottoms. They are often found in sheltered bays, on shallow banks, and in estuaries or river mouths. This species has been reported in the Pacific and Atlantic Oceans and Gulf of Mexico; however, the U.S. population is found only in the Atlantic Ocean and Gulf of Mexico. Historically, the U.S. population was common throughout the Gulf of Mexico from Texas to Florida, and along the east coast from Florida to Cape Hatteras. The current range of this species has contracted to peninsular Florida, and smalltooth sawfish are relatively common only in the Everglades region at the southern tip of the state. Anecdotal observations indicate that this species was once common throughout its historic range and that smalltooth sawfish have declined dramatically in the U.S. waters over the last century.

The sawfish decline in abundance has been attributed to their restricted habitat, low rate of reproduction, and the ease with which they become entangled in nets. It is their propensity for entanglement in the nets used by various fisheries, especially gill nets, which is believed to be the leading cause of the population decline. Because adults can grow very large, they can potentially damage fishing gear and also may pose a threat to fishermen. Therefore, many incidentally captured sawfish were killed before they were removed from fishing gear, even if the fishermen had no interest in keeping them.

Another cause for a decline in population is that juvenile sawfish use shallow vegetated habitats, such as mangrove forests, as important nursery areas. Many such habitats have been modified or lost due to development of the waterfront in Florida and other southeastern states.

Although suitable habitat for the whooping crane (in Nueces County, as well as San Patricio County) and smalltooth sawfish can be found in the project vicinity, the numbers, current range, and lack of home territories (whooping crane) in the area all contribute to the unlikely presence of these species in the project area. Therefore, for the reasons described above and the lack of any changes in the project that would alter the conclusions of the Section 7 consultation in the 2003 FEIS, it is again determined that the CCSC Channel Improvement Project may affect, but is not likely to adversely affect these species, and that the Measures identified in the 2003 FEIS and discussed in this report remain valid.

General Water Quality

Water quality in the Corpus Christi Bay system has improved over the 25 years preceding a 1997 system-wide study, with the exception of the Inner Harbor Channel, and the study area can generally be characterized as good. Existing water resources data for the Entrance Channel, Lower Bay, LaQuinta, and Upper Bay areas indicate no problems associated with water or

elutriate sample testing. However, historical water and elutriate data (prior to 1997) for the Inner Harbor, where petrochemical industries are located, indicated problems with heavy metals and oil and grease. Since 1997, water quality has shown improvement in the Inner Harbor. Nonetheless, dredged material from this channel reach will be placed in upland, fully-confined sites to minimize water quality concerns. Proposed excavation, construction and future maintenance activities may affect water quality within the project area by temporarily increasing turbidity and suspended sediment load in the estuarine water column. However, these temporary conditions are not expected to adversely impact marine mammals, essential fish habit or other aquatic resources in the study area.

Section 404(r) Water Quality Exclusion

Section 404(r) of the Clean Water Act of 1977, as amended, provides an exemption from obtaining either a state water quality certificate or Section 404 permit provided the following three requirements are met (ER 1105-2-100, Appendix C, page C-42.6g):

- 1) Information on the effects of the discharge of dredged or fill material into waters of the United States, including application of the Section 404(b)(1) Guidelines, are included in the EIS on the proposed project, and,
- 2) The EIS is submitted to Congress before the actual discharge takes place and prior to either authorization of the proposed project or appropriation of funds for its construction,
- 3) District commanders shall clearly document in the feasibility report when the 404(r) exemption criteria have been met, regardless of whether or not the District plans to obtain State water quality certification.

These requirements were met for this project and documented in Appendix A of the 2003 FEIS. The state agency responsible for water certification, Texas Natural Resource Conservation Commission in 2003 and Texas Council on Environmental Quality today, was aware of the District's invoking 404(r) and did not challenge it. A 404(r) justification request was prepared by the District and submitted to the Office of Assistant Secretary of the Army-Civil Works (OASA(CW)) and Secretary Woodley in 2007, who concurred in the use of the 404(r) waiver for this project based on his subsequent letters to Congress that indicated his intent to invoke 404(r). For the purposes of the LRR no new or additional water quality certification is required.

Hazardous, Toxic and Radioactive Waste

Site reconnaissance, review of historical regulatory data, aerial photography review, and interviews with regulatory officials for the 2003 FEIS found no National Priority List, State Superfund, or City/County Solid Waste Landfill sites in the study area. Texas Council on Environmental Quality (TCEQ) reported a contaminant plume of hydrocarbons and chromium seeping into the Inner Harbor. However, TCEQ reports that the release of contaminated groundwater to the waterway has been significantly reduced or eliminated since mid-2000. These risks will be reduced further during project construction by placing the dredged sediments in upland, fully-confined placement areas. Based on these findings, the probability of increased cost and lost time from discovery, coordination and disposal activities is low. While initial assessment findings indicate a low probability of waste discovery in the study area, contingency plans to efficiently deal with such events will be prepared prior to construction.

Air Quality and Noise

Nueces and San Patricio Counties, which compose the Corpus Christi urban air shed, remain in attainment for ozone and other air pollutants. As such, an air conformity determination is not required. Due to phased, one-time construction dredging and implementation of best management practices for reduction of construction emissions, it is expected that there will be no long-term impacts to air quality in the area.

A localized increase in the noise levels in the immediate project work area will result from proposed construction and maintenance dredging activities. However, this increase is expected to be temporary and will not significantly impact quality of life for inhabitants within the vicinity of the study area. The sensitive receptors are primarily limited to the Ingleside-on-the-Bay and Portland areas. These impacts were addressed in the 2003 FEIS. The noise impacts and project area receptors have not changed since coordination of the 2003 FEIS and further consideration of these impacts is not needed.

Historic Properties

Cultural resource investigations described in the 2003 FEIS identified potential impacts from proposed channel deepening and widening actions to one historic shipwreck: the *SS Mary* (41NU252) located adjacent to the Entrance Channel between the Port Aransas Jetties. Another unidentified shipwreck (41NU264) is located just beyond the end of the Port Aransas Jetties, but no adverse impacts to this site are expected due to natural scour having already occurred at this

site, which eliminates the need for dredging. There are no anticipated impacts to any other submerged or terrestrial cultural resources. No new resources have been identified in the study area since publication of the 2003 FEIS.

Socioeconomic and Environmental Justice Impacts

While the populations in San Patricio and Nueces Counties and the study area have grown since the 2003 FEIS was prepared, the relative proportions of ethnic groups have not changed significantly. The draft 2012 Environmental Assessment (EA) prepared for the CCSC La Quinta Channel Extension Deepening Project Section 204(f) Federal Assumption of Maintenance (La Quinta AOM) provided an update to the race and ethnicities occurring in census block groups within one mile of the study area using 2010 Census data. The populations of minority groups within this area are slightly lower than what was presented in the 2003 FEIS and are lower than overall minority populations in San Patricio and Nueces Counties. Hispanic and white populations remain dominant in the total populations of both counties and it is unlikely that the proportions of other population measures, such as household tenure, length of residency, median household incomes (in constant dollars), and employment have changed significantly since 2003.

The proposed project is likely to induce new industrial development within the Inner Harbor and along the north side of Corpus Christi Bay, particularly at the end of the La Quinta Channel Extension. The new industries will augment population growth within the two counties through the additions of new jobs, which will lead to increases in single-family homes, the tax base, and infrastructure to support travel, education, health, and public protection and support facilities. Project impacts are not considered a disproportionate impact on ethnic minorities or low-income populations since there are no disproportionately high and adverse human health or environmental effects on these populations. As discussed in the 2003 FEIS, only minor, temporary impacts on air quality from the recommended plan would occur during dredging activities and air quality from maintenance dredging and ship operations are expected to be similar to current conditions. Therefore, there are no populations in the area that would receive a higher exposure to emissions in areas adjacent to the Port. It is expected that the minority populations would experience no adverse changes to the demographics, economic, or community cohesion characteristics with their neighborhoods as a result of the project. On the contrary, it is expected that these populations would benefit from the project through an increase in economic output, creation of new industrial jobs or jobs to supply and support these industries, and tax base within the communities.

Mitigation

No ecosystem mitigation is required for elements addressed in this LRR (CCSC Widening and Deepening and Barge Shelves), but the following mitigation will occur for Historic Properties.

The wreck of the SS Mary, a National Register eligible property, will be impacted by project construction and requires mitigation. Traditional excavation/recovery cannot be conducted because of dangerous dive conditions resulting from heavy currents and proximity to heavy ship traffic. Because of this, USACE has proposed and the Texas State Historic Preservation Officer (SHPO) has concurred in development of an alternative mitigation plan under which USACE would develop and distribute an educational DVD addressing historic maritime trade along the Texas coast between 1800 and 1900, historic ship construction between 1800 and 1900, and underwater archeology. The primary target audience for this educational DVD would be Junior High School students as well as museum patrons. The DVD would be distributed to Junior High Schools and museums along the Texas Coast.

The 2003 FEIS included ecosystem mitigation for impacts to 5 acres of seagrasses, however, this mitigation site (referred to as BU Site GH) is not associated with the separable elements, CCSC Widening and Deepening and Barge Shelves, addressed in this LRR. This site was addressed in the 2010 La Quinta Channel Extension LRR and is currently under construction.

Cumulative Impacts

Nine past, present, and reasonably foreseeable future projects and their impacts upon the project area were evaluated in the 2003 FEIS. The cumulative impact assessment concluded the recommended plan had a net positive effect on the project area relative to the without project condition. Since publication of the 2003 FEIS and as described in the 2012 draft La Quinta AOM EA, three additional reasonably foreseeable future actions are anticipated in the project area. These three reasonably foreseeable future actions are: 1) Corpus Christi Liquefaction, 2) Port of Corpus Christi Multi-Purpose Cargo Dock and Container Facility, and 3) various non-Federal channel improvements.

Corpus Christi Liquefaction involves Cheniere Energy's current proposal to construct a Liquefied Natural Gas export facility on the La Quinta Channel Extension. This project, which was previously permitted as an import facility would result in impacts to approximately 14 acres of coastal saltmarsh, 1.3 acres of high marsh habitat, 3.2 acres of sand/algal flats, and 9.4 acres of submerged aquatic vegetation (SAV).

The Port of Corpus Christi Multi-Purpose Cargo Dock and Container Facility involves the Port's proposal to construct a multi-purpose cargo dock and container facility at the western terminus of the La Quinta Channel Extension. Environmental impacts are subject to project refinement.

Various non-Federal channel improvements are various proposed minor dredging projects, most of which will be conducted by Port's tenants along the La Quinta Channel, CCSC, and the GIWW.

Examples include the expansion of Kiewit Offshore Services “deep loading hole”, widening of the La Quinta Channel by Kiewit, and widening of the GIWW by Gulf Marine Fabricators. These projects are likely to result in minor impacts to SAV and will require mitigation to ensure no net loss of aquatic function.

The cumulative impacts analysis included in the 2003 FEIS concluded that impacts due to past, existing, and reasonably foreseeable future projects were found to produce a net positive cumulative impact in the CCSC area. Although some parameters were concluded to experience negative impacts, these impacts would be temporary and minor. Benefits realized through creation and protection of wetlands, seagrass, and marsh habitat by the preferred alternative and various other projects resulted in a net positive impact assessment. The cumulative impacts analysis included in the 2012 draft La Quinta AOM EA provided an update of anticipated reasonably foreseeable future actions in the project area and these three actions are described above. Because these actions are expected to be adequately mitigated, there would be no net loss of aquatic function in the project area. Therefore, conclusions of the cumulative impacts analysis included in the 2003 FEIS remain applicable in this environmental update.

Beneficial Use of Dredged Material

This LRR addresses the CCSC Widening and Deepening and Barge Shelves separable elements. The selected plan described earlier in this LRR, divides the channel into four separable segments. These four segments are: 1) Entrance Channel, 2) Lower Bay Portion of the CCSC, 3) Upper Bay Portion of the CCSC, and 4) Inner Harbor. The Dredged Material Management and Beneficial Use Plan (Appendix A of the 2003 FEIS) describes the Beneficial Use (BU) sites to be created within each segment. For the Entrance Channel, the following BU sites are to be constructed: BU Site ZZ and BU Site MN. For the Lower Bay Portion, the following BU Sites are to be constructed: BU Site I, BU Site Pelican, BU Site R, and BU Site S. For the Upper Bay Portion, only BU Site CQ will be constructed. There are no BU sites associated with the Inner Harbor segment.

BU Site GH is a site designated for seagrass mitigation and is not associated with the CCSC Widening and Deepening and Barge Shelves separable elements. This site was addressed in the 2010 La Quinta Channel Extension LRR and is currently under construction.

Two additional separable ecosystem restoration features of the selected plan were also developed. These sites are referred to as BU Site P and BU Site L. BU Site P was included in the 2010 La Quinta Channel Extension LRR and has been constructed. This BU site, also known as “Ecosystem Restoration at Ingleside”, serves as a breakwater along the La Quinta Channel and Port Ingleside. It was constructed as a rock breakwater and did not utilize beneficial use of

dredged material. This breakwater will function to minimize bank erosion and offer protection to existing shallow water seagrass habitat. BU Site L was constructed in 2005 by the City of Port Aransas using Coastal Erosion Planning and Response Act funding provided by the Texas General Land Office. This site was also constructed as a rock breakwater and did not utilize beneficial use of dredged material. This site is located on the south bank of the CCSC between Piper Channel and the public fishing pier to the west of Port Aransas and protects existing sensitive coastal “sand flats” habitat that was eroding due to ship wakes along the channel.

4.0 RECOMMENDED PLAN

This LRR demonstrates that the authorized 52-foot project for the CCSC and barge shelves segment is economically justified and is consistent with the administration's program for protecting the Nation's environment. The studies undertaken in the reevaluation effort have shown no significant impacts that would preclude plan implementation.

Pursuant to Section 1001(40) of WRDA 2007, subparagraph (B), in carrying out the authorized project, the Secretary shall enforce the navigational servitude in the CCSC (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of Section 101 of WRDA 86 (33 U.S.C. 2211). Therefore, the Sponsor is responsible for performing, or assuring the performance, of all relocations, including utility relocations, necessary for construction of the project. All relocations, including utility relocations, are to be accomplished at no cost to the Federal Government.

Because the recommended plan consists of a 52-foot deep navigation channel, the project is considered a deep-draft project. Therefore, in accordance with Section 101(a)(4) of WRDA 86, for all relocations of pipelines that are classified as "utility relocations," one-half of the cost of each such relocation shall be borne by the owner of the facility being relocated and one-half of the cost of each such relocation shall be borne by the Sponsor.

Consistent with the legislative history for Section 101 of WRDA 86, any pipeline, cable, or related facility located within the channel that must be relocated for construction of the project is considered a utility relocation for the purpose of applying the cost sharing rule in Section 101(a)(4) of WRDA 86, as amended.

As detailed earlier, this report updates the economics for two of the four separable elements previously authorized (WRDA 2007). Table 54 summarizes the project first cost of those two separable elements; the CCSC Widening and Deepening and Barge Shelves, at 2013 price levels (October 2012).

	Federal	Non-Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors	\$97,604	\$97,250	\$194,854
Bank Stabilization	\$17,160	\$17,160	\$34,320
Engineering and Design	\$6,355	\$6,305	\$12,660
Construction Management	\$4,802	\$4,785	\$9,587
Total GNF	\$125,921	\$125,500	\$251,421
Federal 100% for Cultural Resource Preservation			
Cultural Resources Preservation	\$294	\$0	\$294
Non-Federal Costs (100%)			
Lands	\$0	\$5,908	\$5,908
Non-Creditable Costs for LERRDS	\$0	\$817	\$817
Pipeline Relocation Costs (includes E&D & CM)	\$0	\$27,490	\$27,490
¹Total	\$126,215	\$159,715	\$285,930

¹Total does not include Associated Non-Federal Costs (\$61,643). Associated non-Federal costs are comprised of 100 percent pipeline removals (owner), 50 percent of pipeline relocation costs (owner), Berthing Area Modifications, Berthing Area Dredging, and Buoy Modifications.

Estimated costs for all four separable elements of the CCSC, Texas Channel Improvement Project at 2013 price levels are detailed in Tables 55, 56, 57, and 58. Because La Quinta Channel Extension and Ecosystem Restoration Separable Elements reflected in Tables 57 and 58 are nearing completion the cost estimate includes the actual construction cost for the one completed contract and minimal risk for those contracts nearing completion. For future work contracts (i.e., bank stabilization) including labor, the cost has been price leveled to October 2012.

	Federal	Non-Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors	\$97,205	\$97,205	\$194,410
Bank Stabilization	\$17,160	\$17,160	\$34,320
Engineering and Design	\$6,298	\$6,298	\$12,596
Construction Management	\$4,785	\$4,785	\$9,570
Total GNF	\$125,448	\$125,448	\$250,896
Federal 100% for Cultural Resource Preservation			
Cultural Resources Preservation	\$294	\$0	\$294
Non-Federal Costs (100%)			
Lands	\$0	\$5,908	\$5,908
Non-Creditable Costs for LERRDS	\$0	\$817	\$817
Pipeline Relocation Costs (includes E&D & CM)	\$0	\$27,490	\$27,490
¹Total	\$125,742	\$159,663	\$285,405

¹Total does not include Associated Non-Federal Costs (\$61,643). Associated non-Federal costs are comprised of 100 percent pipeline removals (owner), 50 percent of pipeline relocation costs (owner), Berthing Area Modifications, Berthing Area Dredging, and Buoy Modifications.

	Federal	Non-Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors	\$398	\$44	\$442
Engineering and Design	\$57	\$6	\$63
Construction Management	\$17	\$3	\$20
Non-Federal Costs (100%)			
Pipeline Relocation Costs	\$0	\$0	\$0
Total	\$472	\$53	\$525

	Federal	Non-Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors ¹	\$30,394	\$7,694	\$38,088
Bank Stabilization	\$583	\$148	\$731
Engineering and Design	\$3,331	\$843	\$4,174
Construction Management	\$2,617	\$662	\$3,279
Total GNF	\$36,925	\$9,347	\$46,272
Non-Federal Costs (100%)			
Lands	\$0	\$2,418	\$2,418
Non-Creditable Costs for LERRDS	\$0	\$60	\$60
Total²	\$36,925	\$11,825	\$48,750

¹ Includes \$1,161 in expended costs for P.A. 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded).

² Total does not include Associated Non-Federal Costs (\$24,310). Associated non-Federal costs are comprised of 100 percent pipeline removals owner), Ship Docking Terminal (Dredging Only), Berthing Area Dredging, and Buoy Modifications.

	Federal	Non-Federal	Total
Ecosystem Restoration			
Bank Stabilization	\$5,636	\$3,035	\$8,671
Engineering and Design	\$538	\$288	\$826
Construction Management	\$281	\$152	\$433
Non-Federal Costs (100%)			
Lands	\$0	\$0	\$0
Total	\$6,455	\$3,475	\$9,930

Total project first costs for the entire CCSC, Texas Project detailed in Table 59 were updated using actual construction costs where applicable and 2013 price levels (October 2012) for those not yet constructed. The Total Project Cost Summary (TPCS) and 902 at October 2012 price levels reflect the full cost of pipeline relocations (\$27,490,000) shown in Table 59. Previous to PED an updated Real Estate Plan will be developed.

Table 59
Project First Cost for the Entire Corpus Christi Ship Channel, Texas
Channel Improvement Project (\$000's)

	Federal	Non-Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors ¹	\$127,998	\$104,943	\$232,941
Bank Stabilization	\$17,743	\$17,307	\$35,050
Engineering and Design	\$9,687	\$7,149	\$16,835
Construction Management	\$7,416	\$5,450	\$12,868
Total GNF	\$162,844	\$134,849	\$297,695
Ecosystem Restoration			
Bank Stabilization	\$5,636	\$3,035	\$8,671
Engineering and Design	\$538	\$288	\$825
Construction Management	\$281	\$152	\$433
Total Ecosystem Restoration	\$6,455	\$3,474	\$9,929
Federal 100% for Cultural Resource Preservation			
Cultural Resources Preservation	\$294	\$0	\$294
Non-Federal Costs (100%)			
Lands	\$0	\$8,326	\$8,326
Non-Creditable Costs for LERRDS	\$0	\$877	\$877
Pipeline Relocation Costs (includes E&D & CM)	\$0	\$27,490	\$27,490
Total	\$169,593	\$175,017	\$344,610

¹ Includes \$1,161 in expended costs for PA 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded).

²Total does not include Associated Non-Federal Costs (\$85,953 for entire project). Associated non-Federal costs are comprised of 100 percent pipeline removals cost (owner), 50 percent of pipeline relocation costs (owner), Berthing Area Modifications, Berthing Area Dredging, and Buoy Modifications.

The previous cost of the entire project, including all separable elements, as detailed in the 2003 Feasibility Report, was \$153,808,000. All elements of the project were authorized in WRDA 07 at a cost of \$188,110,000.

5.0 POST AUTHORIZATION CHANGES

5.1 Changes in Project Purpose

There is no change in project purpose. The CCSC is a multipurpose project. The two project purposes are to provide navigation improvements to the Port of Corpus Christi, and to construct ecosystem restoration via beneficial uses of dredged material.

5.2 Changes in Scope of Authorized Project

There is no change in scope of the authorized project.

5.3 Changes in Local Cooperation Requirements

This economic update will be used to amend the existing Project Partnership Agreement (PPA) between the Port of Corpus Christi and USACE to include provision adopting project elements for the CCSC Widening and Deepening and Barge Shelves project components as presented in this LRR.

5.4 Changes in Location of Project

This economic update does not involve any change in location of the project.

5.5 Design Changes

This economic update does not require any design changes for the authorized project.

5.6 Changes in Total Project First Costs

The CCSC project for navigation and ecosystem restoration was authorized at a total cost of \$188,110,000 under WRDA 2007, based on the Report of the Chief of Engineers dated 2 June 2003 (October 2005 price level).

Project first costs have increased since authorization in WRDA 2007, from \$188,110,000 to \$344,610,000. Per guidance in ER 1105-2-100, Appendix G, paragraph G-16.a.(9) changes in total project first costs should be demonstrated by providing a table showing a four column comparison of 1) the estimated cost for the project being recommended; 2) the project as authorized by Congress; 3) the authorized project updated to current price levels (October 2012); and 4) the project last presented to Congress. Table 60 provides the project first cost comparisons.

Project First Cost for Project Being Recommended¹ (Oct 2002 Price Level)	Project as Authorized by Congress² (Oct 2005 Price Level)	Authorized Project Updated to Current Price Levels³ (Oct 2012 Price Level)	Current Project First Cost (Oct 2012 Price Level)
\$153,808	\$188,110	\$239,876	\$344,610 ⁴

¹This cost is from the 2003 Chief's Report.

²Cost from Chief's Report updated to October 2005 price level).

³This is the 188,110 cost updated to October 2012 price level.

⁴Includes \$1,161 in expended costs for PA 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded).

Using the certified 902 Tool, price indexes in EM 1110-2-1304 (September 2012) were utilized to develop a new Section 902 limit (\$283,544,726) based on October 2012 price levels (See Appendix D). The newly developed project first cost for the entire project is \$344,610,000. Based on these considerations the project now exceeds the Section 902 limit and will require additional authorization at the new price level.

The most current cost estimate for the CCSC, Texas Project was certified 31 August 2012. The project first cost, includes the cost of constructing the general navigation features, the value of lands, easements, and rights-of-way, the value of relocations provided under Section 101(a)(3) of WRDA 1986, as amended (33 U.S.C. 2211(a)(3)), and the costs of utility relocations borne by the non-Federal sponsor for utility relocations under Section 101(a)(4) of WRDA 1986, as amended (33 U.S.C. 2211(a)(4)). Based on October 2012 prices, the estimated project first cost is \$344,610,000 with an estimated Federal share of \$169,593,000 and an estimated non-Federal share of \$175,017,000, of which \$27,490,000 is for pipeline relocation cost by owner. The total project cost of \$381,854,000, is the constant dollar cost fully funded with escalation to the May 2018 mid-point of construction.

For the purpose of calculating the Section 902 limit, the total estimated first cost of the project is (a) \$344,610,000, including an estimated Federal share of (b) \$169,593,000, and an estimated non-Federal share of (c) \$175,016,000. These costs include

- (a) Includes only GNF costs (\$297,695,000) plus LERR value (\$9,203,000), (and for deep draft harbors) plus the 50% of deep draft utility relocation (DDUR) costs borne by the NFS (\$27,490,000) (ie. (a) = (b) + (c) below plus Ecosystem Restoration (\$9,929,000) and 100 percent Government cost for Cultural Resource Preservation (\$294,000).
- (b) Includes only the Government's percentage share of GNF costs (\$162,844,000), Governments cost share portion for Ecosystem Restoration (\$6,455,000), and 100 percent Government cost for Cultural Resource Preservation (\$294,000).
- (c) Includes only the NFSs initial percentage share of GNF costs (ie. not the extra 10% payment amount) (\$134,849,000) plus LERR value (\$9,203,000), (and for deep draft harbors) plus the 50% of DDUR costs borne by the NFS (\$27,490,000) and NFS cost share portion of Ecosystem Restoration (\$3,474,000).

All of the GNF project costs and associated costs are included in the benefit to cost ratio calculation

To compare the major components (i.e., Account 01, 12, etc.) from the Chief's report to the present cost estimate, the costs from the Chief's report major components were updated from October 2005 price levels to October 2012 price levels using computations provided in the EM 1110-2-1304, *Engineering and Design, Civil Works Construction Cost Index System (CWCCIS)* and EC 11-2-202, *Army Programs: Corps of Engineers Civil Works Direct Program Development Guidance Fiscal Year 2014*. The original costs from the Chief's report were updated to October 2012 price levels and compared to the current cost estimate accounts. Table 61 shows the costs for the original authorization at the October 2005 price level and the costs of the original authorization updated to October 2012 price levels using the aforementioned guidance above.

Table 61 displays the major components of the current cost estimate and then the difference in cost between the original and current cost estimates at FY13 (October 2012) price levels to illustrate how the costs have changed.

Table 61
Comparison of Costs between Original Authorization updated to October 2012 Price Level and Current Cost Estimate
(\$000s)

Cost Account	Description	Original Authorization by Congress (Fully Funded)	Original Authorization by Congress (Fully Funded)	Current Cost Estimate (Fully Funded)	Difference in Cost Between Original Authorization and Current Cost Estimate (Fully Funded)
01	Lands & Damages	(Price Level October 2005) \$5,965	(Price leveled to October 2012) \$7,606	(Price Level October 2012) \$9,710	(Both at October 2012 Price Level) \$2,104
02	Relocations	\$20,053	\$25,571	\$29,584	\$4,013
12	Navigation, Ports & Harbors	\$107,849	\$137,529	\$258,712	\$121,183
16	Bank Stabilization	\$32,369	\$41,276	\$47,392	\$6,116
18 ¹	Cultural Resources	\$0	\$0	\$310	\$310
30	Engineering & Design	\$11,121	\$14,181	\$20,340	\$6,159
31	Construction Management	\$10,753	\$13,721	\$15,806	\$2,085
	Total	\$188,110	\$239,875	\$381,854	\$141,979

¹In the original cost estimate the cultural resources preservation cost was not broken out into Cost Account 18. The only reference to Cultural Resources in the original cost estimate was itemized under the 30 code account as "Cultural Resources Studies Docs." Cost Engineer separated the mitigation cost from the 30 account for the purpose of calling attention to this item as a project cost.

The Baseline Cost Estimate Update and Section 902 Calculation in Appendix A includes a discussion in Section 8, outlining key factors driving the project's cost growth since it was authorized for construction under WRDA 2007. Those key factors, as considered in the updated project cost estimate, are included below.

Account Code 01 – Lands and Damages: The significant factors affecting the lands and damages costs are increased labor costs and a slight increase in land costs.

Account Code 02 – Relocations: The significant factors affecting the relocation costs are increased labor and material costs.

Account Code 12 - Navigation, Ports, and Harbors: The most significant increase in cost for the project is under the 12 Code Account. The price of fuel assumed in the original estimate (October 2002 price level) was \$1.00 per gallon. When the project cost was updated for the WRDA 2007 authorization the original project cost was simply inflated to the October 2005 price level by applying inflation and consumer price index adjustment factors. The updated costs did not reflect increases in fuel prices which fluctuated from a recorded low of \$1.67 a gallon to a high of \$2.86 a gallon in 2005. This approximate doubling of the fuel price typically results in an approximately 50 to 55 percent increase in the unit price of dredging. Additionally, the higher fuel price also translates to higher mobilization and demobilization costs for the dredge plant.

Assumed Bank Heights also have an impact on cost. The term bank height in dredging practices represents the face of material to be dredged. In the original cost estimate the bank height assumed for pipeline dredging was seven feet whereas the updated cost estimate (October 2012) was assumed to be a more conservative five to six feet bank height. When fuel prices are high, the lower bank height can dramatically increase dredging costs.

Again, labor and material costs have risen considerably. For example, the cost to place rock in the original estimate at 2001 prices was \$56.50 per ton. At the October 2012 price level, the cost to place stone is estimated at \$87.00 per ton. Thus, even after accounting for inflation in the cost of placing stone to October 2005 prices, the cost has increased considerably faster than the rate of inflation.

Account Code 16 – Bank Stabilization: The significant factors affecting the bank stabilization costs are increased labor and material costs. The estimated cost of placing stone for breakwaters and shoreline revetments today for example is 50% higher than what was estimated in the original cost estimate.

Account Code 18 - Cultural Resources Preservation: The increase in costs of Cultural Resources is due to this cost being included in account code 30 for the original cost estimate. This cost has now been reflected under the cultural resources account code.

5.7 Changes in Project Benefits

The existing CCSC project benefits result from navigation improvements and ecosystem restoration improvements. Navigation benefits associated with the various deepening and widening alternatives were derived from reductions in vessel transportation costs, reductions in vessel delays, and reductions in vessel casualties. Table 62 shows the Average Annual Benefits for the Widening and Deepening and Barge Shelves from the 2003 Feasibility Report and this economic update to FY 2013 Price Levels.

	Widening & Deepening 2003 Feasibility October 2000 prices	Widening & Deepening Economic Update October 2012 prices		Barge Shelves 2003 Feasibility October 2000 prices	Barge Shelves Economic Update October 2012 prices		Combined Widening & Deepening plus Barge Shelves October 2012 prices	
Interest Rate	5.87%	3.750%	7.000%	5.87%	3.750%	7.000%	3.750%	7.000%
AAB	\$32,607	\$51,942	\$43,971	\$134	\$743	\$812	\$52,685	\$44,783
AAC Construction	\$9,786	\$17,950	\$33,371	\$78	\$23	\$38	\$17,973	\$33,409
AAC O&M	\$1,670	\$5,705	\$5,714	\$27	\$16	\$15	\$5,702	\$5,729
AAC Total	\$11,456	\$23,655	\$39,085	\$105	\$39	\$53	\$23,693	\$39,138

Table 63 shows the Average Annual Benefits for the La Quinta Channel separable element from the 2003 Feasibility Report, the 2009 Economic Update for those two components, and then updated to 2013 Price Levels (October 2012).

	La Quinta 2003 Feasibility October 2000 prices	La Quinta 2009 Economic Update October 2009 prices	La Quinta Economic Update October 2012 prices	
Interest Rate	5.87%	4.375%	3.750%	7.000%
AAB	\$9,264	\$17,370	\$18,664	\$15,537
AAC Construction	\$1,494	\$5,593	\$6,057	\$9,098
AAC O&M	\$550	\$1,159	\$1,256	\$1,229
AAC Total	\$2,044	\$6,752	\$7,311	\$10,327

5.8 Benefit-Cost Ratio

The BCR for the La Quinta Channel Extension and Ecosystem Restoration separable elements is shown in Table 64. These values are derived from the 2003 Feasibility Report, the 2009 Economic Update titled *Corpus Christi Ship Channel, Corpus Christi, Texas, Limited Reevaluation Report, La Quinta Channel/Ingeside Breakwater, Economic/Environmental Update*, dated November 2009, and updating costs to October 2012 prices at a 3.750 percent interest rate.

La Quinta 2003 Feasibility October 2000 prices	La Quinta 2009 Economic Update October 2009 prices	La Quinta Updated October 2012 prices	
Interest Rate	Interest Rate	Interest Rate	
5.87%	4.375%	3.750%	7.000%
1.8	2.6	2.6	1.5

The Ecosystem Restoration separable element is addressed in Table 65 using at Average Annual Cost (AAC)/Average Annual Habitat Unit (AAHU) Comparison from the 2003 Feasibility Report, the 2009 Economic Update, and at October 2012 price levels. The AAHU totals detailed here are the same as identified in the 2003 Feasibility Report. No measurable changes have occurred at the site.

Report	2003 Feasibility Report	2009 Economic Update	2012 Economic Update
Price Level	October 2001	October 2009	October 2012
AAC	\$106,375	\$558,316	\$604,591
AAHU	16	16	16
AAC/AAHU	\$6,648	\$34,895	\$37,787

The RBRCR for the recommended project and the BCR for the authorized project at current price levels is shown in Table 66.

Widening & Deepening 2003 Feasibility <i>Oct 2000¹</i>	Widening & Deepening Economic Update		Barge Shelves 2003 Feasibility <i>Oct 2000</i>	Barge Shelves Economic Update		Combined Widening & Deepening and Barge Shelves <i>Oct 2012</i>		Combined Widening & Deepening, Barge Shelves, & La Quinta Extension <i>Oct 2012</i>	
	<i>Oct 2012</i>		<i>Oct 2000</i>	<i>Oct 2012</i>		<i>Oct 2012</i>		<i>Oct 2012</i>	
	BCR	RBRCR		BCR	RBRCR		RBRCR		Total RBRCR
5.87% ²	3.750%	7.000%	5.875%	3.750%	7.000%	3.750%	7.000%	3.750%	7.000%
2.6	2.2	1.1	1.6	18.9	15.4	2.2	1.1	2.3	1.2

¹Price Level and ²Interest Rate

The 2003 Feasibility Report showed a BCR of 2.6 for the widening and deepening and a BCR of 1.6 for the barge shelves using October 2000 prices and a 5.87 percent interest.

The RBRCR for this economic update is 2.2 for the widening and deepening and 18.9 for the barge shelves using October 2012 prices and 3.750 percent interest. The RBRCR was also calculated at a value of 1.1 for the widening and deepening and 15.4 for the barge shelves using a 7.0 percent interest. The RBRCR has markedly increased for the barge shelves separable element due to the fact that the bay bottom is currently very close to the authorized depth for the barge shelves; therefore, the construction of the barge shelves will require minimal dredging.

5.9 Cost Apportionment and Cost Allocation

This project involves several different cost sharing rates. Project cost sharing for the construction would be apportioned as shown in Table 67:

Table 67 - Cost Apportionment (\$000)		
Project Feature	Cost Share Rate	
	Federal	Non Federal
Navigation Features for the CCSC – 52 foot depth (50/50)	\$125,448	\$125,448
Navigation Features for Barge Shelves – 12 foot depth (90/10)	\$472	\$53
Navigation Features for La Quinta Extension – up to 20 foot depth (90/10)	\$13,326	\$1,481
Navigation Features for La Quinta Extension – 20 to 39 foot depth (75/25)	\$23,598	\$7,866
Total Cost Shared GNF	\$162,844	\$134,848
Navigation Cultural Resources Preservation (up to 1%) – (100/0)	\$294	\$0
Ecosystem Restoration Features (65/35)	\$6,455	\$3,475
Navigation Pipeline Relocation (0/100)	\$0	\$27,490
Navigation Lands (0/100)	\$0	\$8,326
Navigation Non-Creditable Costs for LERRS	\$0	\$877
Total Cost Shared (Other)	\$6,749	\$40,168
Total	\$169,593	\$175,016
Total General Navigation Features Costs and Credits		
Cost-Shared GNF	\$297,692	
10 percent of GNF	\$29,769	
Creditable Land Costs	\$8,326	
Creditable Difference	(\$21,443)	

Table 68 presents the allocation of cost among the project purposes for the authorized project (October 2005 price levels) and the recommended project (project update) at October 2012 price levels.

Table 68 – Changes in Cost Allocation (\$000) for all Separable Elements		
Construction Item	Authorized Cost Recommended Plan (1 Oct 2005 price level)	First Project Cost Recommended Plan (1 Oct 2012 Price level)
CORPUS CHRISTI SHIP CHANNEL (CCSC)		
Federal Costs – Corps of Engineers		
General Navigation Features (50%)	\$63,617	\$125,448
Cultural Resources Preservation (100%)		\$294
Non-Federal Costs		
General Navigation Features (50%)	\$63,617	\$125,448
Non-Federal Costs (100%)		
Lands	\$3,728	\$5,908
Navigation Non-Creditable Costs for LERRDS		\$817
Relocations – Pipelines (Incl E&D; CM)	\$21,786	\$27,490
TOTAL CCSC Navigation	\$152,748	\$285,405
BARGE SHELVES		
Federal Costs – Corps of Engineers		
General Navigation Features (90%)	\$774	\$472
Non-Federal Costs		
General Navigation Features (10%)	\$86	\$53
TOTAL Barge Shelves	\$860	\$525
LA QUINTA EXTENSION		
Federal Costs – Corps of Engineers		
General Navigation Features up to 20' depth (90%)	\$0	\$13,326
General Navigation Features 20' to 39' depth (75%)	\$19,781	\$23,598
Non-Federal Costs		
General Navigation Features up to 20' depth (10%)	\$0	\$1,481
General Navigation Features 20' to 39' depth (25%)	\$6,593	\$7,867
Non-Federal Costs (100%)		
Lands	\$1,954	\$2,418
Navigation Non-Creditable Costs for LERRDS		\$60
Relocations – Pipelines (Incl E&D; CM) (100%)	\$1,323	\$0 ¹
TOTAL La Quinta Extension	\$29,651	\$48,750
ECOSYSTEM RESTORATION		
Federal Costs – Corps of Engineers (65%)		
Ecosystem Restoration (65%)	\$3,638	\$6,455
Non-Federal Costs (35%)		
Ecosystem Restoration (35%)	\$1,213	\$3,475
TOTAL Ecosystem Restoration	\$4,851	\$9,930
Total Project First Cost – All Components²	\$188,110	\$344,610

¹Pipeline owners removed pipelines – no cost to project.

²Includes \$1,161 in expended costs for PA 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded).

5.10 Environmental Considerations in Recommended Changes.

This report concerns an economic update for an authorized project. There have been no significant changes in the project area or sensitive resources that would result in impacts to resources not previously considered and accounted for in the 2003 FEIS. Based on this consideration, the ROD remains applicable to the recommended plan; however, updates to environmental clearances (e.g., Endangered Species Act) have been provided in Section 3.0 of this document.

5.11 Public Involvement

This report concerns an economic update for an authorized project. There has been no additional public coordination.

6.0 RECOMMENDATION

I recommend that the Corpus Christi Ship Channel, Corpus Christi, Texas Project, as authorized by Section 1001(40) of WRDA 07, be reauthorized at current cost levels as outlined in this re-evaluation report, and remaining construction implemented to completion by the construction of the two remaining authorized separable elements: 1) the deepening and widening of the Corpus Christi Ship Channel; and 2) construction of barge shelves paralleling the Corpus Christi Ship Channel. , Based on increased construction costs since authorization, , the construction of these two separable elements would exceed the WRDA 86 Section 902 limit for the authorized project.

I further recommend the existing Project Partnership Agreement (PPA), executed with the non-Federal sponsors on October 13, 2009, be amended to include the Corpus Christi Ship Channel and Barge Shelves separable component features, descriptions, costs, and cost sharing, in order to implement the remaining authorized project construction as generally described in this report.

A Limited Reevaluation Report updating the economics and environmental information for the La Quinta Extension and the Inglese Ecosystem Restoration separable elements was previously approved in 2010 and the construction of the ecosystem feature is complete and the construction of the La Quinta Channel Extension is scheduled to be complete in 2013.

The original Section 902 limit for the entire project is updated to current FY 13 levels (October 2012), and is \$278,722,927. The current Total Project First cost of the authorized project, including features already constructed or under construction and the cost for this LRR, is \$344,610,000 not including inflation and interest during construction. This exceeds the original Section 902 limit; therefore, for the purpose of calculating the new Section 902 limit, the total estimated first cost of the project is \$344,610,000, including an estimated Federal share of \$169,593,000, and an estimated non-Federal share of \$175,017,000. The total average annual costs for the remaining Corpus Christi Ship Channel and Barge Shelves separable components are \$23,655,000, and \$39,000, respectively. The Fully Funded Project Cost of the project is \$381,854,000.

The non-Federal sponsor, prior to implementation, shall agree, through the amendment to the PPA, to perform items of project partnership which may include, if applicable, the following:

a. Provide 10 percent of the total cost of construction of the general navigation features (GNFs) attributable to dredging to a depth not in excess of 20 feet; plus 25 percent of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 20 feet but not in dredging to a depth in excess of 45 feet as further specified below:

1. Provide 25 percent of design costs allocated by the Government to commercial navigation in accordance with the terms of a design agreement entered into prior to commencement of design work for the project;

2. Provide, during the first year of construction, any additional funds necessary to pay the full non-Federal share of design costs allocated by the Government to commercial navigation;

3. Provide, during construction, any additional funds necessary to make its total contribution for commercial navigation equal to 10 percent of the total cost of construction of the GNFs attributable to dredging to a depth not in excess of 20 feet; plus 25 percent of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 20 feet but not in excess of 45 feet; plus 50 percent of the total cost of construction of the GNFs attributable to dredging to a depth in excess of 45 feet;

b. Provide all lands, easements, and rights-of-way (LER), including those necessary for the borrowing of material and the disposal of dredged or excavated material, and perform or ensure the performance of all relocations, including utility relocations, all as determined by the Federal Government to be necessary for the construction or operation and maintenance, 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 GNFs less the amount of credit afforded by the Government for the value of the LER and relocations, including utility relocations, provided by the Sponsor for the GNF. If the amount of credit afforded by the Government for the value of the LER and relocations, including utility relocations, provided by the Sponsor equals or exceeds 10 percent of the total cost of construction of the GNFs, the Sponsor shall not be required to make any contribution under this paragraph, nor shall it be entitled to any refund for the value of LER and relocations, including utility relocations, in excess of 10 percent of the total cost of construction of the GNFs;

d. Provide, operate, maintain, repair, replace, and rehabilitate, at its own expense, the local service facilities in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

e. Provide 50 percent of the excess cost of operation and maintenance of the project over that cost that the Federal Government determines would be incurred for operation and maintenance if the project had a depth of 45 feet;

f. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Sponsor owns or controls for access to the project for the purpose of completing, inspecting, operating, and maintaining the GNFs;

g. Hold and save the United States free from all damages arising from the construction or operation and maintenance of the project, any betterments, and the local service facilities, except for damages due to the fault or negligence of the United States or its contractors;

h. Keep, and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as will properly reflect total cost of construction of the GNFs, and in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and local governments at 32 CFR, Section 33.20;

i. Perform, or ensure performance of, any investigations for hazardous substances as 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 USC 9601–9675, that may exist in, on, or under LER that the Federal 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 investigations unless the Federal Government provides the Sponsor with prior specific written direction, in which case the Sponsor shall perform such investigations in accordance with such written direction;

j. Assume complete financial responsibility, as between the Federal Government and the Sponsor, for all necessary cleanup and response costs of any hazardous materials regulated under CERCLA that are located in, on, or under LER that the Federal Government determines to be necessary for the construction or operation and maintenance of the project;

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

l. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 USC 1962d-5b), and Section 101 of the WRDA 86, Public Law 99-662, as amended, which provide that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the Sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

m. Comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 USC 4601– 4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring LER required for construction or operation and maintenance of the project; and inform all affected persons of applicable benefits, policies, and procedures in connection with said act;

n. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 USC § 2000d et seq.), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled “Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army.” The Sponsor is also required to comply with all applicable Federal labor standards requirements including, but not without substantive change the provisions of the Davis-Bacon Act (formerly 40 USC 276a et seq.), the Contract Work Hours and Safety Standards Act (formerly 40 USC 327 et seq.), and the Copeland Anti-Kickback Act (formerly 40 USC 276c);

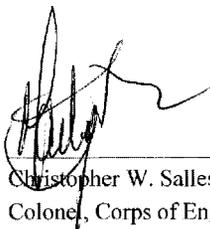
o. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1 percent of the total amount authorized to be appropriated for the project; and

p. Not use funds from other Federal programs, including any non-Federal contribution required as a matching share therefore, to meet any of the Sponsor’s obligations for the project unless the Federal agency providing the Federal portion of such funds verifies in writing that such funds are authorized to be used to carry out the project.

q. Provide any necessary additional contribution required to balance the cost sharing for study costs of for this Limited Reevaluation Report at 50% Federal and 50% Non-federal.

The recommendations contained herein reflect the information available at this time and current departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified prior to transmittal to the appropriate authority as proposals for implementation funding. However, prior to transmittal to the Congress, the non-Federal Sponsors, the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.

9 Nov 2012
Date



Christopher W. Sallase
Colonel, Corps of Engineers
District Engineer

File



US Army Corps of
Engineers®

**BASELINE COST ESTIMATE UPDATE
AND SECTION 902 CALCULATION**

APPENDIX

**CORPUS CHRISTI SHIP CHANNEL, TEXAS
CHANNEL IMPROVEMENT PROJECT**

September 2012

Prepared for:
U.S. Army Corps of Engineers
Galveston District

Prepared by:
U.S. Army Corps of Engineers
Professional Services Section,
Galveston District

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EXECUTIVE SUMMARY

Purpose. The U.S. Army Corps of Engineers, Galveston District, has begun making improvements to the Corpus Christi Ship Channel (CCSC) Project that were authorized for construction under the Water Resources Development Act of 2007. These improvements are: 1) deepening and widening of the main Corpus Christi Ship Channel, 2) adding barge shelves along the ship channel, 3) extending the length of the existing La Quinta Channel to include a new turning basin, and 4) protecting and preserving existing seagrass near the community of Ingleside-on-the-Bay at the junction of the La Quinta Channel with the CCSC. The improvements are separable components of the larger CCSC Improvement Project and each therefore must be economically justified as a stand-alone project. Construction of one of the components – the ecosystem restoration component which will preserve existing seagrass - is almost completed. The La Quinta Channel Extension is also under construction and scheduled to be completed in mid 2013. The purpose of updating the total project cost is two-fold – to find out 1) if the remaining project components – deepening and widening the main CCSC and adding barge shelves – are still economically viable for construction and 2) if the total project cost is under the Section 902 limit. This report presents in detail the fully funded project cost broken out by the feature cost code accounts.

Background. The project serves ports at Corpus Christi, Harbor Island, and Ingleside in Nueces County, Texas. Because of its importance to the regional and national economies, the number of very large crude carriers that are presently calling upon the Port of Corpus Christi which cannot now traverse the waterway due to their size, and because a new container terminal is planned at the terminus of the La Quinta Channel, among other economic considerations, a comprehensive feasibility study was undertaken to see if channel improvements would be economically feasible. The last deepening of the waterway was completed in 1989. This study was completed in 2003 and all components comprising the project were subsequently authorized for construction under the Water Resources Development Act of 2007. On October 13, 2009, the Project Partnership Agreement (PPA) was executed for the La Quinta Channel Extension and Ecosystem Restoration components. Construction of both these components began in late 2011. The PPA for the deepening and widening of the main channel could not be executed because the escalated authorized project cost exceeded the Section 902 limit.

Project Scope. The recommended improvement plans are to deepen the channel to -52 feet MLT and widen it where practicable to 530 feet; add 200-foot wide barge shelves on both sides of the channel through the Corpus Christi Bay reach; extend the La Quinta Channel 1.4 miles at a depth of -39 feet MLT; and build an ecosystem restoration feature near the community of Ingleside-on-the-Bay. The ecosystem restoration feature is nearly completed and the La Quinta Channel Extension project is scheduled to be completed in mid 2013. The scope of work for the improvement project has not changed.

Risk Methodology. A risk analysis was performed to establish reasonable contingencies reflective of an 80 percent confidence level to successfully accomplish the project work within the established contingency amounts. The results of the analysis are intended to provide project planners and management with contingency information for project planning, budgeting, and scheduling purposes, as well as provide tools to support decision-making and risk management as the project progresses through planning and implementation.

Total Project Cost Summary. The estimated first cost of the project (prior to full funding) is \$336.79 M at the 1 October 2011 price level. Fully funded, the total project cost is estimated to be \$374.37 M (including already spent dollars), the Federal portion of which is \$183.6 M and the Non-Federal portion \$190.77 M. The project cost was certified by the Walla Walla Cost Engineering Technical Center of Expertise as meeting the quality standards prescribed in ER 1110-2-1150 – Engineering and Design for Civil Works and ER 1110-2-1302 – Civil Works Cost Engineering after its review of the project scope, report, cost estimates, schedules, escalations, and risk-based contingencies. The total cost of items and work incidental to construction of the Federal project which are not considered to be directly project-related is estimated to be \$106.45 million. Such items of work include utility and pipeline relocations, dredging of berthing areas, upgrades and improvements to dock facilities, the construction of new dock facilities, and navigation aids relocations.

COST ENGINEERING REPORT

1. INTRODUCTION

Elements of the Corpus Christi Ship Channel (CCSC) Improvement Project have already been implemented and are under construction, those being the La Quinta Channel Extension and Ecosystem Restoration projects. The main CCSC deepening and widening component which comprises the largest piece of the improvement project and Barge Shelves component have yet to be implemented. This report describes in detail the updated project costs for all feature accounts expected to be associated with this project.

The project cost is being updated to see if the CCSC deepening and widening and Barge Shelves components of the project are still economically viable for construction and to see if the total cost is under the 902 limit. This report also presents the rationale for the project's significant cost growth.

2. REFERENCES

ER 1110-1-1300, Cost Engineering Policy & General Requirements, 26 Mar 1993.

ER 1110-2-1302, Civil Works Cost Engineering, 15 Sep 2008.

EI 01D010, Construction Cost Estimates, 1 Sep 1997.

EP 1110-1-8, Volume 2, Construction Equipment Ownership and Operating Expense Schedule – Region VI, July 2007.

EC Bulletin No 2007-17, Application of Cost Risk Analysis Methods to Develop Contingencies for Civil Works Total Project Costs, 10 Sep 2007.

EM 1110-2-1304, Civil Works Construction Cost Index System (CWCCIS), 31 Mar 2008.

ETL 1110-2-573, Construction Cost Estimating Guide for Civil Works, 30 Sep 2008.

3. PROJECT DETAILS

3.1. CORPUS CHRISTI SHIP CHANNEL - MAIN CHANNEL

The National Economic Development Plan for the Corpus Christi Ship Channel entails deepening and widening of the existing channel from the Entrance Channel to a point about ½ mile east of the Harbor Bridge. From there, the channel will be deepened without widening, except at the Tule Lake Lift Bridge (Navigation Boulevard), where selective widening will be done. The estimate assumes that the Tule Lake Lift Bridge, which is planned to be removed, will be removed by the time construction begins on this channel reach. Also, the existing Entrance Channel will be lengthened 10,000 feet. Altogether, 36 miles of channel are to be dredged.

The presently authorized 45-foot channel will be deepened to -52' feet MLT, except for the Entrance Channel, which will be deepened from its present depth of -47' MLT to an authorized depth of -54' MLT. Substantial widening of the channel is only prescribed through Upper Corpus Christi Bay, where the channel will be widened from its present 400-foot width to 530 feet. Lesser widening, from 500 feet to 530 feet, is prescribed for the Lower Corpus Christi Bay reach.

New work dredge material will be used beneficially to build/create 4 marsh habitats of varying diversity types ranging from submerged to fully emergent topographies. Each habitat will be semi-enclosed and protected behind geotextile-tube or rock breakwater dikes. Using the dredge material beneficially to create new marsh habitat in open water, even with the added expense of building the containment dikes, was determined to be a cost-effective way of disposing the material while enhancing the environment at the same time.

Note: The removal of maintenance material residing within the existing channel template at the time the new work dredging is done will be paid for with O&M funds.

3.2. CORPUS CHRISTI SHIP CHANNEL - BARGE SHELVES

Barge shelves, 200 feet wide by 12 feet deep, are planned alongside both sides of the waterway through the Upper Bay. The barge shelves are to run from the junction of the CCSC with the La Quinta Channel to near the entrance of the Inner Harbor (approximately 10 miles). For the most part, the existing bay bathymetry along the channel is already deep enough to accommodate barge tows, so little dredging is necessary. In fact, the areas flanking the channel are currently being used to transport barges and keep them out of the channel. Some buoys will have to be relocated to demarcate the barge shelves.

3.3. CORPUS CHRISTI SHIP CHANNEL - LA QUINTA CHANNEL EXTENSION

The La Quinta Channel Extension project is under construction and scheduled to be completed in mid 2013. La Quinta Channel is being extended 1.4 miles westward from its current terminus. The extended part will be dredged to the same depth and width as the existing channel at -39' MLT by 400 feet terminating in a second turning basin. The dredged material will be used beneficially to build marsh habitat and a seagrass bed platform in open water adjacent to the extension which will incidentally serve to shelter the channel and turning basin from strong wind-generated waves. Material in excess of that needed to build the marsh habitat and seagrass bed platform will be disposed in an upland placement area – Placement Area 14 – which is a new upland placement area that was specifically constructed for this project in 2010. Fifteen (15) acres of seagrass are to be planted within the beneficial-use site to mitigate the project impacts to approximately 5 acres of seagrass.

3.4. CORPUS CHRISTI SHIP CHANNEL – ECOSYSTEM RESTORATION

The construction of a near-shore rock breakwater and corresponding shoreline revetment near the community of Ingleside-on-the Bay where the La Quinta Channel branches off the Corpus Christi Ship Channel is nearing completion. The breakwater structure is intended to protect 40 acres of highly productive seagrass between it and adjacent shoreline. The shoreline revetment will serve to protect the shoreline from strong ship wakes, wave attack, and induced littoral currents along the shoreline.

4. ASSOCIATED PROJECT COSTS

4.1. CORPUS CHRISTI SHIP CHANNEL – MAIN CHANNEL

It is expected that 17 supply pipelines will have to be removed and 26 pipelines relocated as a result of the channel deepening. All pipeline removals only will be at the owner's/operator's expense. For those pipelines which are to be removed and relocated, the costs for the relocations are to be shared 50/50 between the Non-Federal Sponsor and the pipeline owner/operator where pipeline ownership can be determined. For the project cost estimate, it was assumed that the ownership of all pipelines can be established. In the event the ownership of a particular pipeline cannot be established, the Non-Federal Sponsor and the Government will cost share 50/50 in the pipeline's removal cost. The Non-Federal Sponsor's 50% share of the relocation costs is considered a project cost and was included as such. The other half is considered a cost associated with the channel deepening. It was assumed in the cost estimate that the pipelines to be relocated will be done so via directional drilling to a deeper depth at the same crossing location. Non-Federal costs associated with the project include the costs to deepen berthing areas and upgrade/further develop 11 dock and terminal facilities in the Inner Harbor reach. Navigation buoys will also have to be relocated.

4.2 CORPUS CHRISTI SHIP CHANNEL - LA QUINTA CHANNEL EXTENSION

All 5 supply pipelines that formerly crossed the channel extension footprint were removed at owner/operator expense. Consequently, the Non-Federal Sponsor did not incur any of the costs for the pipeline removals. A new multi-purpose dock and terminal facility is planned to handle a wide variety of cargo. The costs to develop this facility will be incurred by the Non-Federal Sponsor and commercial enterprises.

5. COST METHODOLOGY

5.1. GENERAL

The baseline cost estimate is based on effective prices as of 1 October 2011 and follows the guidelines and policies found in ER 1110-1-1300 - Cost Engineering Policy and General Requirements and ER 1110-2-1302 - Civil Works Cost Engineering. The estimate was completed using the latest guidance from the Office of the Chief of Engineers concerning implementation of the Civil Works Breakdown Structure (CWBS).

5.2. COST STRUCTURE

The baseline cost estimate for the channel improvement project was organized based on the project's feature components and construction contracts proposed by the PDT. The constituent items for each component were then broken out following the CWBS format. The project costs are presented on 3 Total Project Cost Summary (TPCS) spreadsheets. One spreadsheet presents the project's total cost by summing the costs of the Corpus Christi Ship Channel – Main Channel and Barge Shelves TPCS and the La Quinta Extension and Ecosystem Restoration TPCS, both of which present the costs in detail for their respective components and the assumed construction contracts.

The PDT made certain assumptions regarding the number of construction contracts that would be necessary to construct the remaining project components, contract sequencing, and resourcing. Accordingly, the estimates were developed to follow these contracts and sequencing. As the estimating effort progressed, the construction durations computed based on the size dredge and production efficiencies assumed and the costs calculated were considered in deciding on the final number and duration of the construction contracts. The construction schedules are largely premised on a single 30-inch pipeline dredge doing the work.

The Corps of Engineers' Dredge Estimating Program (CEDEP) and MII, version 4.1, cost estimating program were used to develop the construction costs, major resources, and construction durations. The 30 and 31 account dollar amounts were developed using the TPSC spreadsheets. Real Estate provided the 01 account costs for lands and damages. The escalation percentage was computed using the Civil Works Construction Cost Index System (CWCCIS) predicated on when the contract is scheduled to be executed. Contingences were developed for each project component by way of identifying and weighing the risks to the project cost and schedule.

The following feature accounts (CWBS) are associated with the improvement project:

- a. **(01) Lands and Damages.** This account includes the costs for both permanent and temporary real estate acquisitions. Temporary easements will be needed to provide equipment staging areas. Appropriate administrative costs have been included in this account.
- b. **(02) Relocations.** This account is for project-related costs associated with removing and relocating utilities that are to be incurred Non-Federal Sponsor. For the navigation project, the only utilities to be removed and relocated are pipelines. Relocated pipelines are expected to be directionally drilled to a deeper depth at their present locations to provide adequate clearance between the deepened channel bottom and pipeline.
- c. **(12) Navigation, Ports, & Harbors.** Included in this account are all costs associated with new work dredging of the channel, including the costs of disposing the material. Associated project costs such as those for dredging to deepen existing berthing areas and modifying existing dock and terminal facilities, while associated with this feature account, are not costs that have to be incurred to construct the project; therefore, they are not included in the total project cost.
- d. **(16) Bank Stabilization.** This account is for all non-dredging work associated with constructing the ecosystem enhancement/restoration features which consists of the building of geotextile-tube and rock containment dikes. The plantings of fringe *Spartina alterniflora* and seagrass are also included in this feature account.
- e. **(18) Cultural Resource Preservation.** This account is for the mitigation effort associated with archiving the shipwrecked "Mary" which will be impacted by the improvements to the Entrance Channel but cannot be recovered from its south bank. In all likelihood, the mitigation effort will be documentation of the historical significance of the "Mary" and similar-type ships of the same era that could include presentation in a public exhibit.

- f. **(30) Planning, Engineering, and Design.** The work covered under this account includes project management, planning, preliminary and final designs, geotechnical investigations, hydraulic modeling if needed, the preparation of contract plans and specifications, engineering and design during construction, contract solicitations, bid openings, and contract awards.
- g. **(31) Supervision and Administration.** The work covered under this account includes contract supervision and administration, construction administration, technical management activities, and district office supervision and administration.

6. KEY ASSUMPTIONS

Key assumptions are those assumptions most likely to significantly affect or influence determinations and weights of the risks identified in the risk analysis. They are important in aiding project leaders and other decision-makers understand the steps, logic, limitations, and decisions made in the risk analysis, as well as any resultant limitations on the use of outcomes.

Reauthorization of the project will be necessary if the Section 902 limit is exceeded. Although the project scope has not changed since the project was authorized for construction in 2007, significant price increases in the intervening years and further delays in construction that have price inflation consequences associated with future construction have resulted in substantial cost growth. Originally, the entire project was anticipated to have been completed by now. The main risk drivers influencing project cost continue to be the availability of adequate funding that if not provided will result in smaller and more construction contracts (reducing contract execution efficiency), which will prolong construction and increase cost; fuel price volatility where the fuel price could potentially go even higher than what was assumed in this estimate; and assumed projected dredge production efficiencies premised on the assumed consistencies of the material to be dredged, effective bank heights, and pumping efficiencies.

7. ESTIMATED PROJECT COSTS

The estimated project first cost (prior to full funding) is \$350.54 M at the 1 October 2011 price level. Fully funded, the total project cost is estimated to be \$374.19 M (including spent dollars), the Federal portion of which is \$183.42 M and the Non-Federal portion \$190.77 M. The project cost has been certified by the Walla Walla Cost Engineering Technical Center of Expertise as meeting the quality standards prescribed in ER 1110-2-1150 – Engineering and Design for Civil Works and ER 1110-2-1302 – Civil Works Cost Engineering after its review of the project scope, report, cost estimates, schedules, escalations, and risk-based contingencies. See the Total Project Cost Summaries in Appendix A for the estimated costs of the separable project components and individual contracts. A TPCS is also provided for the entire project. The total cost of items and work incidental to construction of the Federal project which are not considered to be directly project-related is estimated to be \$106.45 million. Such items of work include utility and pipeline relocations, dredging of berthing areas, upgrades and improvements to dock facilities, the construction of new dock facilities, and navigation aids relocations. See Appendix G for the TPCS for the associated project costs.

8. REASONS FOR PROJECT COST GROWTH

- a. Increase in Fuel Price. The original cost estimate was prepared in 2001 where an effective pricing date of 1 October 2001 was assumed. The price of fuel assumed in the original estimate was \$1.00 per gallon. When updating the project cost for the WRDA 2007 authorization, the original project cost was simply inflated to the 1 Oct 2005 price level by applying inflation and consumer price index adjustment factors. It was not determined how much the fuel price increased based on these adjustment factors, but the historical fuel price quote record shows that fuel prices fluctuated widely in 2005 from a recorded low of \$1.67 a gallon to a high of \$2.86 a gallon. The fuel price reflected in the 2012 updated cost estimate is \$3.55 a gallon. One can reasonably conclude then that the fuel price assumed in the current estimate is likely twice that intrinsically assumed in the inflated dredging cost to the 2005 price level. For the dredging costs associated with this particular project, a doubling of the fuel price typically equates to a 50 to 55% increase in the unit price of dredging. This is because the fuel price used in the original estimate was relatively low to begin with that any substantive increase is going to have an enhanced effect on the dredging cost. The higher fuel price also translates to higher mobilization and demobilization costs for the dredge plant.
- b. Assumed Bank Heights. The effective dredging bank heights assumed in the 2012 updated cost estimate were conservatively assumed to be 1 to 2 feet lower than the uniform 7-foot bank height assumed for pipeline dredging in the original cost estimate. For the Corpus Christi Bay reach, where the effective bank height was assumed to be 6 feet, this assumption is modestly conservative when considering the existing channel depth and that the channel is to be widened. The channel banks to be dredged in conjunction with the widening will present higher bank heights that will increase dredging productivity. At least 60% of the volume of new work material to be dredged is expected come from the bay reach. Outside the bay reach, the lower effective bank heights assumed in the updated cost estimate appear reasonable and more likely to be encountered in the new work dredging than those assumed in the original cost estimate. When the fuel price is high, even a foot lower effective bank height (below an optimum of 9 feet) can dramatically increase the dredging costs. Dredging costs increase because the production efficiency of a pipeline dredge decreases when lower bank heights are encountered due to the fact that less material will also be encountered, which would necessitate exercising greater positioning control of the cutterhead to maintain a certain level of production, and less material by volume percentage in the slurry mix would be pumped through the pipeline.
- c. Assumed Placement Area Work. The updated cost estimate assumes that some levee rehabilitation work will have to be done to prepare the existing upland placement areas for disposal use whereas the original estimate assumed no levee rehabilitation work. Both the original and updated cost estimates assumed that additional effort would be necessary to hydraulically build and shape the marsh habitat platforms that are to be created in open water. The cost of this additional effort is subject to fuel price and labor cost increases which accounts for the significant cost growth for this item.
- d. Dredge Production Efficiency. The original cost estimate assumed a uniform dredging efficiency (effective operational time) of 60% for pipeline dredging using a 30-inch dredge. While this relatively high efficiency percentage is not unusual for maintenance dredging jobs, the dredging efficiencies usually are and expected to be considerably less for new work dredging jobs. Accordingly, the updated cost estimate conservatively assumes less effective operational times

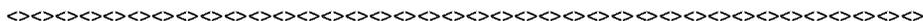
of between 52% and 54%. Dredge productivity is dependent on a number of variables. It is possible therefore that the actual effective operational times could average 60% or more; nevertheless, the conservative assumption made for dredging efficiency results in a small increase in the dredging cost.

- e. Composition of Material to be Dredged. For the most part, the assumed material to be dredged outside the Corpus Christi Bay reach is of similar composition and consistency in both the original and updated cost estimates. Through the bay reach however, most of the new work material was assumed to consist more of loose fine sand than of silt that the original estimate had assumed. Consequently, this will result in a modest increase in the cost of dredging for this particular reach.
- f. Increase in Labor and Material Costs. Labor and material costs have risen considerably. For example, the cost to place rock in the original estimate at 2001 prices was \$56.50 per ton. At the 2012 price level, the cost to place stone is estimated at \$85.00 per ton. Thus, even after accounting for inflation in the cost of placing stone to October 2005 prices, the cost has increased considerably faster than the rate of inflation.

The factors considered and assumptions made relevant to the pipeline dredging substantially increase the cost of dredging the main Corpus Christi Ship Channel which comprises the majority of the work to be done. The 12 feature account – Navigation, Ports, and Harbors understandably accounts for the largest percentage increase in the total project cost.

The significant factors affecting the bank stabilization costs are increased labor and material costs.

Compounding the cost growth is that the estimated contingency percentages for further potential cost growth risk are being applied to substantially higher dollar amounts. Both the original and updated cost estimates assumed the same contingency percentage of 25% for each of the feature accounts for the CCSC Main Channel and Barge Shelves components except for Lands and Damages.



APPENDIX A

MII SUMMARY SHEETS FOR PROJECT COSTS (Down to Sub-Feature Level) Bare Construction Cost Only

CORPUS CHRISTI SHIP CHANNEL, DEEPEN AND WIDEN CCSC TO 530' X -52' MLT
NOTE: The costs of work breakdown Accounts 01, 30, and 31 are developed and found in the TPCS only to prevent errors. The escalation percentage is developed from the construction schedule and included in the TPCS. Contingencies are developed in the Risk Analysis Appendix and included in the TPCS. Due to the breakout of Federal and Non-Federal Sponsor costs rounding errors do occur, but they tally correctly. -- MAIN CHANNEL_MIL ESTIMATE --

Estimated by CESWG-EC-PS
Designed by CESWG-EC
Prepared by Jon Plymale
Preparation Date 7/24/2012
Effective Date of Pricing 3/20/2012
Estimated Construction Time Days

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62I CONSTRUCTION COSTS	1
62I-12 NAVIGATION PORTS AND HARBORS	1
62I-18 CULTURAL RESOURCE PRESERVATION	1
64 CCSC -- STA 12+55 TO STA 180+00, CONTRACT #2	1
64I CONSTRUCTION COSTS	1
64I-12 NAVIGATION PORTS AND HARBORS	1
66 CCSC -- STA 180+00 TO STA 670+00, CONTRACT #3	1
66I CONSTRUCTION COSTS	1
66I-12 NAVIGATION PORTS AND HARBORS	1
66I-16 BANK STABILIZATION	1
67 CCSC -- MARSH PLANTING (STA 180+00 TO STA 670+00), CONTRACT #4	1
67I CONSTRUCTION COSTS	1
67I-160 PLANTING OF SPARTINA ALTERNIFLORA	1
68 CCSC -- STA 670+00 TO STA 1080+00, CONTRACT #5	1
68I CONSTRUCTION COSTS	1
68I-12 NAVIGATION PORTS AND HARBORS	1
70 CCSC -- STA 1080+00 TO STA 1320+00, CONTRACT #6	1
70I CONSTRUCTION COSTS	1
70I-12 NAVIGATION PORTS AND HARBORS	1
72 CCSC -- Sta. 1320+00 to 1361+00, CONTRACT #7	1
72I CONSTRUCTION COSTS	1
72I-12 NAVIGATION PORTS AND HARBORS	1
91 CCSC - BARGE SHELVES--Sta.980+00 to 1060+00, CONTRACT #5A	1
91I CONSTRUCTION COSTS	1
91I CONSTRUCTION COSTS	2
91I-12I NAVIGATION PORTS AND HARBORS	2
95 CCSC -- RELOCATIONS AND REMOVALS	2
95I NON-FEDERAL SPONSOR COSTS	2
95I-0203 CEMETERY, UTILITIES, & STRUCTURE	2

Description	UOM	Quantity	DirectCost	ContractCost	ProjectCost
Project Cost Summary Report					
CC REMAINING FUTURE WORK			199,465,005	201,534,453	201,534,453
62 CCSC -- STA 310+00 TO STA -38+00, CONTRACT #1	EA	1.00	199,465,005	201,534,453	201,534,453
621 CONSTRUCTION COSTS	LF	34,800.00	17,786,331	17,786,331	17,786,331
621-12 NAVIGATION PORTS AND HARBORS	LS	1.00	17,786,331	17,786,331	17,786,331
621-18 CULTURAL RESOURCE PRESERVATION	CY	3,849,217.00	17,556,331	17,556,331	17,556,331
64 CCSC -- STA 12+55 TO STA 180+00, CONTRACT #2	EA	1.00	230,000	230,000	230,000
641 CONSTRUCTION COSTS	LF	16,745.00	12,988,737	13,442,473	13,442,473
641-12 NAVIGATION PORTS AND HARBORS	LS	1.00	12,988,737	13,442,473	13,442,473
66 CCSC -- STA 180+00 TO STA 670+00, CONTRACT #3	CY	2,523,881.00	12,988,737	13,442,473	13,442,473
661 CONSTRUCTION COSTS	LF	49,000.00	67,869,601	68,460,883	68,460,883
661-12 NAVIGATION PORTS AND HARBORS	LS	1.00	67,869,601	68,460,883	68,460,883
661-16 BANK STABILIZATION	CY	9,305,108.73	41,384,952	41,691,817	41,691,817
67 CCSC -- MARSH PLANTING (STA 180+00 TO STA 670+00), CONTRACT #4	CY	2,082,390.00	26,484,649	26,769,065	26,769,065
671 CONSTRUCTION COSTS	ACR	30.00	148,575	148,575	148,575
671-160 PLANTING OF SPARTINA ALTERNIFLORA	LS	1.00	148,575	148,575	148,575
68 CCSC -- STA 670+00 TO STA 1080+00, CONTRACT #5	ACR	30.00	148,575	148,575	148,575
681 CONSTRUCTION COSTS	LF	41,000.00	33,851,114	33,851,114	33,851,114
681-12 NAVIGATION PORTS AND HARBORS	LS	1.00	33,851,114	33,851,114	33,851,114
70 CCSC -- STA 1080+00 TO STA 1320+00, CONTRACT #6	CY	10,475,387.60	33,851,114	33,851,114	33,851,114
701 CONSTRUCTION COSTS	LF	24,000.00	23,323,028	24,108,290	24,108,290
701-12 NAVIGATION PORTS AND HARBORS	LS	1.00	23,323,028	24,108,290	24,108,290
72 CCSC -- Sta. 1320+00 to 1561+00, CONTRACT #7	CY	3,294,685.00	23,323,028	24,108,290	24,108,290
721 CONSTRUCTION COSTS	LF	24,100.00	21,590,419	21,829,520	21,829,520
721-12 NAVIGATION PORTS AND HARBORS	LS	1.00	21,590,419	21,829,520	21,829,520
91 CCSC - BARGE SHELVES--Sta.980+00 to1060+00, CONTRACT #5A	CY	2,586,325.01	21,590,419	21,829,520	21,829,520
	LF	51,000.00	347,525	347,591	347,591

Description	UOM	Quantity	DirectCost	ContractCost	ProjectCost
911 CONSTRUCTION COSTS	LS	1.00	347,525	347,591	347,591
911-121 NAVIGATION PORTS AND HARBORS	CY	69,459.00	347,525	347,591	347,591
95 CCSC -- RELOCATIONS AND REMOVALS	LS	1.00	21,559,676	21,559,676	21,559,676
951 NON-FEDERAL SPONSOR COSTS	LS	1.00	21,559,676	21,559,676	21,559,676
951-0203 CEMETERY, UTILITIES, & STRUCTURE	LF	68,000.00	21,559,676	21,559,676	21,559,676

LA QUINTA CHANNEL EXTENSION & ECOSYSTEM RESTORATION

Estimated by	CESWG-EC-PS
Designed by	CESWG-EC
Prepared by	Jon Plymale
Preparation Date	5/29/2012
Effective Date of Pricing	3/20/2012
Estimated Construction Time	Days

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60-121 PORTS	1
LQ2 WORK NEARLY COMPLETE	1
61 CONTRACT #3, ECOSYSTEM RESTORATION	1
61-16 BANK STABILIZATION	1
61-1602 BENEFICIAL-USE SITE # 9	1
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62 LA QUINTA EXTENSION, CONTRACT #2	1
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62-121 PORTS - LA QUINTA CHANNEL EXTENSION	1
LQ4 REMAINING FUTURE WORK	1
63 LA QUINTA CHANNEL EXT. CONTRACT #4, BANK STABILIZATION	1
63-16 BANK STABILIZATION	1
63-1603 BANK SLOPE STABILIZING	1

<u>Description</u>	<u>UOM</u>	<u>Quantity</u>	<u>DirectCost</u>	<u>ContractCost</u>	<u>ProjectCost</u>
Project Cost Summary Report					
LQ1 CONTRACT CLOSED OUT	EA	1.00	1,142,797	1,142,797	1,142,797
60 LA QUINTA CH EXT, CONTRACT #1, CONSTRUCT UPLAND PA 14 (COMPLETED)	ACR	100.00	1,142,797	1,142,797	1,142,797
60-12 NAVIGATION PORTS AND HARBORS	LS	1.00	1,142,797	1,142,797	1,142,797
60-121 PORTS	EA	1.00	1,142,797	1,142,797	1,142,797
LQ2 WORK NEARLY COMPLETE	EA	1.00	8,500,939	8,500,939	8,500,939
61 CONTRACT #3, ECOSYSTEM RESTORATION	LF	3,112.00	8,500,939	8,500,939	8,500,939
61-16 BANK STABILIZATION	LS	1.00	8,500,939	8,500,939	8,500,939
61-1602 BENEFICIAL-USE SITE # 9	LF	3,112.00	8,500,939	8,500,939	8,500,939
LQ3 ON-GOING WORK	EA	1.00	33,537,027	33,537,027	33,537,027
62 LA QUINTA EXTENSION, CONTRACT #2	LF	7,301.00	33,537,027	33,537,027	33,537,027
62-12 NAVIGATION PORTS AND HARBORS	LS	1.00	33,537,027	33,537,027	33,537,027
62-121 PORTS - LA QUINTA CHANNEL EXTENSION	LF	7,301.00	33,537,027	33,537,027	33,537,027
LQ4 REMAINING FUTURE WORK	EA	1.00	572,845	572,845	572,845
63 LA QUINTA CHANNEL EXT, CONTRACT #4, BANK STABILIZATION	EA	1.00	572,845	572,845	572,845
63-16 BANK STABILIZATION	EA	1.00	572,845	572,845	572,845
63-1603 BANK SLOPE STABILIZING	ACR	15.00	572,845	572,845	572,845

APPENDIX B

PROJECT COST AND RISK ANALYSIS REPORT



**US Army Corps
of Engineers®**

**CORPUS CHRISTI SHIP CHANNEL DEEPENING
AND BARGE SHELVES
CORPUS CHRISTI, TEXAS
LIMITED RE-EVALUATION STUDY**

Project Cost and Schedule Risk Analysis Report

Galveston District, TX

REPORT UPDATE - 2012

Prepared for:

U.S. Army Corps of Engineers,
Galveston District

Prepared by:

U.S. Army Corps of Engineers
Cost Engineering Technical Center of Expertise, Walla Walla

Date: May 15, 2012

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Appendix A – Cost and Schedule Risk RegisterA-1

EXECUTIVE SUMMARY

REPORT PURPOSE

This risk analysis report documents the results of the Cost and Schedule Risk Analysis (CSRA) performed for the Corpus Christi Ship Channel Deepening and Barge Shelves Limited Re-evaluation Study under development by the U.S. Army Corps of Engineers (USACE), Galveston District.

PROJECT BACKGROUND

The Corpus Christi Ship Channel (CCSC) is a deep-draft navigation channel servicing multipurpose port facilities at Corpus Christi, Texas, located midway along the Texas Gulf Coast approximately 150 miles north of the United States border with Mexico. The channel provides deep-water access from the Gulf of Mexico to the Port of Corpus Christi, via Aransas Pass, through Redfish Bay and Corpus Christi Bay. Access points include the La Quinta Channel, the Gulf Intracoastal Waterway (GIWW), and the Rincon Canal. From a jettied entrance at Aransas Pass, the waterway extends 30 miles westward and encompasses 5 turning basins within the industrial area of the landlocked Inner Harbor reach at the waterway's west end. The La Quinta Channel branches off the CCSC near Ingleside, Texas, and runs parallel to the eastern shoreline of Corpus Christi Bay for 5.5 miles to its terminal turning basin.

A comprehensive navigation study investigating the feasibility of improving the CCSC and La Quinta Channel was completed in 2003. The project was subsequently authorized by Section 1001(40) of the Water Resources Development Act (WRDA) of 2007 (Public Law 110-114, 121 Stat 1056). Current guidance requires that if "more than three fiscal years have elapsed since the release of the Report of the Chief of Engineers, an economic re-evaluation must be the first item of work upon receipt of any funds intended to further project implementation" (ER 1105-2-100). The purpose of this re-evaluation is to update project costs, economics, and environmental information to make sure that the project components remain justified consistent with the previously authorized feasibility study. Accordingly, a Limited Re-evaluation Study was initiated in 2007, but due to funding constraints had to be restructured to move forward in 2008 on just two of the four separable elements comprising the project – 1) the CCSC (main channel), 2) Barge Shelves, 3) the La Quinta Channel Extension, and 4) an ecosystem restoration feature. Extension of the La Quinta Channel was justified by way of benefits associated with a planned future container terminal. The ecosystem restoration feature will protect 40 acres of seagrass bed near Ingleside-on-the-Bay, Texas, with the construction of an offshore stone breakwater. For the latter two elements, the Limited Re-evaluation Report (LRR) was finalized and approved by Southwestern Division (SWD) in February of 2010.

Summary of National Economic Development Plan.

- Corpus Christi Ship Channel. The CCSC is to be deepened from its authorized

depth of -45 feet Mean Low Tide (MLT) to an authorized depth of -52 feet MLT and widened to 530 feet, except in the Inner Harbor reach, where widening to 400 feet will only be done at a specific location. The reason no widening is proposed for the Inner Harbor reach is because the port infrastructure fronting the channel, on both sides of the channel, is so heavily developed that it is impractical to widen the channel. The improvements also call for extending the Entrance Channel by 10,000 feet and enlarging the existing Avery Point, Tule Lake, Chemical, and Viola Turning Basins.

- Barge shelves are planned along each side of the Corpus Christi Ship Channel through the Upper Bay reach from Sta. 540+00 at the La Quinta Channel junction to Sta. 1060+00 just east of the Harbor Bridge. Each shelf will be 200 feet wide as measured from the bottom edge of the widened channel.

Planned Construction Contracts. The project is planned to be constructed under the following 7 construction contracts:

- Contract 1: Entrance Channel - Channel Sta. 310+00 to Sta. -38+00
- Contract 2: Lower Bay - Channel Sta. 12+55 to Sta. 180+00
- Contract 3: Lower Bay - Channel Sta. 180+00 to Sta. 670+00
- Contract 4: *Spartina Alterniflora* Planting
- Contract 5: Upper Bay and Barge Shelves - Channel Sta. 670+00 to Sta. 1080+00
- Contract 6: Inner Harbor - Channel Sta. 1080+00 to Sta. 1320+00
- Contract 7: Inner Harbor - Channel Sta. 1320+00 to Sta. 1561+00

REPORT SCOPE

The scope of the risk analysis report is to reflect the project as presented in the Limited Re-evaluation Study and to calculate and present the cost contingencies at the 80 percent (P80) confidence level using the risk analysis processes mandated by USACE Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for both cost and schedule risks for all construction features at feasibility-level development.

RISK ANALYSIS PROCESS

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingencies. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball), which is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes.

Since the dredging estimates for this project were developed within the USACE Cost Engineering Dredge Estimating Program (CEDEP), which is Excel based, the risk analysis process used the CEDEP as the risk model basis, incorporating both cost and schedule for the major work elements as presented within the MCACES MII estimate

and risks discussed within the risk register. Contract 4 (*Spartina Alterniflora* Planting) is a contract that will only add nominal cost to the project; therefore, the mitigation work to be done under this contract was excluded from consideration in the risk analyses.

Except for Contract 4, all the contracts are deep-draft dredging contracts that are similar construction efforts and carry similar risks. Therefore, they share the same risk events identified within the risk register to support the risk models and resulting contingencies.

Contract 3, while mostly dredging, also carries additional risk in that this contract includes the building of marsh habitat areas in the open water of Corpus Christi Bay. Included in the building of these marsh habitat areas are the installation of large geotextile tubes that will serve as semi-permanent containment structures for the hydraulically-placed fill, the placement of rock dikes (breakwaters), and the placement of rock to protect the newly created shorelines from wave-attack erosion. The cost to build the marsh habitat areas therefore is sensitive to fluctuations in commodity prices as well as equipment and labor costs.

CONTINGENCY RESULTS

As the following table indicates, a recommended 80 percent confidence level project contingency reflects 25 percent of base costs. This approximates \$52 million added dollars to the base construction cost. That same 25 percent contingency was then added to the PED and Construction Management costs with the broad assumption that increased construction risks also impact the design and construction management costs. It is these contingencies that are reflected within the Total Project Cost Summary.

Table ES-1. Contract Contingency Results - 80 Percent Confidence

Contract No	Contract Description/Title	Type of Work	Contingency
Contract 1	Entrance Channel – Channel Sta. 310+00 to Sta. -38+00	Dredging	\$5.5M
Contract 2	Lower Bay – Channel Sta. 12+55 to Sta. 180+00	Dredging	\$4.0M
Contract 3	Lower Bay – Channel Sta. 180+00 to Sta. 670+00	Dredging	\$20.5M
Contract 4	<i>Spartina Alterniflora</i> Planting	Planting Marsh	\$100K
Contract 5	Upper Bay and Barge Shelves – Channel Sta. 670+00 to Sta. 1080+00	Dredging	\$7.4M
Contract 6	Inner Harbor – Channel Sta. 1080+00 to Sta. 1320+00	Dredging	\$7.0M
Contract 7	Inner Harbor – Channel Sta. 1320+00 to Sta. 1561+00	Dredging	\$6.6M

The following risk factors were found to be common among all the dredging contracts:

Cost Risks:

- Major: Fuel price fluctuations and volatility. Dredging costs are heavily reliant on fuel availability and prices which is not controlled by project delivery team.
- Moderate: Estimate assumptions related to Mobilization costs, Contractor Overheads and Profits, Bidding Climate at bid time, Low and Unknown risks (unidentified), Quantity Variances and Equipment Productivity.

Schedule Risks:

- Major: Project competing for available Funds, Uncertainty with current construction schedules.
- Moderate: Separate reach contracts lasting more than one year.

1 PURPOSE

The purpose of this report is to document the results of the Cost and Schedule Risk Analysis (CSRA) performed for the Corpus Christi Ship Channel (CCSC) Deepening and Barge Shelves Limited Re-evaluation Study under development by the U.S. Army Corps of Engineers (USACE), Galveston District.

2 BACKGROUND

The authorized depth for both the CCSC and the La Quinta Channel is 45 feet Mean Low Tide (MLT). Existing project width of the CCSC ranges from 700 feet in the Entrance Channel to 200 feet at locations in the Inner Harbor. The La Quinta Channel measures 300 to 400 feet wide. Construction of the existing 45-foot project on both the Corpus Christi and La Quinta Channels was completed in 1989.

The size of ships has steadily increased such that vessels have to be light-loaded to traverse the waterway. The current channel depth requires that large crude carriers remain offshore and transfer their cargo into smaller crude tankers for the remainder of the voyage.

The Chief of Engineer's Report dated June 2, 2003, recommended a plan to modify the existing projects for Corpus Christi and La Quinta channels and provide ecosystem restoration to areas near the navigation channel. The plan consisted of the following improvements:

- Deepen the CCSC from Viola Turning Basin to the end of the jetties in the Gulf of Mexico (approximately 34 miles) to -52 feet MLT (-53 - 54 feet Mean Lower Low Water [MLLW]); deepen the remainder of the channel into the Gulf of Mexico (approximately 2 miles) to -54 feet MLT (- 55 feet MLLW); and widen the Upper Bay and Lower Bay reaches (approximately 20 miles) to 530 feet.
- Construct barge shelves (channels) 200 feet wide and 12 feet deep MLT (-14 feet MLLW) on both sides of the CCSC from its junction with the La Quinta Channel to the entrance of the Inner Harbor (approximately 10 miles).
- Extend the La Quinta Channel approximately 1.4 miles beyond its current limit at a depth of -39 feet MLT (-40.5 feet MLLW). The extended channel will measure 400 feet wide and include a second turning basin having a turning circle diameter of 1,200 feet. The turning basin will be constructed at the end of the channel extension also to a depth of -39 feet MLT. The existing La Quinta Channel will remain at its existing 45-foot depth. Approximately 15 acres of new seagrass bed will be established adjacent to the La Quinta Channel Extension to mitigate for project impacts to approximately 5 acres of seagrass.
- Construct two ecosystem restoration features made up of rock breakwaters and geotextile tubes to protect 1,200 acres of an existing high-quality, complex wetland ecosystem consisting of a valuable mix of sub-tidal habitat, salt marsh, blue-green algae flats, sand flats, and associated uplands. Additionally, these features will

protect 40 acres of highly productive seagrass. Both ecosystem restoration components are adjacent to the CCSC in the Lower Bay reach of the channel.

Each of the improvements, which are considered separable elements of the overall CCSC improvement project, was individually justified as a stand-alone project.

The Water Resources and Development Act of 2007, Section 1001(40), authorized the modifications to the CCSC.

3. REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost contingencies at the 80 percent confidence level using the risk analysis processes as mandated by USACE Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for both cost and schedule risks for all construction features.

3.1 Project Scope

The purpose of the project re-evaluation is to update project costs, economics, and environmental information to determine if the project components remain justified in accordance with the previously authorized feasibility study.

Table 1. Project Channel Reaches

A. Entrance Channel – Channel Sta. 310+00 to Sta. -38+00. The Entrance Channel is defined as that portion of the CCSC extending from Sta. 310+00 in the Gulf of Mexico to Sta. -37+82 in the Inner Basin. It is 700 feet wide and protected by jetties. The land-locked portion of the Entrance Channel is to be deepened to 52 feet plus 2 feet of advanced maintenance. This depth would be modified in the portion of the channel that enters the open waters of the Gulf. This segment will be dredged to a 54-foot authorized depth with 2 feet of advanced maintenance to ensure safe vessel passage in a high wave energy environment. The existing channel will be extended an additional 10,000 feet into the Gulf in order to reach the 56-foot contour. Minor widening of 100 feet is necessary on the northern side of the channel for approximately 4,000 feet adjacent to San Jose Island based on the results of the Engineer Research and Development Center's (ERDC's) Ship Simulation Report. This will improve the turning radius for vessels passing through the Entrance Channel and making the turn either out to the Gulf or into the Lower Bay portion of the channel.

B. Lower Bay portion of the CCSC – Channel Station 12+55 to 670+00. This reach of the channel extends from Station 12+55 and abuts the Inner Basin to Station 540+00 just west of the La Quinta Junction. This segment will be deepened from 45 feet to 52 feet plus 2 feet of advanced maintenance. Based on the ERDC's Ship Simulation Report, the selected width for this portion of the channel is 530 feet. The eastern portion of this channel segment is currently wider than the selected 530 feet and will remain as is; therefore, no widening will be necessary in this reach. The western portion of the reach measures approximately 500 feet in width and will be widened to 530 feet.

Lower Bay portion (continued). A rock breakwater will be used to protect high quality rookery and nesting habitat on Pelican Island. The breakwater will protect the northeastern corner of the island. The Pelican Island site is an island encompassing two placement areas that is used by an endangered species, the Brown Pelican, as a nesting site. The armoring protection described for this site was coordinated with the U.S. Fish and Wildlife Service (USFWS) during Section 7 consultation under the Endangered Species Act (ESA).

Material dredged from the Lower Reach will be used beneficially to build 4 new protected shallow-water and emergent island habitats in open water.

C. Upper Bay portion of the CCSC - Channel Sta. 670+00 to Sta. 1080+00. This reach of the channel begins west of the La Quinta Channel's junction with the CCSC to just east of the Harbor Bridge at Sta. 1080+00. At its current width of 400 feet and depth of 45 feet, it is the most physically restrictive in terms of width in addressing the need for ships to pass safely and in a timely manner because it crosses the open-water segment of Corpus Christi Bay. The entire stretch will be widened to 530 feet based on the results of ERDC's Ship Simulation Report. The reach will also be deepened to 52 feet with 2 feet advanced maintenance.

D. Inner Harbor - Channel Sta. 1080+00 to Sta. 1561+00. Since the Harbor Bridge and Tule Lake Lift Bridge currently prevent two-way traffic in the Inner Harbor portion of the channel, no consideration was given to alternatives that would widen this reach. The Inner Harbor segment, measured from Station 1080+00 to 1561+00, will be deepened to 52 feet plus 2 feet advanced maintenance. The channel width will range between 300 and 400 feet. Several minor modifications will be made to the turning basins to ensure that they meet U.S. Army Corps of Engineers (USACE) navigation requirements. One basin - the Avery Point Basin - will not meet USACE width criteria due to the presence of industry on the shoreline of the channel. In the vicinity of the Tule Lake Lift Bridge, because the bridge is planned to be removed prior to construction, it was assumed that the channel width in this area will be widened to 400 feet. The widened channel will then be consistent with the remainder of the Inner Harbor channel segment. Making the channel width consistent in this area, should the bridge be removed, will make the Inner Harbor reach compliant with USACE criteria, creating a safer passage through the channel for all ship traffic. Should the bridge remain at the time of project construction, the channel width will be kept at its existing width of 200 feet to prevent adverse impacts to the bridge supports. This width is sufficient to allow all expected traffic access beyond the bridge. The continued presence of the bridge will not prevent the realization of the economic benefits derived.

In the LRR, the construction contracts for the CCSC and Barge Shelves are broken out as follows:

- Contract 1: Entrance Channel – Channel Sta. 310+00 to Sta. -38+00
- Contract 2: Lower Bay – Channel Sta. 12+55 to Sta. 180+00
- Contract 3: Lower Bay – Channel Sta. 180+00 to Sta. 670+00
- Contract 4: *Spartina Alterniflora* Planting
- Contract 5: Upper Bay and Barge Shelves – Channel Sta. 670+00 to Sta. 1080+00
- Contract 6: Inner Harbor – Channel Sta. 1080+00 to Sta. 1320+00
- Contract 7: Inner Harbor – Channel Sta. 1320+00 to Sta. 1561+00

3.2 USACE Risk Analysis Process

The risk analysis process reflected within the risk analysis report uses probabilistic CSRA methods within the framework of the Crystal Ball software. The risk analysis results are intended to serve several functions, one being the establishment of reasonable contingencies reflective of an 80 percent confidence level to successfully accomplish the project work within that established contingency amount. Furthermore, the scope of the report includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

Risk analysis results are also intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as provide tools to support decision making and risk management as the project progresses through planning and implementation. To fully recognize its benefits, CSRA should be considered as an ongoing process conducted concurrent to, and iteratively with, other important project processes such as scope and execution plan development, resource planning, procurement planning, cost estimating, budgeting, and scheduling.

In addition to broadly defined risk analysis standards and recommended practices, the risk analysis is performed to meet the requirements and recommendations of the following documents and sources:

- ER 1110-2-1150, dated August 31, 1999.
- ER 1110-2-1302, dated September 15, 2008.
- Engineering Technical Letter 1110-2-573, dated September 30, 2008.
- Engineering and Construction Bulletin issued by James C. Dalton, P.E. (Chief, Engineering and Construction, Directorate of Civil Works), dated September 10, 2007.
- Memorandum from Major General Don T. Riley (U.S. Army Director of Civil Works), dated July 3, 2007.
- CSRA process guidance prepared by the USACE Cost Engineering TCX.

4. METHODOLOGY/PROCESS

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence. A parallel process is also used to determine the probability of various project schedule duration outcomes and quantify the required schedule contingency (i.e., float) needed in the schedule to achieve any desired level of schedule confidence.

In simple terms, contingency is an amount added to an estimate (cost or schedule) to allow for items, conditions, or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of

project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed in a probabilistic context using confidence levels.

The USACE Cost Engineering TCX for Civil Works guidance for CSRA generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk-adverse approach (whereas the use of P50 would be a risk-neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as compared to a P50 confidence level.

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingency. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are packaged into an Excel format and used directly for cost risk analysis purposes.

Since the dredging estimates for this project were developed within the USACE Cost Engineering Dredge Estimating Program (CEDEP), which is Excel-based, the risk analysis used the CEDEP as the risk model basis, incorporating both cost and schedule for the major work elements as presented within the MCACES MII estimate and risks discussed within the risk register.

The PDT members met twice, June 2010 and again in April 2012. Major members represented include:

- Project Management
- Environmental
- Lead Planner
- Lead Civil Engineer
- Civil, Structural, Geotechnical Engineering
- Cost and Schedule Engineering
- Port of Corpus Christi
- Risk Analyst

4.1 Identify and Assess Risk Factors

Identifying the risk factors via the project delivery team (PDT) are considered a qualitative process that results in establishing a risk register document. The risk register document then serves to support the quantitative study using the Crystal Ball risk software. Risk factors are events and conditions that may influence or drive uncertainty in project performance. They may be inherent characteristics or conditions of the project or external influences, events, or conditions such as weather or economic conditions. Risk factors may have either favorable or unfavorable impacts on project cost and schedule.

The qualitative risks were captured and placed within the risk register format. This format is the basis used for establishing the quantitative risks and developing the Crystal Ball risk model.

Except for Contract 4, all the contracts are deep-draft dredging contracts that carry similar risks. Therefore, they share the same risk events identified within the risk register to support the risk models and resulting contingencies. Contract 3 carries additional risk in that this contract involves the building of marsh habitat areas in the open water of Corpus Christi Bay. Included in the building of these marsh habitat areas are the installation of large geotextile tubes that will serve as semi-permanent containment structures for the hydraulically-placed fill, the placement of rock dikes (breakwaters), and the placement of rock to protect the newly-created shorelines from wave-attack erosion. The cost to build the marsh habitat areas therefore is sensitive to fluctuations in commodity prices as well as equipment and labor costs.

4.2 Risk Register

A risk register is a tool commonly used in project planning and risk analysis. The risk register reflects the results of risk factor identification and assessment, risk factor quantification, and contingency analysis. It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

- Documenting risk mitigation strategies being pursued in response to the identified risks and their assessment in terms of probability and impact.
- Providing project sponsors, stakeholders, and leadership/management with a documented framework from which risk status can be reported in the context of project controls.
- Communicating risk management issues.
- Providing a mechanism for eliciting risk analysis feedback and project control input.
- Identifying risk transfer, elimination, or mitigation actions required for implementation of risk management plans.

Once established, the risk register serves as the risk analysis model per contract. In the cases studied, the schedule analysis was incorporated into the cost analysis as another risk event.

4.3 Quantify Risk Factor Impacts

The quantitative impacts of risk factors on project plans are analyzed using a combination of professional judgment, empirical data, and analytical techniques. Risk factor impacts are quantified using probability distributions (density functions), because risk factors are entered into the Crystal Ball software in the form of probability density functions.

Similar to the identification and assessment process, risk factor quantification involves multiple project team disciplines and functions. However, the quantification process relies more extensively on collaboration between cost engineering, designers, and risk analysis team members with lesser inputs from other functions and disciplines.

The following is an example of the PDT quantifying risk factor impacts by using an iterative, consensus-building approach to estimate the elements of each risk factor:

- Maximum possible value for the risk factor.
- Minimum possible value for the risk factor.
- Most likely value (the statistical mode), if applicable.
- Nature of the probability density function used to approximate risk factor uncertainty.
- Mathematical correlations between risk factors.
- Affected cost estimate and schedule elements.

Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and discussions are meant to support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

For the six dredging contracts, the estimates were developed using USACE's CEDEP, which is Excel-based and can also be used to support the Crystal Ball model. The CEDEP model allowed risk study at the detailed estimate level by incorporating variances for direct and indirect costs that support the risk register concerns. The study went even further, considering items such as contractor markups, mobilization, quantities, and productivities. Within that same CEDEP, schedule variance is also included since it relates to the productivity factors found within CEDEP.

4.4 Analyze Cost Estimate and Schedule Contingency

Contingency is analyzed using the Crystal Ball software (an add-in to the Microsoft Excel format of the cost estimate and schedule). *Monte Carlo* simulations are performed by applying the risk factors (quantified as probability density functions) to the appropriate estimated cost and schedule elements identified by the PDT. Contingencies are calculated by applying only the moderate and high level risks identified for each option (i.e., low-level risks are typically not considered but remain within the risk register to serve historical purposes as well as support follow-on risk studies as the project and risks evolve).

For the cost estimate, the contingency is calculated as the difference between the P80 cost forecast and the base cost estimate. Each option-specific contingency is then allocated on a civil works feature level based on the dollar-weighted relative risk of each feature as quantified by *Monte Carlo* simulation. Standard deviation is used as the feature-specific measure of risk for contingency allocation purposes. This approach results in a relatively larger portion of all the project feature cost contingency being allocated to features with relatively higher estimated cost uncertainty.

For schedule contingency within this analysis, noting that many of the contracts were separated into an approximate 1-2 year construction duration, the schedule risk of escalation was applied within the cost risk model.

5. PROJECT ASSUMPTIONS

Certain assumptions are key in establishing most likely design, cost and schedule during a feasibility phase where design, surveys and investigations remain incomplete. For that reason, it is expected that contingency dollars should be reserved to cover risks outside those key assumptions:

- The PDT established a certain number of dredging contracts in the attempt to complete annual contracts, leaving the project less reliant on full funding for full completion with limited bidder competition under one-large contract scenario.
- Current design assumptions are based upon current geotechnical knowledge that can impact dredging and productivity.
- The estimates are heavily reliant on numerous assumptions, but also consider historic experience of dredging in the region. Assumptions that can have major influence in cost and schedules are:
 - Hopper verses pipeline dredging
 - Fuel pricing at current verses future time frames
 - Dredging availability, equipment size and mobilization distances
 - Productivity reliant upon dredge sizes and soil conditions

6. RISK ANALYSIS RESULTS

6.1 Contingency Results at 80 Percent Confidence

The Cost Engineering TCX recommended risk analyses output reflects the P80 confidence level in successfully completing the project. The following table reflects those results for the eight specific contracts:

Table 2. Contingency Results - 80 Percent Confidence

Contract No	Contract Description/Title	Type of Work	Contingency
Contract 1	Entrance Channel – Channel Sta. 310+00 to Sta. -38+00	Dredging	\$5.5M
Contract 2	Lower Bay – Channel Sta. 12+55 to Sta. 180+00	Dredging	\$4.0M
Contract 3	Lower Bay – Channel Sta. 180+00 to Sta. 670+00	Dredging	\$20.5M
Contract 4	<i>Spartina Alterniflora</i> Planting	Planting Marsh	\$100K
Contract 5	Upper Bay and Barge Shelves – Channel Sta. 670+00 to Sta. 1080+00	Dredging	\$7.4M
Contract 6	Inner Harbor – Channel Sta. 1080+00 to Sta. 1320+00	Dredging	\$7.0M
Contract 7	Inner Harbor – Channel Sta. 1320+00 to Sta. 1561+00	Dredging	\$6.6M

6.2 Model Sensitivity Analysis and Output

The sensitivity analysis output indicates the risk events carrying the greatest potential variance in cost and schedule that also result in the greatest risks. For this report, the sensitivity results are presented for a sample of the dredging projects and environmental mitigation.

6.2.1 Cost Risks

The risk analysis was performed on a given construction cost, excluding Lands and Damages, Preconstruction, Engineering and Design, and Construction Management base costs. Presented below are the resulting contingency values reflected from the risk analysis and sensitivity analysis. As can be seen from Figure 1 below, the risks with the greatest sensitivity variances and potential cost impacts are:

- Major Issues: Fuel price fluctuations and volatility. Dredging costs are heavily reliant on fuel availability and prices, neither of which the PDT can control.
- Moderate Issues: Estimate assumptions related to Mobilization costs, Contractor Overheads and Profits, Bidding Climate at bid time, Low and Unknown risks (unidentified), and Quantity Variances and Equipment Productivity.

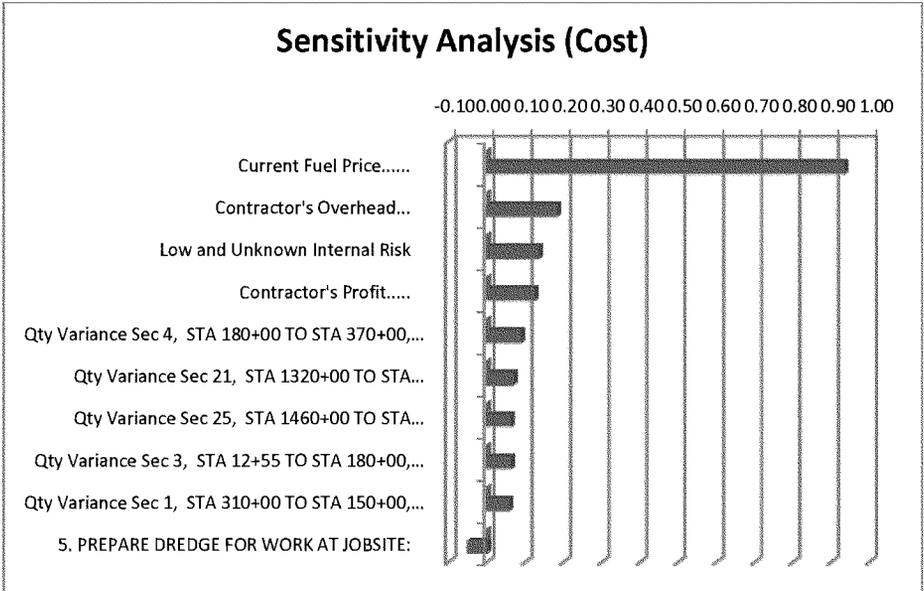


Figure 1. Cost Sensitivity Analysis

As the following table indicates, a recommended 80 percent confidence level project contingency reflects 25 percent of base costs. This approximates \$52 million added dollars to the base construction cost. That same 25 percent contingency was then added to the PED and Construction Management costs with the broad assumption that increased construction risks also impact the design and construction management costs.

Table 3. Project Cost Contingencies

Confidence Level	Simulated Cost	Contingency %
10%	\$19,767,008	9.51%
20%	\$24,203,896	11.65%
30%	\$28,440,747	13.69%
40%	\$32,436,853	15.61%
50%	\$36,477,584	17.56%
60%	\$40,954,408	19.71%
70%	\$45,951,725	22.12%
80%	\$51,960,339	25.01%
90%	\$61,165,363	29.44%
100%	\$108,709,819	52.32%

6.2.2 Schedule Risks

The risk analysis was also performed on the project schedule. Presented below are the resulting time contingency values reflected from the risk analysis and sensitivity analysis. As can be seen from figure 2 below, the risks with the greatest sensitivity variances and potential cost impacts are:

- Major: Project competing for available Funds, Uncertainty with current construction schedules, which can change over time pending funding availability.
- Moderate: Separate reach contracts lasting more than one year are more dependent upon sufficient annual funding but represent just two contracts.

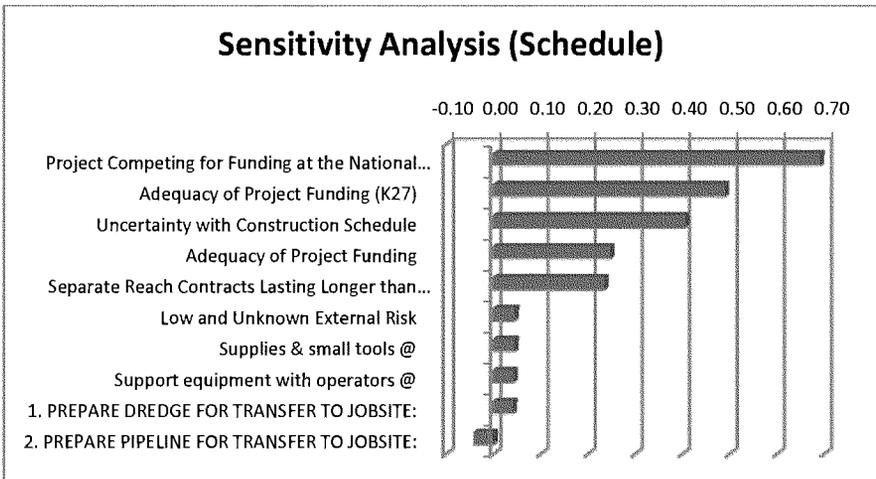


Figure 2. Schedule Sensitivity Analysis

As the following table indicates, a recommended 80 percent confidence level project time contingency suggests a potential added 34 months. The related cost impacts were included within the cost contingency of the added 25 percent.

Table 4. Project Schedule Contingencies

Confidence Level	Simulated Additional Months
10%	10 Months
20%	14 Months
30%	18 Months
40%	21 Months
50%	24 Months
60%	27 Months
70%	30 Months
80%	34 Months
90%	39 Months
100%	59 Months

7 MAJOR FINDINGS/OBSERVATIONS

Fuel Price Fluctuations: Within the past decade, fuel prices have fluctuated dramatically but continue to creep higher as each price rise settles. While the previous risk of Inflation would seem to capture this issue, the two were studied separately. Fuel pricing is an element of the estimate, while inflation and funding are elements of the program. Fuel pricing fluctuations are currently unavoidable; however, contract solicitations may benefit from timely award during low fuel season.

Estimate Assumptions - Contractor Overhead and Profits: The estimate assumes a certain Contractor Overhead and Profit markup. Since both costs are upper level indirect cost placed on all direct costs, false assumptions could result in negative impacts. The markups are dependent on actual bid competition, dredge sizes, and small to large business contractors and subcontractors. The risk may be mitigated depending on acquisition strategy, dredging season as related to severe weather, fuel costs, any wildlife implications, and contract duration.

Estimate Assumption - Uncertain Dredge Material Classifications: The material actually encountered during dredging may differ substantially than what was assumed based on the geotechnical investigations. Presently, the material consistencies are based on soil samples taken along the channel, generalized assumptions about the geomorphology of Corpus Christi Bay, and local engineering experience. The generalized conclusions about the consistencies of the materials to be encountered result in less confident estimated dredging productivities.

Estimate Assumption - Dredge size and productivity: The dredging cost is predicated on using the most efficient-size or productive dredge possible. There is the possibility that the most efficient dredge won't be utilized to do the dredging in which case the unit price for dredging will higher.

Dredging Prism - Quantities: Dredging prism equates to quantities dredged. As more cross-section surveys are taken to better define the existing channel, this risk is reduced. However, until that occurs, confidence and quantity variance remains a concern. The other main concern is related to the construction activities in the way of quantity impacts and modifications, resulting in further quantity variance.

Project Schedule Growth: The greatest risks to schedule growth relate to sufficient funding and protracted construction contracts. The PDT chose to assume annual contracts as much as possible. This results in greater potential schedule growth, but the feeling is that this also creates better potential in overall project completion should funding be limited or sporadic.

Another added advantage of smaller contracts is greater competition from regional contractors.

APPENDIX A

COST AND SCHEDULE RISK REGISTER

CONTRACT ACQUISITION RISKS									
CA-1	Numerous Separate Contracts	Several individual construction contracts are necessary because of the fact that the design and construction are piecemealed into multiple channel reaches.	Cost and schedule could be impacted. The design may lapse this in an upcoming meeting.	Likely	Critical	4	Likely	Marginal	2
TECHNICAL RISKS									
TL-1	Design Development for Pelican Island	There is some uncertainty as to the geotechnical design specific to the geotextile tubes for Pelican Island.	Could impact costs.	Likely	Significant	3	Very Unlikely	Negligible	0
TL-2	Enhance to Inner Harbor (transition channel)	There is some uncertainty as to the dredging methodology for this particular feature (popper placement areas). The uncertainty is with the placement areas.	No costs were added to estimates for the PA improvements. Could affect costs.	Unlikely	Marginal	1	Unlikely	Negligible	0
LANDS AND DAMAGES RISKS									
LD-1	Relocations may not happen in time	There is some uncertainty that the utility owners/Port of Corpus Christi may not perform the relocations in time. The relocations must occur prior to dredging in some reaches.	Schedule could be delayed.	Unlikely	Negligible	0	Unlikely	Marginal	1
REGULATORY AND ENVIRONMENTAL RISKS									
RE-1	Potential Environmental Work Windows (Wildlife)	There are some potential environmental work windows related to birds. The plan already accommodates work windows for turtles and other species.	PDT feels this issue is low risk.	Unlikely	Marginal	1	Unlikely	Marginal	1
ESTIMATE AND SCHEDULE RISKS									
EST-1	Dredge Availability	The availability and number of dredges can impact bid competition and contract prices. The types and classifications of materials for the purpose of estimating could present a risk to the project costs and schedule. Since the types and classifications of materials are uncertain, there is some uncertainty about the types of material that will be encountered.	Historically this has not been a problem. PDT feels this is not likely to be an issue.	Unlikely	Significant	2	Unlikely	Marginal	1
EST-2	Differences in Characteristics of Material to be Dredged	Dredging efficiencies could vary considerably depending on the size of the dredge plant used, characteristics of the material dredged (bank height, pumping distances, etc.) and the location of the material to be dredged in the building of the in-water beneficial-use placement areas.	Mixing types affect dredging efficiency which affects the costs. Could affect the unit prices for dredging and dredging time.	Likely	Significant	3	Likely	Marginal	2
EST-3	Dredging Efficiency	The quantities of material to be dredged could vary significantly (up or down) from the quantities that have been assumed based on surveys at a greater number of cross-section surveys.	Dredging efficiency affects cost and dredging time.	Likely	Marginal	2	Possible	Marginal	2
EST-4	Change in Dredging Quantities	There is some uncertainty as to the ultimate configuration and design of the placement areas, and consequently the material quantities that were estimated to build these areas.	The quantity of material to be dredged affects cost and dredging time.	Likely	Significant	3	Likely	Marginal	2
EST-5	Change in Design of Beneficial-Use Sites	The schedule is based on the previous estimate which is being revised.	The designs developed for the beneficial-use sites are the least defined of the project features. Consequently, the quantity estimates and origin-order estimates based on assumed parameters.	Very Likely	Significant	4	Very Likely	Marginal	3
EST-6	Uncertainty with the Construction Schedule	Key assumptions on which the estimates rely heavily on are can greatly influence budget and risks include Mobilization distances, Contractor/Owners profits.	Could affect the schedule.	Likely	Critical	4	Likely	Critical	4
EST-7	Key Estimate Assumptions	The numerous dredging estimates rely on certain key assumptions that, if incorrect, could have a significant impact to the actual contract awards.	Key assumptions on which the estimates rely heavily on are can greatly influence budget and risks include Mobilization distances, Contractor/Owners profits.	Unlikely	Significant	2	Unlikely	Marginal	1

CONSIDERATION FOR INTERNAL RISKS IDENTIFIED AS LOW OR NOT STUDIED (UNKNOWN, UNKNOWN'S)									
Item	Low and Unknown Internal Risk	There is still potential of unidentified or unknown risks causing certain impacts	An assumption is that the PDT has identified the major and likely risks; however, there is always potential for residual risks and the PDT should identify that part to be considered as cost and schedule impact to the project	Likely	Marginal	2	Likely	Marginal	2
Programmatic Risks (External Risk items are those that are generated, caused, or controlled exclusively outside the PDT's sphere of influence)									
Item	Severe Weather Impacts (Hurricanes)	Tropical Storms and hurricanes could be a factor during construction that will impact dredging operations and placement area construction	Could increase cost and slip schedule	Likely	Negligible	1	Likely	Negligible	1
Item	Fuel Price	The volatility of fuel prices is a critical risk driver affecting cost. Historically, fuel cost has been the major contributor to cost growth on dredging jobs	Increases in the fuel prices will increase construction costs	Very Likely	Critical	5	Very Likely	Negligible	2
Item	Adequacy of Project Funding	The adequacy and availability of federal funds has been a significant issue on this project	Delays in project execution will likely result in increased construction costs and slip the project schedule	Very Likely	Critical	5	Very Likely	Critical	5
CONSIDERATION FOR EXTERNAL RISKS IDENTIFIED AS LOW OR NOT STUDIED (UNKNOWN, UNKNOWN'S)									
Item	Low and Unknown External Risk			Likely	Critical	4	Likely	Marginal	2

⁴Likelihood, Impact, and Risk Level to be verified through market research and analysis (conducted by cost estimator).

- Risk/Opportunity Event** identified with reference to the Risk Identification Checklist and through deliberation and study by the PDT.
- Concerns and PDT Discussions** elaborate on the Risk/Opportunity Events. The assumptions or findings should contain information relevant to eventual study and analysis of an event's impact to the project.
- Likelihood** is a measure of the probability of the event occurring -- **Very Unlikely, Unlikely, Very Likely**. The likelihood of the event will be the same for both Cost and Schedule regardless of impact.
- Impact** is a measure of the event's effect on project objectives in relation to scope, cost, and/or schedule -- **Negligible, Marginal, Significant, Critical**. Impacts on Project Cost may vary in degree from impacts on Project Schedule.
- Risk Level** is the resultant of an event's Likelihood and Impact and is graded with the numbers 0 through 5 with 0 signifying the least risk and 5 signifying the greatest risk to Project Cost and Schedule. Refer to the matrix at top of chart.
- Variance Distribution** refers to the behavior of the individual risk item with respect to its potential effects on Project Cost and Schedule. For example, an item with clearly defined parameters and a solid, most likely scenario follow a triangular or normal distribution. A risk item for which the PDT has little data or probability of modeling with respect to effects on cost or schedule (i.e. "anyone's guess") would probably follow a uniform or discrete uniform distribution.
- Correlation** recognizes those risk events which may be related to one another. Care should be given to ensure the risks are handled correctly without a "double counting."
- The designated **Responsibility/POC** is regarded as the Subject Matter Expert (SME) on the PDT responsible for actions, monitoring, or information concerning the identified risk or opportunity.
- Affected Project Component** identifies the specific item of the project to which the risk directly or strongly correlates. The PDT is responsible for conducting studies for both Project Cost and Schedule.
- The results of the risk identification process are studied and further developed by the Cost Estimator. They are then analyzed using a Monte Carlo analysis method to predict cost (contingency) and schedule (escalation) growth.

APPENDIX C

TOTAL PROJECT COST SPREADSHEETS (TPSC) FOR PROJECT COSTS

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		DISTRICT: Calveshan		PREPARED: 8/31/2012									
LOCATION: Corpus Christi, TX		POC: CHIEF, COST ENGINEERING, Willie Horcoz		PREPARED: Willie Horcoz									
This Estimate reflects the scope and schedule in report; Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002													
WBS Structure		ESTIMATED COST			PROJECT FIRST COST (Constant Dollar Basis)			TOTAL PROJECT COST (FULLY FUNDED)					
WBS NUMBER	WBS Description	COST (\$K)	CNTG (%)	CNTG (\$K)	TOTAL (\$K)	Program Year (Budget EC): 2012		Special Ther: 10/01/11	L	M	N	O	
						ESC (\$K)	OTG (\$K)						
A	B	C	D	E	F	G	H	I	J	K			
	CCSC Improvement Project - All Components (Combined)												
02	RELOCATIONS - NON-FEDERAL	\$21,560	25%	\$5,390	\$26,950		\$21,560	\$5,390	\$26,950		\$23,203	\$5,801	\$29,004
12	NAVIGATION PORTS & HARBORS - FEDERAL	\$103,383	21%	\$21,285	\$124,668		\$103,383	\$21,285	\$124,668	\$929	\$14,557	\$23,607	\$139,273
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$82,862	24%	\$19,605	\$102,567		\$82,862	\$19,605	\$102,567	\$234	\$69,022	\$22,110	\$115,365
16	BANK STABILIZATION - FEDERAL	\$19,443	18%	\$3,480	\$22,923		\$19,443	\$3,480	\$22,923		\$20,891	\$3,842	\$24,733
16	BANK STABILIZATION - NON-FEDERAL	\$16,549	21%	\$3,393	\$19,942		\$16,549	\$3,393	\$19,942		\$17,979	\$3,751	\$21,730
18	CULTURAL RESOURCE PRESERVATION	\$115	25%	\$29	\$144		\$115	\$29	\$144		\$122	\$30	\$152
18	CULTURAL RESOURCE PRES - NON-FEDERAL	\$115	25%	\$29	\$144		\$115	\$29	\$144		\$122	\$30	\$152
CONSTRUCTION ESTIMATE TOTALS:		\$244,147		\$53,210	\$297,356		\$244,147	\$53,210	\$297,356	\$1,143	\$268,896	\$59,371	\$329,410
01	LANDS AND DAMAGES - NON-FEDERAL	\$8,752	4%	\$319	\$9,071		\$8,752	\$319	\$9,071		\$9,188	\$332	\$9,520
30	PLANNING, ENGINEERING & DESIGN	\$8,831	18%	\$1,573	\$10,204		\$8,831	\$1,573	\$10,204	\$3	\$9,815	\$1,868	\$11,686
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$5,175	22%	\$1,260	\$7,035		\$5,175	\$1,260	\$7,035		\$6,752	\$1,503	\$8,255
31	CONSTRUCTION MANAGEMENT - FEDERAL	\$6,408	18%	\$1,147	\$7,555		\$6,408	\$1,147	\$7,555		\$7,355	\$1,392	\$8,747
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$4,584	22%	\$1,067	\$5,571		\$4,584	\$1,067	\$5,571		\$5,302	\$1,242	\$6,744
PROJECT COST TOTALS:		\$292,275	21%	\$58,318	\$338,791		\$278,275	\$58,318	\$338,791	\$1,161	\$307,538	\$65,668	\$374,367
												ESTIMATED FEDERAL COST: 49%	\$183,596
												ESTIMATED NON-FEDERAL COST: 51%	\$190,771
												ESTIMATED TOTAL PROJECT COST:	\$374,367
												The costs for Lands and Damages and Pipeline Relocations and Removals are to be borne entirely by the Non-Federal Sponsor	
												CHIEF, COST ENGINEERING, Willie Horcoz	
												PROJECT MANAGER, James Worthington	
												CHIEF, REAL ESTATE, Orlando Rozas	
												CHIEF, PLANNING, Dorian Dunn	
												CHIEF, ENGINEERING, Robert Howell	
												CHIEF, OPERATIONS, Joseph Hraznetz	
												CHIEF, CONSTRUCTION, Donald Camlock	
												CHIEF, CONTRACTING, John Eugene	
												CHIEF, PM, Valinda Miller	
												CHIEF, DPM, Pate Perez	

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		DISTRICT: Galveston		PREPARED: 8/31/2012																									
LOCATION: Corpus Christi, TX		POC: CHIEF, COST ENGINEERING, Willie Honce		PREPARED: CHIEF, COST ENGINEERING, Willie Honce																									
This Estimate reflects the scope and schedule in report:		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Oluña Channel, Draft Engineering Appendix published in 2002		Draft Engineering Appendix published in 2002																									
WBS Structure		ESTIMATED COST				PROJECT FIRST COST				TOTAL PROJECT COST (FULLY FUNDED)																			
WBS NUMBER	Description	COST		ONTG		TOTAL		ESC		COST		ONTG		TOTAL		Spent Thru:													
		JBL	C	JBL	D	JBL	E	JBL	F	JBL	G	JBL	H	JBL	I	JBL	J	JBL	K	JBL	L	JBL	M	JBL	N	JBL	O		
Main Ship Channel and Barge Shelves Components		C		D		E		F		G		H		I		J		K		L		M		N		O			
02	RELOCATIONS - NON-FEDERAL	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860
12	NAVIGATION PORTS & HARBORS - FEDERAL	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300
12	BARGE LANES - FEDERAL	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391
12	BARGE LANES - NON-FEDERAL	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43
16	BANK STABILIZATION - FEDERAL	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824
16	BANK STABILIZATION - NON-FEDERAL	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824
18	CULTURAL RESOURCE PRESERVATION	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144
18	CULTURAL RESOURCE PRES - NON-FEDERAL	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144
CONSTRUCTION ESTIMATE TOTALS:		\$207,534	\$50,364	24%	\$257,898	\$207,534	\$50,364	24%	\$257,898	\$207,534	\$50,364	24%	\$257,898	\$207,534	\$50,364	24%	\$257,898	\$207,534	\$50,364	24%	\$257,898	\$207,534	\$50,364	24%	\$257,898	\$207,534	\$50,364	24%	\$257,898
01	LANDS AND DAMAGES - NON-FEDERAL	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594
30	PLANNING, ENGINEERING & DESIGN	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941
31	CONSTRUCTION MANAGEMENT	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781
PROJECT COST TOTALS:		\$225,268	\$55,057	24%	\$280,345	\$225,268	\$55,057	24%	\$280,345	\$225,268	\$55,057	24%	\$280,345	\$225,268	\$55,057	24%	\$280,345	\$225,268	\$55,057	24%	\$280,345	\$225,268	\$55,057	24%	\$280,345	\$225,268	\$55,057	24%	\$280,345
TOTAL PROJECT COST (FULLY FUNDED)		\$220,098	\$56,525		\$276,623	\$220,098	\$56,525		\$276,623	\$220,098	\$56,525		\$276,623	\$220,098	\$56,525		\$276,623	\$220,098	\$56,525		\$276,623	\$220,098	\$56,525		\$276,623	\$220,098	\$56,525		\$276,623

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		DISTRICT: Galveston		PREPARED: 8/17/2012												
LOCATION: Corpus Christi, TX		POC: CHIEF, COST ENGINEERING, Wylie Acosta														
This Estimate reflects the scope and schedule in report:		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002														
WBS Structure		PROGRAM YEAR (Budget FY): 2012				TOTAL PROJECT COST (FULLY FUNDED)										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	ESTIMATED COST		PROJECT FIRST COST				Spent Thru: 1-03-11								
		COST (\$K)	NTG %	ESC (\$K)	COST (\$K)	NTG %	TOTAL (\$K)	K	J	L	M	N	O			
A	La Quinta Channel Extension and Ecosystem Restoration Components															
1.2	NAVIGATION PORTS & HARBORS - FEDERAL	\$26,830	8%	\$28,976		\$26,830	\$2,146	\$28,976	\$809					\$26,868	\$2,156	\$30,021
1.2	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$6,707	8%	\$7,244		\$6,707	\$537	\$7,244	\$,234					\$6,709	\$539	\$7,512
1.6	BANK STABILIZATION - FEDERAL	\$5,984	2%	\$8,098		\$5,984	\$115	\$8,098						\$6,008	\$121	\$6,128
1.6	BANK STABILIZATION - NON-FEDERAL	\$3,090	1%	\$3,119		\$3,090	\$29	\$3,119						\$3,096	\$30	\$3,126
CONSTRUCTION ESTIMATE TOTALS:		\$42,611	\$2,826	\$45,437		\$42,611	\$2,826	\$45,437	\$1,143					\$42,798	\$2,846	\$46,787
01	LANDS AND DAMAGES - NON-FEDERAL	\$2,465	0%	\$2,477		\$2,465	\$12	\$2,477						\$2,457	\$13	\$2,670
30	PLANNING, ENGINEERING & DESIGN - FEDERAL	\$3,513	8%	\$3,808		\$3,513	\$294	\$3,808	\$3					\$3,551	\$302	\$3,855
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$1,022	7%	\$1,083		\$1,022	\$72	\$1,083						\$1,032	\$73	\$1,105
31	CONSTRUCTION MANAGEMENT - FEDERAL	\$2,656	8%	\$2,841		\$2,656	\$204	\$2,841	\$15					\$2,665	\$207	\$2,877
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$738	7%	\$790		\$738	\$51	\$790						\$744	\$52	\$795
PROJECT COST TOTALS:		\$52,887	\$3,459	\$56,446		\$52,888	\$3,459	\$56,446	\$1,181					\$53,437	\$3,493	\$58,081

PROJECT: Corpus Christi Ship Channel 52-Foot Project
 LOCATION: Corpus Christi, TX
 DISTRICT: Galveston
 POC: CHIEF, COST ENGINEERING, Willie Horza
 PREPARED: 8/31/2012

**** TOTAL PROJECT COST SUMMARY ****
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002
 This Estimate reflects the scope and schedule in report.

WBS NUMBER	WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Constant Dollar Basis)										TOTAL PROJECT COST (FULLY FUNDED)									
		COST _BCKL_	CNTG _D_	CNTG _E_	TOTAL _F_	ESC _G_	COST _H_	CNTG _I_	TOTAL _J_	Spent Thru 100% _K_	COST _M_	CNTG _N_	FULL _O_	ESC _P_	COST _Q_	CNTG _R_	TOTAL _S_	Spent Thru 100% _T_	COST _U_	CNTG _V_	FULL _W_										
02	Main Ship Channel and Barge Shelves Components RELOCATIONS - NON-FEDERAL	\$21,580	\$5,390	25%	\$26,950				\$21,580	\$5,390	\$26,950				\$21,580	\$5,801	\$27,004														
1.2	NAVIGATION PORTS & HARBORS	\$76,240	\$19,060	25%	\$95,500				\$76,240	\$19,060	\$95,500				\$76,240	\$21,651	\$107,894														
1.2	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$76,240	\$19,060	25%	\$95,500				\$76,240	\$19,060	\$95,500				\$76,243	\$21,561	\$107,864														
1.2	BARGE LANES	\$313	\$78	25%	\$391				\$313	\$78	\$391				\$359	\$90	\$448														
1.2	BARGE LANES - NON-FEDERAL	\$313	\$78	25%	\$391				\$313	\$78	\$391				\$40	\$10	\$50														
1.6	BANK STABILIZATION	\$13,459	\$3,365	25%	\$16,824				\$13,459	\$3,365	\$16,824				\$14,883	\$3,721	\$18,604														
1.6	BANK STABILIZATION - NON-FEDERAL	\$13,459	\$3,365	25%	\$16,824				\$13,459	\$3,365	\$16,824				\$14,883	\$3,721	\$18,604														
1.8	CULTURAL RESOURCE PRESERVATION	\$115	\$29	25%	\$144				\$115	\$29	\$144				\$122	\$30	\$152														
1.8	CULTURAL RESOURCE PRES - NON-FEDERAL	\$115	\$29	25%	\$144				\$115	\$29	\$144				\$122	\$30	\$152														
CONSTRUCTION ESTIMATE TOTALS		\$201,534	\$50,394		\$251,919				\$201,534	\$50,394	\$251,919				\$220,696	\$56,525	\$282,621														
01	LANDS AND DAMAGES - NON-FEDERAL	\$6,287	\$107	5%	\$6,394				\$6,287	\$107	\$6,394				\$6,531	\$319	\$6,949														
30	PLANNING ENGINEERING & DESIGN	\$5,118	\$1,279	25%	\$6,397				\$5,118	\$1,279	\$6,397				\$6,764	\$1,666	\$7,831														
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$4,753	\$1,186	25%	\$5,941				\$4,753	\$1,186	\$5,941				\$5,720	\$1,430	\$7,150														
31	CONSTRUCTION MANAGEMENT	\$3,772	\$943	25%	\$4,714				\$3,772	\$943	\$4,714				\$4,700	\$1,175	\$5,875														
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$3,625	\$956	25%	\$4,581				\$3,625	\$956	\$4,581				\$4,758	\$1,190	\$5,948														
PROJECT COST TOTALS		\$226,268	\$55,057	24%	\$280,445				\$226,268	\$55,057	\$280,445				\$254,669	\$62,204	\$316,273														

CHIEF, COST ENGINEERING, Willie Horza
 PROJECT MANAGER, James Worthington
 CHIEF, REAL ESTATE, Orlando Rouse
 CHIEF, PLANNING, Dylan Dunn
 CHIEF, ENGINEERING, Robert Howell
 CHIEF, OPERATIONS, Joseph Hranetz
 CHIEF, CONSTRUCTION, Donald Clarke
 CHIEF, CONTRACTING, John Eugenio
 CHIEF, PM-J, Valens Miller
 CHIEF, DPM, Pete Perez

ESTIMATED FEDERAL COST: 44% **\$140,713**
 ESTIMATED NON-FEDERAL COST: 56% **\$175,560**
 ESTIMATED TOTAL PROJECT COST: **\$316,273**

The costs for Lands and Damages and Pipeline Relocations and Removals are to be borne entirely by the Non-Federal Sponsor

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
LOCATION: Corpus Christi, TX
This Estimate reflects the scope and schedule in report;

DISTRICT: Galveston
POC: CHEF, COST ENGINEERING, White Horza
PREPARED: 6/31/2012
Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS NUMBER A CONTRACT 1 - ENTRANCE CHANNEL STA. 310+00 TO 38+00	WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Constant Dollar Basis)										TOTAL PROJECT COST (FULLY FUNDED)												
		Estimate Prepared: Effective Price Level:		24-Jul-12 1-Oct-11		RISK-BASED		COST		CNTG		TOTAL		ESC		COST		CNTG		TOTAL		Program Year (Budget EC): Effective Price Level Date:		2012 1 OCT 11		M4-Point		INFLATED		COST		CNTG		FULL
		C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	
1.2	NAVIGATION PORTS & HARBORS	\$17,556	\$4,389	25%	\$21,945										\$17,556	\$4,389	\$21,945									2015Q2	5.7%	\$18,951	\$4,640	\$23,201				
1.8	CULTURAL RESOURCE PRESERVATION	\$230	\$59	25%	\$289										\$230	\$59	\$289									2015Q2	5.7%	\$243	\$91	\$304				
01	LANDS AND DAMAGES - NON-FEDERAL	\$17,786	\$4,447	25%	\$22,233										\$17,786	\$4,447	\$22,233											\$18,804	\$4,701	\$23,505				
3.0	PLANNING, ENGINEERING & DESIGN																																	
1.0%	Project Management	\$178	\$45	25%	\$223										\$178	\$45	\$223									2014Q3	6.3%	\$188	\$47	\$236				
0.7%	Planning & Environmental Compliance	\$125	\$31	25%	\$156										\$125	\$31	\$156									2014Q3	6.3%	\$133	\$33	\$166				
3.0%	Engineering & Design	\$524	\$134	25%	\$658										\$524	\$134	\$658									2014Q3	6.3%	\$567	\$142	\$709				
0.9%	Engineering Tech Review ITR & VE	\$160	\$40	25%	\$200										\$160	\$40	\$200									2014Q3	6.3%	\$170	\$43	\$213				
0.3%	Contracting & Reprographics	\$53	\$13	25%	\$66										\$53	\$13	\$66									2014Q3	6.3%	\$56	\$14	\$70				
0.4%	Engineering During Construction	\$71	\$18	25%	\$89										\$71	\$18	\$89									2015Q2	9.4%	\$78	\$19	\$97				
0.3%	Planning During Construction	\$53	\$13	25%	\$66										\$53	\$13	\$66									2015Q2	9.4%	\$58	\$14	\$72				
0.1%	Project Operations	\$18	\$5	25%	\$23										\$18	\$5	\$23									2014Q3	6.3%	\$19	\$5	\$24				
3.1	CONSTRUCTION MANAGEMENT																																	
4.7%	Construction Management	\$729	\$182	25%	\$911										\$729	\$182	\$911									2015Q2	9.4%	\$789	\$199	\$987				
0.7%	Project Operations	\$18	\$5	25%	\$23										\$18	\$5	\$23									2015Q2	9.4%	\$20	\$5	\$25				
0.9%	Project Management	\$160	\$40	25%	\$200										\$160	\$40	\$200									2015Q2	9.4%	\$175	\$44	\$219				
CONTRACT COST TOTALS:		\$19,885	\$4,971		\$24,857										\$19,885	\$4,971	\$24,857										\$21,867	\$5,267	\$26,333					

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
LOCATION: Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Ojuna Channel, Draft Engineering Appendix published in 2002.
This Estimate reflects the scope and schedule in report.

DISTRICT: District 1
PREPARED BY: CH2M HILL COST ENGINEERING, W&A, Inc.
DATE: 03/12/2012
CORPUS CHRISTI SHIP CHANNEL IMPROVEMENT PROJECT, CORPUS CHRISTI SHIP CHANNEL AND LA OJUNA CHANNEL, DRAFT ENGINEERING APPENDIX PUBLISHED IN 2002

WBS Structure	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)												
	Estimate Prepared: Effective Price Date:		24-Jul-12 1-Oct-11		TOTAL		ESC		COST		ONTG		TOTAL		Mid-Point		INFLATED		COST		ONTG		FULL		
WBS NUMBER	Feature & Sub-Feature Description	LSKL	ONTG	LSKL	ONTG	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL	LSKL
A	CONTRACT 2 - LOWER BAY, PART 1																								
1.2	NAVIGATION PORTS & HARBORS	\$13,442	\$3,361	25%	\$16,803		\$13,442	\$3,361	25%	\$16,803		\$13,442	\$3,361	25%	\$16,803		\$13,442	\$3,361	25%	\$16,803		\$13,442	\$3,361	25%	\$16,803
01	LANDS AND DAMAGES - NON-FEDERAL																								
30	PLANNING, ENGINEERING & DESIGN																								
1.4%	Project Management	\$188	\$47	25%	\$235		\$188	\$47	25%	\$235		\$188	\$47	25%	\$235		\$188	\$47	25%	\$235		\$188	\$47	25%	\$235
0.6%	Planning & Environmental Compliance	\$121	\$30	25%	\$151		\$121	\$30	25%	\$151		\$121	\$30	25%	\$151		\$121	\$30	25%	\$151		\$121	\$30	25%	\$151
4.2%	Engineering & Design	\$565	\$141	25%	\$706		\$565	\$141	25%	\$706		\$565	\$141	25%	\$706		\$565	\$141	25%	\$706		\$565	\$141	25%	\$706
1.3%	Engineering Tech Review ITR & VE	\$175	\$44	25%	\$219		\$175	\$44	25%	\$219		\$175	\$44	25%	\$219		\$175	\$44	25%	\$219		\$175	\$44	25%	\$219
0.3%	Contracting & Reenactings	\$40	\$10	25%	\$50		\$40	\$10	25%	\$50		\$40	\$10	25%	\$50		\$40	\$10	25%	\$50		\$40	\$10	25%	\$50
0.6%	Engineering During Construction	\$81	\$20	25%	\$101		\$81	\$20	25%	\$101		\$81	\$20	25%	\$101		\$81	\$20	25%	\$101		\$81	\$20	25%	\$101
0.4%	Planning During Construction	\$54	\$14	25%	\$68		\$54	\$14	25%	\$68		\$54	\$14	25%	\$68		\$54	\$14	25%	\$68		\$54	\$14	25%	\$68
0.2%	Project Operations	\$27	\$7	25%	\$34		\$27	\$7	25%	\$34		\$27	\$7	25%	\$34		\$27	\$7	25%	\$34		\$27	\$7	25%	\$34
31	CONSTRUCTION MANAGEMENT																								
0.7%	Construction Management	\$766	\$192	25%	\$958		\$766	\$192	25%	\$958		\$766	\$192	25%	\$958		\$766	\$192	25%	\$958		\$766	\$192	25%	\$958
0.1%	Project Operations	\$13	\$3	25%	\$16		\$13	\$3	25%	\$16		\$13	\$3	25%	\$16		\$13	\$3	25%	\$16		\$13	\$3	25%	\$16
1.3%	Project Management	\$175	\$44	25%	\$219		\$175	\$44	25%	\$219		\$175	\$44	25%	\$219		\$175	\$44	25%	\$219		\$175	\$44	25%	\$219
CONTRACT COST TOTALS:		\$15,647		\$3,812		\$19,459		\$15,647		\$3,812		\$19,459		\$15,647		\$3,812		\$19,459		\$15,647		\$3,812		\$19,459	
CONTRACT COST (FULLY FUNDED)		\$14,467		\$3,617		\$18,084		\$14,467		\$3,617		\$18,084		\$14,467		\$3,617		\$18,084		\$14,467		\$3,617		\$18,084	

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
LOCATION: Corpus Christi, TX
This Estimate reflects the scope and schedule in report:

Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Cuitas Channel, Draft Engineering Appendix published in 2002

DISTRICT: Galveston
POC: CHIEF, COST ENGINEERING, Willie Hurns
PREPARED: 8/31/2012

WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Constant Dollar Basis)										TOTAL PROJECT COST (FULLY FUNDED)										
	Estimate Prepared:		24-Jul-12		1-Oct-11		Program Year (Budget EC):		2012		1 OCT 11		ESC		COST		ONTG		TOTAL		M&Pmt		Date		INFLATED		COST		CNTG		FULL
WBS NUMBER	WBS Description	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF
12	NAVIGATION PORTS & HARBORS	\$41,692	\$10,423	25%	\$52,115										\$41,692	\$10,423	\$52,115			2017Q4	10.5%	\$46,690	\$11,522	\$58,212						\$57,612	
16	BANK STABILIZATION	\$26,769	\$6,692	25%	\$33,461										\$26,769	\$6,692	\$33,461			2017Q4	10.5%	\$29,693	\$7,398	\$37,091						\$36,991	
CONTRACT 3 - LOWER BAY, PART 2																															
CONTRACT 3 - LOWER BAY, PART 2																															
CONSTRUCTION ESTIMATE TOTALS:		\$68,461	\$17,115	25%	\$85,576										\$68,461	\$17,115	\$85,576														\$84,603
01	LANDS AND DAMAGES - NON-FEDERAL																														
30	PLANNING, ENGINEERING & DESIGN	\$308	\$77	25%	\$385										\$308	\$77	\$385			2016Q2	13.7%	\$350	\$68	\$418						\$438	
0.5%	Project Management	\$205	\$51	25%	\$256										\$205	\$51	\$256			2016Q2	13.7%	\$233	\$58	\$291						\$291	
0.5%	Planning & Environmental Compliance	\$1,027	\$257	25%	\$1,284										\$1,027	\$257	\$1,284			2016Q2	13.7%	\$1,167	\$292	\$1,459						\$1,459	
1.5%	Engineering & Design	\$205	\$51	25%	\$256										\$205	\$51	\$256			2016Q2	13.7%	\$233	\$58	\$291						\$291	
0.3%	Engineering Tech Review (TR & VE	\$48	\$12	25%	\$60										\$48	\$12	\$60			2016Q2	13.7%	\$55	\$14	\$69						\$68	
0.1%	Contracting & Reinsurances	\$171	\$43	25%	\$214										\$171	\$43	\$214			2017Q4	20.1%	\$205	\$51	\$257						\$257	
0.3%	Engineering During Construction	\$137	\$34	25%	\$171										\$137	\$34	\$171			2017Q4	20.1%	\$164	\$41	\$205						\$206	
0.2%	Planning During Construction	\$14	\$4	25%	\$18										\$14	\$4	\$18			2016Q2	13.7%	\$16	\$4	\$20						\$20	
0.0%	Project Operations																														
31	CONSTRUCTION MANAGEMENT	\$1,780	\$445	25%	\$2,225										\$1,780	\$445	\$2,225			2017Q4	20.1%	\$2,137	\$534	\$2,671						\$2,671	
2.6%	Construction Management	\$21	\$5	25%	\$26										\$21	\$5	\$26			2017Q4	20.1%	\$29	\$6	\$35						\$35	
0.0%	Project Operations	\$274	\$69	25%	\$343										\$274	\$69	\$343			2017Q4	20.1%	\$328	\$82	\$410						\$410	
0.4%	Project Management																														
CONTRACT COST TOTALS:		\$72,651	\$18,163		\$90,814										\$72,651	\$18,163	\$90,814														\$98,977
																															\$201,149

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
LOCATION: Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002.
This Estimate reflects the scope and schedule in report.

DISTRICT: Galveston DISTRICT: PREPARED: 8/31/2012
PROJECT: COST ENGINEERING, WBS Plus
Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002.

WBS Structure	ESTIMATED COST	PROJECT FIRST COST (Constant Dollar Basis)	TOTAL PROJECT COST (FULLY FUNDED)
<p>WBS NUMBER A CONTRACT 4 - LOWER BAY STA. 18+00 TO 27+00 - BANK STABILIZATION</p>	<p>Estimate Prepared: 24-Jul-12 Effective Price Level: 1-Oct-11</p> <p>COST C D E F ESC % G H I J COST \$ K L M N ONTG % O P Q R TOTAL \$ S T U V</p>	<p>Program Year (Budget EC): 2012 Effective Price Level Date: 1 OCT 11</p> <p>ESC % G H I J COST \$ K L M N ONTG % O P Q R TOTAL \$ S T U V</p>	<p>Mid-Point Date P FULLY FUNDED PROJECT ESTIMATE ESC % L M N COST \$ O P Q R ONTG % S T U V TOTAL \$ W X Y Z</p>
16 BANK STABILIZATION	\$149 \$37 25% \$186	\$149 \$37 \$186	2020Q3 2020Q3 16.1% \$173 \$43 \$216
CONSTRUCTION ESTIMATE TOTALS:			
01 LANDS AND DAMAGES - NON-FEDERAL	\$149 \$37 25% \$186	\$149 \$37 \$186	\$173 \$43 \$216
30 PLANNING, ENGINEERING & DESIGN			
20.0% Project Management	\$30 \$8 25% \$38	\$30 \$8 \$38	2020Q1 2020Q1 23.7% \$39 \$10 \$49
20.0% Planning & Environmental Compliance	\$30 \$8 25% \$38	\$30 \$8 \$38	2020Q1 2020Q1 23.7% \$39 \$10 \$49
3.0% Engineering & Design	\$7 \$2 25% \$9	\$7 \$2 \$9	2020Q1 2020Q1 23.7% \$9 \$2 \$11
3.0% Engineering Test Review (TR & VE	\$30 \$8 25% \$38	\$30 \$8 \$38	2020Q1 2020Q1 23.7% \$39 \$10 \$49
2.0% Contracting & Logistics	\$18 \$5 25% \$23	\$18 \$5 \$23	2020Q3 2020Q3 31.9% \$24 \$8 \$30
12.0% Engineering During Construction	\$37 \$9 25% \$46	\$37 \$9 \$46	2020Q3 2020Q3 31.9% \$49 \$12 \$61
23.0% Planning During Construction Project Operations			
31 CONSTRUCTION MANAGEMENT			
30.0% Construction Management	\$45 \$11 25% \$56	\$45 \$11 \$56	2020Q3 2020Q3 31.9% \$59 \$15 \$74
16.5% Project Operations	\$25 \$6 25% \$31	\$25 \$6 \$31	2020Q3 2020Q3 31.9% \$33 \$9 \$41
16.5% Project Management			
CONTRACT COST TOTALS:			
	\$401 \$100 \$501	\$401 \$100 \$501	\$502 \$126 \$628

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
LOCATION: Corpus Christi, TX
This Estimate reflects the scope and schedule in report:

DISTRICT: Galveston
POC: CHEF, COST ENGINEERING, Willie Honza
PREPARED: 8/31/2012

Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS Structure	ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)					
	Estimate Prepared: Effective Price Level:	24-Jul-12 1-028-11	Program Year (Budget EC): Effective Price Level (Date):	2012 1 OCT 11	ESC _JBL_	COST _JBL_	CNTG _JBL_	TOTAL _JBL_	ESC _JBL_	COST _JBL_	CNTG _JBL_	TOTAL _JBL_	Mag-Pier#	FULL _JBL_
WBS NUMBERS A 1.2 NAVIGATION PORTS & HARBORS	COST _JBL_	CNTG _JBL_	ONTG _JBL_	TOTAL _JBL_	ESC _JBL_	COST _JBL_	CNTG _JBL_	TOTAL _JBL_	ESC _JBL_	COST _JBL_	CNTG _JBL_	TOTAL _JBL_	201903	\$48,290
	\$33,851	\$8,483	25%	\$42,314		\$33,851	\$8,483	\$42,314	14.1%	\$38,608	\$9,652	\$48,260		
CONSTRUCTION ESTIMATE TOTALS:	\$33,851	\$8,483	25%	\$42,314		\$33,851	\$8,483	\$42,314		\$38,608	\$9,652	\$48,260		
01 LANDS AND DAMAGES - NON-FEDERAL														
30 PLANNING, ENGINEERING & DESIGN	\$271	\$68	25%	\$339		\$271	\$68	\$339	23.3%	\$334	\$84	\$418		
0.8% Project Management	\$169	\$42	25%	\$211		\$169	\$42	\$211	23.3%	\$208	\$52	\$260		
0.9% Planning & Environmental Compliance	\$745	\$186	25%	\$931		\$745	\$186	\$931	23.3%	\$918	\$230	\$1,148		
2.2% Engineering & Design	\$271	\$68	25%	\$339		\$271	\$68	\$339	23.3%	\$334	\$84	\$418		
0.6% Engineering Tech Review (TR & VE)	\$68	\$17	25%	\$85		\$68	\$17	\$85	23.3%	\$84	\$21	\$105		
0.2% Contracting & Topographics	\$102	\$26	25%	\$128		\$102	\$26	\$128	27.5%	\$130	\$33	\$163		
0.3% Engineering During Construction	\$68	\$17	25%	\$85		\$68	\$17	\$85	27.5%	\$87	\$22	\$108		
0.2% Planning During Construction	\$34	\$9	25%	\$43		\$34	\$9	\$43	23.3%	\$42	\$10	\$52		
0.1% Project Operations														
31 CONSTRUCTION MANAGEMENT	\$1,151	\$288	25%	\$1,439		\$1,151	\$288	\$1,439	27.5%	\$1,468	\$367	\$1,835		
3.4% Construction Management	\$34	\$9	25%	\$43		\$34	\$9	\$43	27.5%	\$43	\$11	\$54		
0.7% Project Operations	\$237	\$59	25%	\$296		\$237	\$59	\$296	27.5%	\$302	\$76	\$378		
0.7% Project Management														
CONTRACT COST TOTALS:	\$37,001	\$9,250		\$46,251		\$37,001	\$9,250	\$46,251		\$42,559	\$10,640	\$53,198		

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
LOCATION: Corpus Christi, TX
This Estimate reflects the scope and schedule in report;

Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002
DISTRICT: Galveston
POC: CHIEF, COST ENGINEERING, Willie Horcas
PREPARED: 8/12/2012

WBS NUMBER	WBS Structure	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)					
		ESC _J\$K_	COST _D	CNTG _E	TOTAL _F	ESC _J\$K_	COST _H	CNTG _I	TOTAL _J	Mid-Point Date _P	ESC _J\$K_	COST _M	CNTG _N	FULL _O	ESC _J\$K_	COST _W	CNTG _X	FULL _Y	
1.2	NAVIGATION PORTS & HARBORS	\$348	\$87	25%	\$434	\$348	\$97	28%	\$445	2018Q4	14.6%	\$368	\$100	\$468					
CONSTRUCTION ESTIMATE TOTALS:		\$348	\$97	25%	\$445	\$348	\$97		\$445			\$398	\$100	\$498					
01	LANDS AND DAMAGES - NON-FEDERAL																		
3.0	PLANNING ENGINEERING & DESIGN	\$9	\$2	25%	\$10	\$9	\$2		\$10	2018Q3	23.3%	\$10	\$2	\$12					
2.4%	Project Management	\$3	\$1	25%	\$4	\$3	\$1		\$4	2018Q3	23.3%	\$4	\$1	\$5					
1.6%	Planning & Environmental Compliance	\$25	\$6	25%	\$31	\$25	\$6		\$31	2018Q3	23.3%	\$31	\$6	\$39					
7.2%	Engineering & Design	\$2	\$1	25%	\$3	\$2	\$1		\$3	2018Q3	23.3%	\$2	\$1	\$3					
0.5%	Engineering Tech Review ITR & VE	\$10	\$3	25%	\$13	\$10	\$3		\$13	2018Q3	23.3%	\$10	\$3	\$15					
3.0%	Contracting & Relationships	\$1	\$0	25%	\$1	\$1	\$0		\$1	2019Q4	28.6%	\$1	\$0	\$2					
0.4%	Engineering During Construction Planning During Construction Project Operations			25%															
3.1	CONSTRUCTION MANAGEMENT	\$10	\$3	25%	\$13	\$10	\$3		\$13	2018Q4	28.6%	\$13	\$3	\$18					
2.8%	Construction Management	\$5	\$1	25%	\$6	\$5	\$1		\$6	2018Q4	28.6%	\$6	\$2	\$8					
1.3%	Project Management																		
CONTRACT COST TOTALS:		\$412	\$103		\$514	\$412	\$103		\$514			\$478	\$119	\$597					

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel S2-Foot Project
LOCATION: Corpus Christi, TX
This Estimate reflects the scope and schedule in report;
PROJECT: Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002
DISTRICT: Galveston
POC: CHIEF, COST ENGINEERING, Willie Honza
PREPARED: 8/31/2012

WBS Structure	ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)		TOTAL PROJECT COST (FULLY FUNDED)						
	Estimate Prepared: Effective Price Level:	24-Jul-12 1-03-11	Program Year (Budget ECI): Effective Price Level Date:	2012 1 OCT 11	FULLY FUNDED PROJECT ESTIMATE						
WBS NUMBER	COST	ONTG	ESC	COST	ONTG	FULL					
DESCRIPTION	JKL	JKL	JKL	JKL	JKL	JKL					
	G	E	G	H	M	O					
CONTRACT 6 - INNER HARBOR STA. 1880+00 TO 1320+00	\$24,108	\$6,027	25%	\$24,108	\$6,027	\$30,135	18.2%	\$28,495	\$7,124	\$35,618	
12 NAVIGATION PORTS & HARBORS	\$24,108	\$6,027	25%	\$24,108	\$6,027	\$30,135		\$28,495	\$7,124	\$35,618	
CONSTRUCTION ESTIMATE TOTALS:	\$24,108	\$6,027	25%	\$24,108	\$6,027	\$30,135		\$28,495	\$7,124	\$35,618	
01 LANDS AND DAMAGES - NON-FEDERAL											
30 PLANNING, ENGINEERING & DESIGN											
0.6%	\$183	\$48	25%	\$183	\$48	\$241		202/03	\$255	\$64	\$318
0.6%	\$145	\$36	25%	\$145	\$36	\$181		202/03	\$191	\$46	\$239
2.6%	\$627	\$157	25%	\$627	\$157	\$784		202/03	\$827	\$207	\$1,034
0.6%	\$183	\$48	25%	\$183	\$48	\$241		202/03	\$255	\$64	\$318
0.2%	\$48	\$12	25%	\$48	\$12	\$60		202/03	\$63	\$16	\$79
0.3%	\$72	\$18	25%	\$72	\$18	\$90		202/03	\$98	\$25	\$123
0.2%	\$48	\$12	25%	\$48	\$12	\$60		202/03	\$65	\$16	\$82
0.1%	\$24	\$6	25%	\$24	\$6	\$30		202/03	\$32	\$8	\$40
31 CONSTRUCTION MANAGEMENT											
3.6%	\$868	\$217	25%	\$868	\$217	\$1,085		202/03	\$1,163	\$296	\$1,479
0.1%	\$24	\$6	25%	\$24	\$6	\$30		202/03	\$33	\$8	\$41
0.7%	\$169	\$42	25%	\$169	\$42	\$211		202/03	\$230	\$58	\$288
CONTRACT COST TOTALS:	\$26,519	\$6,630		\$26,519	\$6,630	\$33,149			\$31,727	\$7,952	\$39,688

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project
 LOCATION: Corpus Christi, TX
 This Estimate reflects the scope and schedule in report.

DISTRICT: Galveston
 PREPARED: 8/31/2012
 POC: CNEFC COST ENGINEERING, Wills Hanco
 PROJECT: Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS Structure	ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
	Estimate Prepared: Effective Price Level:	24-Jul-12 1-Oct-11	ESC COST JAN G	ONTG JAN H	CONG JAN I	TOTAL JAN J	Mgt-Point Date P	ESC COST L JAN	CONG M JAN	FULL N JAN	TOTAL O JAN
PIPELINE RELOCATIONS AND REMOVALS											
02 RELOCATIONS	5,390	5,390	\$21,560	5,390	\$26,950	\$26,950	201602	7.6%	\$23,203	\$5,801	\$29,004
CONSTRUCTION ESTIMATE TOTALS:			\$21,560	5,390	\$26,950	\$26,950			\$23,203	\$5,801	\$29,004
01 LANDS AND DAMAGES - NON-FEDERAL	3365	146	\$365	146	\$731	\$731	201402	3.9%	\$607	\$152	\$759
30 PLANNING, ENGINEERING & DESIGN Planning, Engineering & Design	\$195	49	\$195	49	\$244	\$244	201602	9.4%	\$213	\$53	\$267
31 CONSTRUCTION MANAGEMENT Construction Management	\$65	16	\$65	16	\$81	\$81	201602	13.7%	\$74	\$19	\$92
CONTRACT COST TOTALS:			22,404	5,801	\$28,205	\$28,205			\$24,038	\$5,024	\$30,122

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Channel Improvement Project
LOCATION: Corpus Christi, TX

DISTRICT: Galveston
CHIEF, COST ENGINEERING, Willie Horza
PREPARED: 8/31/2012

This Estimate reflects the scope and schedule in report; Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS NUMBER	WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Constant Dollar Basis)										TOTAL PROJECT COST (FULLY FUNDED)									
		COST		CNTG		TOTAL		ESC		COST		CNTG		TOTAL		L		COST		CNTG		FULL									
		(L)	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_	_(L)_	_(S)_								
<p>Program Year (Budget EO): 2012 Effective Price Level Date: 1 OCT 11</p>																															
A		C		D		E		F		G		H		I		J		K		L		M		N							
B		O		P		Q		R		S		T		U		V		W		X		Y		Z							
C		AA		AB		AC		AD		AE		AF		AG		AH		AI		AJ		AK		AL							
D		AM		AN		AO		AP		AQ		AR		AS		AT		AU		AV		AW		AX							
E		AY		AZ		BA		BB		BC		BD		BE		BF		BG		BH		BI		BJ							
F		BK		BL		BM		BN		BO		BP		BQ		BR		BS		BT		BU		BV							
G		BW		BX		BY		BZ		CA		CB		CC		CD		CE		CF		CG		CH							
H		CI		CJ		CK		CL		CM		CN		CO		CP		CQ		CR		CS		CT							
I		CU		CV		CW		CX		CY		CZ		DA		DB		DC		DD		DE		DF							
J		DG		DH		DI		DJ		DK		DL		DM		DN		DO		DP		DQ		DR							
K		DS		DT		DU		DV		DW		DX		DY		DZ		EA		EB		EC		ED							
L		EE		EF		EG		EH		EI		EJ		EK		EL		EM		EN		EO		EP							
M		EQ		ER		ES		ET		EU		EV		EW		EX		EY		EZ		FA		FB							
N		FC		FD		FE		FF		FG		FH		FI		FJ		FK		FL		FM		FN							
O		FO		FP		FQ		FR		FS		FT		FU		FV		FW		FX		FY		FZ							
P		GA		GB		GC		GD		GE		GF		GG		GH		GI		GJ		GK		GL							
Q		GM		GN		GO		GP		GQ		GR		GS		GT		GU		GV		GW		GX							
R		GY		GZ		HA		HB		HC		HD		HE		HF		HG		HH		HI		HJ							
S		HK		HL		HM		HN		HO		HP		HQ		HR		HS		HT		HU		HV							
T		HW		HX		HY		HZ		IA		IB		IC		ID		IE		IF		IG		IH							
U		II		IJ		IK		IL		IM		IN		IO		IP		IQ		IR		IS		IT							
V		IU		IV		IW		IX		IY		IZ		JA		JB		JC		JD		JE		JF							
W		JG		JH		JI		JJ		JK		JL		JM		JN		JO		JP		JQ		JR							
X		JS		JT		JU		JV		JW		JX		JY		JZ		KA		KB		KC		KD							
Y		KE		KF		KG		KH		KI		KJ		KK		KL		KM		KN		KO		KP							
Z		KQ		KR		KS		KT		KU		KV		KW		KX		KY		KZ		LA		LB							
AA		LC		LD		LE		LF		LG		LH		LI		LJ		LK		LL		LM		LN							
AB		LO		LP		LQ		LR		LS		LT		LU		LV		LW		LX		LY		LZ							
AC		LA		LB		LC		LD		LE		LF		LG		LH		LI		LJ		LK		LL							
AD		LM		LN		LO		LP		LQ		LR		LS		LT		LU		LV		LW		LX							
AE		LY		LZ		MA		MB		MC		MD		ME		MF		MG		MH		MI		MJ							
AF		MK		ML		MN		MO		MP		MQ		MR		MS		MT		MU		MV		MW							
AG		MX		MY		MZ		NA		NB		NC		ND		NE		NF		NG		NH		NI							
AH		NJ		NK		NL		NM		NO		NP		NQ		NR		NS		NT		NU		NV							
AI		NW		NX		NY		NZ		OA		OB		OC		OD		OE		OF		OG		OH							
AJ		OI		OJ		OK		OL		OM		ON		OO		OP		OQ		OR		OS		OT							
AK		OU		OV		OW		OX		OY		OZ		PA		PB		PC		PD		PE		PF							
AL		PG		PH		PI		PJ		PK		PL		PM		PN		PO		PP		PQ		PR							
AM		PS		PT		PU		PV		PW		PX		PY		PZ		QA		QB		QC		QD							
AN		QE		QF		QG		QH		QI		QJ		QK		QL		QM		QN		QO		QP							
AO		QR		QS		QT		QU		QV		QW		QX		QY		QZ		RA		RB		RC							
AP		RD		RE		RF		RG		RH		RI		RJ		RK		RL		RM		RN		RO							
AQ		RP		RQ		RS		RT		RU		RV		RW		RX		RY		RZ		SA		SB							
AR		SC		SD		SE		SF		SG		SH		SI		SJ		SK		SL		SM		SN							
AS		SO		SP		SQ		SR		SS		ST		SU		SV		SW		SX		SY		SZ							
AT		TA		TB		TC		TD		TE		TF		TG		TH		TI		TJ		TK		TL							
AU		TM		TN		TO		TP		TQ		TR		TS		TT		TU		TV		TW		TX							
AV		TY		TZ		UA		UB		UC		UD		UE		UF		UG		UH		UI		UJ							
AW		UK		UL		UM		UN		UO		UP		UQ		UR		US		UT		UU		UV							
AX		UV		UW		UX		UY		UZ		VA		VB		VC		VD		VE		VF		VG							
AY		VH		VI		VJ		VK		VL		VM		VN		VO		VP		VQ		VR		VS							
AZ		VT		VU		VV		VW		VX		VY		VZ		WA		WB		WC		WD		WE							
BA		WF		WG		WH		WI		WJ		WK		WL		WM		WN		WO		WP		WQ							
BB		WR		WS		WT		WU		WV		WW		WX		WY		WZ		XA		XB		XC							
BC		XD		XE		XF		XG		XH		XI		XJ		XK		XL		XM		XN		XO							
BD		XP		XQ		XR		XS		XT		XU		XV		XW		XX		XY		XZ		YA							
BE		YB		YC		YD		YE		YF		YG		YH		YI		YJ		YK		YL		YM							
BF		YN		YO		YP		YQ		YR		YS		YT		YU		YV		YW		YX		YY							
BG		ZA		ZB		ZC		ZD		ZE		ZF		ZG		ZH		ZI		ZJ		ZK		ZL							
BH		ZM		ZN		ZO		ZP		ZQ		ZR		ZS		ZT		ZU		ZV		ZW		ZX							
BI		ZZ		AA		AB		AC		AD		AE		AF		AG		AH		AI		AJ		AK							
BJ		AL		AM		AN		AO		AP		AQ		AR		AS		AT		AU		AV		AW							
BK		AX		AY		AZ		BA		BB		BC		BD		BE		BF		BG		BH		BI							
BL		BJ		BK		BL		BM		BN		BO		BP		BQ		BR		BS		BT		BU							
BM		BV		BW		BX		BY		BZ		CA		CB		CC		CD		CE		CF		CG							
BN		CH		CI		CJ		CK		CL		CM		CN		CO		CP		CQ		CR		CS							
BO		CK		CL		CM		CN		CO		CP		CQ		CR		CS		CT		CU		CV							
BP		CV		CW		CX		CY		CZ		DA		DB		DC		DD		DE		DF		DG							
BQ		CG		CH		CI		CJ		CK		CL		CM		CN		CO		CP		CQ		CR							
BR		CK		CL		CM		CN		CO		CP		CQ		CR		CS		CT		CU		CV							
BS		CM		CN		CO		CP		CQ		CR		CS		CT		CU		CV		CW		CX							
BT		CN		CO		CP		CQ		CR		CS		CT		CU		CV		CW		CX		CY							
BU		CO		CP		CQ		CR		CS		CT		CU		CV		CW		CX		CY		CZ							
BV		CP		CQ		CR		CS		CT		CU		CV		CW		CX		CY		CZ		DA							
BW		CQ		CR		CS		CT		CU		CV		CW		CX		CY		CZ		DA		DB							
BX		CR		CS		CT		CU		CV		CW		CX		CY		CZ		DA		DB		DC							
BY		CT		CU		CV		CW		CX		CY		CZ		DA		DB		DC		DD		DE							
BZ		CU		CV		CW		CX		CY		CZ		DA		DB		DC		DD		DE		DF							
CA		CV		CW		CX		CY		CZ		DA		DB		DC		DD		DE		DF		DG							
CB		CW		CX		CY		CZ		DA		DB		DC		DD		DE		DF		DG		DH							
CC		CX		CY		CZ		DA		DB		DC		DD		DE		DF		DG		DH		DI							
CD		CY		CZ		DA		DB		DC		DD		DE		DF		DG		DH		DI		DJ							
CE		CZ		DA		DB		DC		DD		DE		DF		DG		DH		DI		DJ		DK							
CF																															

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Channel Improvement Project
 LOCATION: Corpus Christi, TX
 The Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston
 POC: CHIEF, COST ENGINEERING, Willie Horoz
 PREPARED: 8/31/2012
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002.

WBS Structure		ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)		TOTAL PROJECT COST (FULLY FUNDED)								
WBS NUMBER	Feature & Sub-Feature Description	COST (\$K)	CONTG (%)	ESC (%)	COST (\$K)	CONTG (%)	TOTAL (\$K)	INFLATED (%)	COST (\$K)	CONTG (%)	FULL (\$K)			
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
CONTRACT 1 - UPLAND PLACEMENT AREA NO. 14														
12	NAVIGATION PORTS & HARBORS													
12	NAVIGATION PORTS & HARBORS - NON-FED													
CONSTRUCTION ESTIMATE TOTALS:														
01	LANDS AND DAMAGES - NON-FEDERAL	\$2,418			\$2,418		\$2,418		\$2,418					
01	Non-Creditable LERRD Exec Cost	\$47	25%		\$59		\$47	\$12	\$39					
30	PLANNING, ENGINEERING & DESIGN													
	Project Management													
	Planning & Environmental Compliance													
	Engineering & Design													
	Engineering Tech Review ITR & VE													
	Real Estate, In-House (Federal)													
	Engineering During Construction													
	Planning During Construction													
	Project Operations													
	2013Q2								2013Q2					
	7.8%								7.8%					
	2013Q2								2013Q2					
	7.8%								7.8%					
	2013Q2								2013Q2					
	\$33	\$9	25%	\$42			\$33	\$8	\$42			\$33	\$8	\$42
The cost sharing for PED is apportioned in the summary calculations at the top of this spreadsheet as 80% Federal and 20% Non-Federal.														
31	CONSTRUCTION MANAGEMENT													
	Construction Management													
	Project Operations													
	Project Management													
	2013Q2								2013Q2					
	\$2,469	\$20		\$2,519			\$2,469	\$20	\$2,519			\$2,469	\$20	\$2,519
CONTRACT COST TOTALS:														
		\$2,469	\$20	\$2,519			\$2,469	\$20	\$2,519			\$2,469	\$20	\$2,712

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Channel Improvement Project DISTRICT: Galveston PREPARED: 8/31/2012
 LOCATION: Corpus Christi, TX POC: CHIEF, COST ENGINEERING, Willie Hooza
 This Estimate reflects the scope and schedule in report; Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Oquilda Channel, Draft Engineering Appendix published in 2002

WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Constant Dollar Basis)										TOTAL PROJECT COST (FULLY FUNDED)									
	Estimate Prepared: Effective Price Level:		24-Jul-12 1-Oct-11		Program Year (Budget EC): Effective Price Level Date:		2012 1 OCT 11		MID-POINT DATE		INFLATED COST		CONTRACT COST		FULL COST		MID-POINT DATE		INFLATED COST		CONTRACT COST		FULL COST							
WBS NUMBER	Feature & Sub-Feature Description	COST (\$K)	CONTR (\$K)	CONTR (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CONTR (\$K)	CONTR (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CONTR (\$K)	CONTR (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CONTR (\$K)	CONTR (%)	TOTAL (\$K)	ESC (%)	COST (\$K)	CONTR (\$K)	CONTR (%)	TOTAL (\$K)					
CONTRACT 2 AWARDED & ONGOING																														
CONTRACT 2 - LA QUINTA CHANNEL EXTENSION																														
EXTEND LA QUINTA CHANNEL AND CONSTRUCT TURNING BASIN																														
12	NAVIGATION PORTS & HARBORS	\$26,530	\$2,146	8%	\$28,676		\$26,530	\$2,146	8%	\$28,676		\$26,530	\$2,146	8%	\$28,676		\$26,530	\$2,146	8%	\$28,676		\$26,530	\$2,146	8%	\$28,676					
12	NAVIGATION PORTS & HARBORS - NON-FED	\$6,707	\$537	8%	\$7,244		\$6,707	\$537	8%	\$7,244		\$6,707	\$537	8%	\$7,244		\$6,707	\$537	8%	\$7,244		\$6,707	\$537	8%	\$7,244					
CONSTRUCTION ESTIMATE TOTALS:		\$33,537	\$2,683	8%	\$36,220		\$33,537	\$2,683	8%	\$36,220		\$33,537	\$2,683	8%	\$36,220		\$33,537	\$2,683	8%	\$36,220		\$33,537	\$2,683	8%	\$36,220					
LANDS AND DAMAGES - NON-FEDERAL																														
01																														
CONSTRUCTION ESTIMATE TOTALS:																														
LANDS AND DAMAGES - NON-FEDERAL																														
30	PLANNING, ENGINEERING & DESIGN	\$750	\$80	8%	\$830		\$750	\$80	8%	\$830		\$750	\$80	8%	\$830		\$750	\$80	8%	\$830		\$750	\$80	8%	\$830					
	Project Management	\$1,000	\$80	5%	\$1,080		\$1,000	\$80	5%	\$1,080		\$1,000	\$80	5%	\$1,080		\$1,000	\$80	5%	\$1,080		\$1,000	\$80	5%	\$1,080					
	Planning & Environmental Compliance	\$1,500	\$120	8%	\$1,620		\$1,500	\$120	8%	\$1,620		\$1,500	\$120	8%	\$1,620		\$1,500	\$120	8%	\$1,620		\$1,500	\$120	8%	\$1,620					
	Engineering & Design	\$76	\$6	8%	\$82		\$76	\$6	8%	\$82		\$76	\$6	8%	\$82		\$76	\$6	8%	\$82		\$76	\$6	8%	\$82					
	Engineering Tech Review TR & VE																													
	Contracting & Reprintographics																													
	Real Estate In-House Labor																													
	Engineering During Construction																													
	Planning During Construction																													
	Project Operations																													
The cost sharing for FED is apportioned in the summary calculations at the top of this spreadsheet as 80% Federal and 20% Non-Federal.																														
31	CONSTRUCTION MANAGEMENT	\$2,500	\$200	8%	\$2,700		\$2,500	\$200	8%	\$2,700		\$2,500	\$200	8%	\$2,700		\$2,500	\$200	8%	\$2,700		\$2,500	\$200	8%	\$2,700					
	Construction Management	\$325	\$27	8%	\$352		\$325	\$27	8%	\$352		\$325	\$27	8%	\$352		\$325	\$27	8%	\$352		\$325	\$27	8%	\$352					
	Project Operations																													
	Project Management																													
The cost sharing for Construction Management is apportioned in the summary calculations at the top of this spreadsheet as 80% Federal and 20% Non-Federal.																														
CONTRACT COST TOTALS:		\$39,698	\$3,176		\$42,874		\$39,698	\$3,176		\$42,874		\$39,698	\$3,176		\$42,874		\$39,698	\$3,176		\$42,874		\$39,698	\$3,176		\$42,874					
TOTAL PROJECT COST TOTALS:		\$79,396	\$6,352		\$85,748		\$79,396	\$6,352		\$85,748		\$79,396	\$6,352		\$85,748		\$79,396	\$6,352		\$85,748		\$79,396	\$6,352		\$85,748					

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Channel Improvement Project
 LOCATION: Corpus Christi, TX
 This Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston
 CHIEF: COST ENGINEERING, Willie Henza
 PREPARED: 8/31/2012
 POOC: Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002.

WBS Structure	ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)												
	ESTIMATE PREPARED: Effective Price Level:	24-Jul-12 1-Oct-11	ESC (%)	COST (\$K)	CNTG (%)	ONTG (%)	TOTAL (\$K)	Program Year (Budget EOC): Effective Price Level Date:	2012 1 OCT 11	ESC (%)	COST (\$K)	CNTG (%)	ONTG (%)	TOTAL (\$K)	M4-Point Date	INFLATED (%)	COST (\$K)	CNTG (%)	ONTG (%)	FULL (\$K)	
CONTRACT 3 NEARLY COMPLETE MINIMAL RISK																					
WBS NUMBERS A CONTRACT 3 - ECOSYSTEM RESTORATION AT INGLISIDE-ON-THE-BAY	Civil Works Facilities & Sub-Facility Description B																				
1.6 BANK STABILIZATION		\$5,526					\$5,526							2012Q3			\$5,526				\$5,526
1.6 BANK STABILIZATION - NON-FEDERAL		\$2,975					\$2,975							2012Q3			\$2,975				\$2,975
							\$8,501										\$8,501				\$8,501
01 LANDS AND DAMAGES - NON-FEDERAL																					
30 PLANNING, ENGINEERING & DESIGN																					
Project Management		\$200					\$200							2012Q4	0.4%	\$201					\$201
Planning & Environmental Compliance		\$200					\$200							2012Q4	0.4%	\$201					\$201
Engineering & Design		\$300					\$300							2012Q4	0.4%	\$301					\$301
Engineering Team Review ITR & VE		\$50					\$50							2012Q4	0.4%	\$50					\$50
Contracting & Reprographics		\$35					\$35							2012Q4	0.4%	\$35					\$35
Real Estate In-House Labor		\$25					\$25							2012Q4	0.4%	\$25					\$25
Engineering During Construction		\$25					\$25							2012Q4	0.4%	\$25					\$25
Planning During Construction																					
Project Operations																					
The cost sharing for PED is apportioned in the summary calculations at the top of this spreadsheet as 65% Federal and 35% Non-Federal.																					
31 CONSTRUCTION MANAGEMENT																					
Construction Management		\$300					\$300							2012Q4	0.4%	\$301					\$301
Project Operations		\$125					\$125							2012Q4	0.4%	\$125					\$125
Project Management																					
The cost sharing for Construction Management is apportioned in the summary calculations at the top of this spreadsheet as 65% Federal and 35% Non-Federal.																					
		\$8,736					\$8,736										\$8,741				\$8,741
CONTRACT COST TOTALS:																					

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Channel Improvement Project
 LOCATION: Corpus Christi, TX
 DISTRICT: Galveston
 PREPARED: 8/31/2012
 CHIEF, COST ENGINEERING: Willie Henza
 POCC:
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS Structure	ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)							
	Estimate Prepared: Effective Price Level:	24-Jul-12 1-Oct-11	Program Year (Budget EO): Effective Price Level Date:	2012 1 OCT 11				FULLY FUNDED PROJECT ESTIMATE						
	COST	ONTG	ESC	COST	ONTG	TOTAL	ESC	COST	ONTG	FULL	ESC	COST	ONTG	FULL
	(\$K)	(%)	(%)	(\$K)	(%)	(\$K)	(%)	(\$K)	(%)	(\$K)	(%)	(\$K)	(%)	(\$K)
	C	D	E	F	G	H	I	J	K	L	M	N	O	P
CONTRACT 4 FUTURE WORK														
16	BANK STABILIZATION	\$458	115	25%	\$73	\$458	115	\$73	201503	5.2%	\$482	121	\$603	
16	BANK STABILIZATION - NON-FEDERAL	\$115	\$29	25%	\$143	\$115	\$29	\$143	201503	5.2%	\$121	\$30	\$151	
CONTRACT 4 - BANK STABILIZATION														
CONSTRUCTION ESTIMATE TOTALS:														
01	LANDS AND/DAMAGES - NON-FEDERAL	\$573	\$143	25%	\$716	\$573	\$143	\$716			\$603	\$151	\$753	
30 PLANNING, ENGINEERING & DESIGN														
7.8%	Project Management	\$70	\$18	25%	\$88	\$70	\$18	\$88	201502	8.7%	\$76	\$19	\$95	
11.5%	Planning & Environmental Compliance	\$100	\$25	25%	\$125	\$100	\$25	\$125	201502	8.7%	\$109	\$27	\$136	
24.5%	Engineering & Design	\$140	\$35	25%	\$175	\$140	\$35	\$175	201502	8.7%	\$152	\$38	\$190	
2.5%	Engineering Tech Review ITR & VE	\$14	\$4	25%	\$18	\$14	\$4	\$18	201502	8.7%	\$15	\$4	\$19	
6.0%	Contracting & Reprographics	\$34	\$9	25%	\$43	\$34	\$9	\$43	201502	8.7%	\$37	\$9	\$46	
0.3%	Engineering During Construction	\$2	\$1	25%	\$3	\$2	\$1	\$3	201503	9.8%	\$2	\$1	\$3	
1.0%	Planning During Construction	\$6	\$2	25%	\$8	\$6	\$2	\$8	201503	9.8%	\$7	\$2	\$9	
Project Operations														
The cost sharing for PED is apportioned in the summary calculations at the top of this spreadsheet as 65% Federal and 35% Non-Federal.														
31 CONSTRUCTION MANAGEMENT														
12.3%	Construction Management	\$70	\$18	25%	\$88	\$70	\$18	\$88	201503	9.8%	\$77	\$19	\$96	
7.8%	Project Management	\$45	\$11	25%	\$56	\$45	\$11	\$56	201503	9.8%	\$49	\$12	\$62	
The cost sharing for Construction Management is apportioned in the summary calculations at the top of this spreadsheet as 85% Federal and 15% Non-Federal.														
CONTRACT COST TOTALS:														
\$1,054 \$263 \$1,317 \$1,054 \$263 \$1,317 \$1,127 \$282 \$1,408														

APPENDIX D

COST RE-CERTIFICATION STATEMENT

**WALLA WALLA COST ENGINEERING TECHNICAL
CENTER OF EXPERTISE**

COST AGENCY TECHNICAL REVIEW

RE-CERTIFICATION STATEMENT

For

**SWG – Corpus Christi Ship Channel 52’
incl LaQuinta Channel**

The Corpus Christi Ship Channel 52’ project as presented by Galveston District has undergone a successful Cost Agency Technical Review (Cost ATR) Re-Certification, performed by the Walla Walla District Cost Engineering Technical Center of Expertise (Cost TCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of August 31, 2012, the Cost TCX certifies the estimated total project cost of:

FY 2012 Price Level:

Corpus Christi and Barge Shelves	\$280,345,000
LaQuinta Channel and Ecosystem Restoration	\$ 56,446,000

Fully Funded Amount incl spent costs:

Corpus Christi and Barge Shelves	\$316,273,000
LaQuinta Channel and Ecosystem Restoration	\$ 58,091,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.



**US Army Corps
of Engineers®**

Glenn R. Matlock, PE, CCE
Chief, Cost Engineering
Walla Walla District

**** TOTAL PROJECT COST SUMMARY ****

PROJECT LOCATION:		DISTRICT:		PREPARED:															
Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		Galveston		03/17/2012															
Corpus Christi, TX		POC:		CHIEF, COST ENGINEERING, Willie Horca															
This Estimate reflects the scope and schedule in report.		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Drag Engineering Appendix published in 2002																	
WBS NUMBER	WBS Structure	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)					
		COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	ESC (\$K)	COST (\$K)	CNTG (\$K)	CNTG (%)	TOTAL (\$K)	Spent Thru 10/31/11 (\$K)	L (\$K)	M (\$K)	N (\$K)	Full (\$K)	O (\$K)			
A	CCSC Improvement Project - All Components (Combined)																		
02	RELOCATIONS - NON-FEDERAL	\$21,560	\$5,390	25%	\$26,950		\$21,560	\$5,390	\$26,950					\$23,203	\$5,801	\$29,004			
12	NAVIGATION PORTS & HARBORS - FEDERAL	\$100,363	\$21,285	21%	\$121,648		\$100,363	\$21,285	\$121,648	\$969				\$113,857	\$23,807	\$138,273			
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$82,962	\$19,605	24%	\$102,567		\$82,962	\$19,605	\$102,567	\$234				\$93,022	\$22,110	\$115,386			
16	BANK STABILIZATION - FEDERAL	\$19,443	\$3,480	18%	\$22,923		\$19,443	\$3,480	\$22,923					\$20,881	\$3,842	\$24,733			
16	BANK STABILIZATION - NON-FEDERAL	\$16,549	\$3,393	21%	\$19,942		\$16,549	\$3,393	\$19,942					\$17,979	\$3,751	\$21,730			
18	CULTURAL RESOURCE PRESERVATION	\$115	\$29	25%	\$144		\$115	\$29	\$144					\$122	\$30	\$152			
18	CULTURAL RESOURCE PRES - NON-FEDERAL	\$115	\$29	25%	\$144		\$115	\$29	\$144					\$122	\$30	\$152			
CONSTRUCTION ESTIMATE TOTALS:		\$244,147	\$53,210		\$297,356		\$244,147	\$53,210	\$297,356	\$1,143				\$283,996	\$59,371	\$328,410			
01	LANDS AND DAMAGES - NON-FEDERAL	\$8,752	\$319	4%	\$9,071		\$8,752	\$319	\$9,071					\$8,788	\$332	\$9,520			
30	PLANNING, ENGINEERING & DESIGN	\$8,631	\$1,573	18%	\$10,204		\$8,631	\$1,573	\$10,204	\$3				\$9,815	\$1,868	\$11,686			
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$5,775	\$1,260	22%	\$7,035		\$5,775	\$1,260	\$7,035					\$6,152	\$1,503	\$8,255			
31	CONSTRUCTION MANAGEMENT - FEDERAL	\$6,408	\$1,147	18%	\$7,555		\$6,408	\$1,147	\$7,555	\$15				\$7,565	\$1,362	\$8,752			
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$4,584	\$1,007	22%	\$5,591		\$4,584	\$1,007	\$5,591					\$5,582	\$1,242	\$6,744			
PROJECT COST TOTALS:		\$282,275	\$62,516	21%	\$348,791		\$282,275	\$62,516	\$348,791	\$1,161				\$327,508	\$65,668	\$374,367			
		CHIEF, COST ENGINEERING, Willie Horca PROJECT MANAGER, James Worthington CHIEF, REAL ESTATE, Orlando Rozas CHIEF, PLANNING, Dadin Dunn CHIEF, ENGINEERING, Robert Howell CHIEF, OPERATIONS, Joseph Hornoz CHIEF, CONSTRUCTION, Donald Campbell CHIEF, CONTRACTING, John Euglio CHIEF, PM-J, Valeria Miller CHIEF, DPM, Pete Perez																	
		ESTIMATED FEDERAL COST: 49% \$183,596 ESTIMATED NON-FEDERAL COST: 51% \$190,771 ESTIMATED TOTAL PROJECT COST: \$374,367																	
		The costs for Lands and Damages and Pipeline Relocations and Removals are to be borne entirely by the Non-Federal Sponsor																	

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		DISTRICT: Galveston		PREPARED: 8/31/2012																									
LOCATION: Corpus Christi, TX		POC: CHIEF, COST ENGINEERING, Willie Honce		PREPARED: CHIEF, COST ENGINEERING, Willie Honce																									
This Estimate reflects the scope and schedule in report:		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Oluña Channel, Draft Engineering Appendix published in 2002		Draft Engineering Appendix published in 2002																									
WBS Structure		ESTIMATED COST				PROJECT FIRST COST				TOTAL PROJECT COST (FULLY FUNDED)																			
WBS NUMBER	Description	COST		ONTG		TOTAL		ESC		COST		ONTG		TOTAL		Spent Thru:													
		JBL	C	JBL	D	JBL	E	JBL	F	JBL	G	JBL	H	JBL	I	JBL	J	JBL	K	JBL	L	JBL	M	JBL	N	JBL	O		
Main Ship Channel and Barge Shelves Components		C		D		E		F		G		H		I		J		K		L		M		N		O			
02	RELOCATIONS - NON-FEDERAL	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860	\$21,560	\$5,300	25%	\$26,860
12	NAVIGATION PORTS & HARBORS - FEDERAL	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300	\$76,240	\$19,060	25%	\$95,300
12	BARGE LANES - FEDERAL	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391	\$313	\$78	25%	\$391
12	BARGE LANES - NON-FEDERAL	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43	\$35	\$9	25%	\$43
16	BANK STABILIZATION - FEDERAL	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824
16	BANK STABILIZATION - NON-FEDERAL	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824	\$13,459	\$3,365	25%	\$16,824
18	CULTURAL RESOURCE PRESERVATION	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144
18	CULTURAL RESOURCE PRES - NON-FEDERAL	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144	\$115	\$29	25%	\$144
CONSTRUCTION ESTIMATE TOTALS:		\$207,534	\$50,364	5%	\$257,898	\$207,534	\$50,364	5%	\$257,898	\$207,534	\$50,364	5%	\$257,898	\$207,534	\$50,364	5%	\$257,898	\$207,534	\$50,364	5%	\$257,898	\$207,534	\$50,364	5%	\$257,898	\$207,534	\$50,364	5%	\$257,898
01	LANDS AND DAMAGES - NON-FEDERAL	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594	\$5,287	\$307	5%	\$5,594
30	PLANNING, ENGINEERING & DESIGN	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397	\$5,118	\$1,279	25%	\$6,397
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941	\$4,753	\$1,188	25%	\$5,941
31	CONSTRUCTION MANAGEMENT	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715	\$3,772	\$943	25%	\$4,715
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781	\$3,825	\$956	25%	\$4,781
PROJECT COST TOTALS:		\$225,268	\$55,957	24%	\$281,225	\$225,268	\$55,957	24%	\$281,225	\$225,268	\$55,957	24%	\$281,225	\$225,268	\$55,957	24%	\$281,225	\$225,268	\$55,957	24%	\$281,225	\$225,268	\$55,957	24%	\$281,225	\$225,268	\$55,957	24%	\$281,225

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		DISTRICT: Galveston		PREPARED: 8/17/2012												
LOCATION: Corpus Christi, TX		POC: CHIEF, COST ENGINEERING, Willie Acosta														
This Estimate reflects the scope and schedule in report:		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002														
WBS Structure		PROGRAM YEAR (Budget FY): 2012				TOTAL PROJECT COST (FULLY FUNDED)										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	ESTIMATED COST		PROJECT FIRST COST				Spent Thru: 1-03-11								
		COST (\$K)	NTG %	ESC (\$K)	COST (\$K)	NTG %	TOTAL (\$K)	K	J	L	M	N	O			
A	La Quinta Channel Extension and Ecosystem Restoration Components															
1.2	NAVIGATION PORTS & HARBORS - FEDERAL	\$26,830	8%	\$28,976		\$26,830	\$2,146	\$28,976	\$809					\$26,868	\$2,156	\$30,021
1.2	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$6,707	8%	\$7,244		\$6,707	\$537	\$7,244	\$,234					\$6,709	\$539	\$7,512
1.6	BANK STABILIZATION - FEDERAL	\$5,984	2%	\$8,098		\$5,984	\$115	\$8,098						\$6,008	\$121	\$6,128
1.6	BANK STABILIZATION - NON-FEDERAL	\$3,090	1%	\$3,119		\$3,090	\$29	\$3,119						\$3,096	\$30	\$3,126
CONSTRUCTION ESTIMATE TOTALS:		\$42,611	\$2,826	\$45,437		\$42,611	\$2,826	\$45,437	\$1,143					\$42,798	\$2,846	\$46,787
01	LANDS AND DAMAGES - NON-FEDERAL	\$2,465	0%	\$2,477		\$2,465	\$12	\$2,477						\$2,457	\$13	\$2,670
30	PLANNING, ENGINEERING & DESIGN - FEDERAL	\$3,513	8%	\$3,808		\$3,513	\$294	\$3,808	\$3					\$3,551	\$302	\$3,855
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$1,022	7%	\$1,083		\$1,022	\$72	\$1,083						\$1,032	\$73	\$1,105
31	CONSTRUCTION MANAGEMENT - FEDERAL	\$2,656	8%	\$2,841		\$2,656	\$204	\$2,841	\$15					\$2,665	\$207	\$2,877
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$738	7%	\$790		\$738	\$51	\$790						\$744	\$52	\$795
PROJECT COST TOTALS:		\$52,887	\$3,459	\$56,446		\$52,888	\$3,459	\$56,446	\$1,181					\$53,437	\$3,493	\$58,081

APPENDIX E

UPDATED O&M COST ESTIMATE

UPDATED O&M COST ESTIMATE
CORPUS CHRISTI SHIP CHANNEL DEEPENING AND BARGE SHELVES
CORPUS CHRISTI, TEXAS
NED 50-Year O&M Cost
October 2011 PRICE LEVEL

	PA Cycle	Hopper Dredge Reach	Stas 12+55 to 540+00	Stas 540+00 to 1080+00 Main Channel	Stas 540+00 to 1080+00 Barge Shelves	Stas 1080+00 to 1172+00	Stas 1172+00 to 1561+50
O&M Costs							
Year 1							
Year 2		8,118,144					
Year 3				10,935,862			
Year 4	1					11,714,623	
Year 5	2	8,118,144					7,852,356
Year 6			2,344,074	10,935,862	504,000		
Year 7							
Year 8		8,118,144					
Year 9				10,935,862			
Year 10	3					11,828,298	
Year 11		8,118,144					
Year 12			2,344,074	10,935,862	504,000		
Year 13							7,383,593
Year 14		8,118,144					
Year 15				10,935,862			
Year 16	4					11,281,298	
Year 17		8,118,144					
Year 18			2,344,074	10,935,862	504,000		
Year 19							
Year 20		8,118,144					7,383,593
Year 21				10,935,862			
Year 22	5					11,698,773	
Year 23		8,118,144					
Year 24			2,344,074	10,935,862	504,000		
Year 25							
Year 26		8,118,144					
Year 27	6			10,935,862			
Year 28						11,264,186	
Year 29		8,118,144					7,383,593
Year 30			2,344,074	10,935,862	504,000		
Year 31							
Year 32		8,118,144					
Year 33				10,935,862			
Year 34	7					11,336,411	
Year 35		8,118,144					
Year 36			2,344,074	10,935,862	504,000		
Year 37							7,383,593
Year 38		8,118,144					
Year 39				10,935,862			
Year 40	8					11,378,011	
Year 41		8,118,144					
Year 42			2,344,074	10,935,862	504,000		
Year 43							
Year 44		8,118,144					7,383,593
Year 45				10,935,862			
Year 46	9					11,325,111	
Year 47		8,118,144					
Year 48			2,344,074	10,935,862	504,000		
Year 49							
Year 50		8,118,144					
TOTAL O&M: Adaptive Mngt		\$ 138,008,448	\$ 18,752,592	\$ 174,973,792	\$ 4,032,000	\$ 91,826,711	\$ 44,770,321
TOTAL O&M:		\$ 138,008,448	\$ 18,752,592	\$ 174,973,792	\$ 4,032,000	\$ 91,826,711	\$ 44,770,321

TOTAL O&M COST : \$ 472,363,864

APPENDIX F

MII SUMMARY SHEETS FOR PROJECT ASSOCIATED COSTS (Down to Sub-Feature Level) Bare Construction Cost Only

CORPUS CHRISTI SHIP CHANNEL 52-FT PROJECT - ASSOCIATED PROJECT COSTS, MAIN CHANNEL
NOTE: Work breakdown Accounts 01, 30, and 31 are developed and found only in the TPCS to prevent errors. Escalation dates are developed from the schedule and the percentages are developed and found only in the TPCS to prevent errors. Contingencies are developed in the Risk Analysis Appendix and to prevent errors, found only in the TPCS. Due to the breakout of Federal and Non-Federal costs rounding errors do occur, but they tally correctly.

Estimated by CESWG-EC-PS
Designed by CESWG-EC
Prepared by Jon Plymale / Mustang Eng / Port of Corpus Christi
Preparation Date 3/20/2012
Effective Date of Pricing 3/20/2012
Estimated Construction Time Days

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<u>Description</u>	<u>Page</u>
Library Properties	i
Project Notes	ii
Markup Properties	iii
Project Cost Summary Report	1
CC-REMAINING FUTURE WORK (NON-FED COSTS)	1
95a CCSC -- PIPELINE REMOVALS AND RELOCATIONS (ASSOCIATED COSTS)	1
95a1-02 UTILITY RELOCATIONS AND REMOVALS	1
95a1 NON-FEDERAL COSTS	1
96 CCSC - BERTHING AREA DREDGING	1
961 CCSC - BERTHING AREA DREDGING #6	1
961-12 NAVIGATION PORTS AND HARBORS	1
962 CCSC -- BERTHING AREA DREDGING #7	1
962-12 NAVIGATION PORTS AND HARBORS	1
98 CCSC -- BERTHING AREA MODIFICATIONS	1
981 NON-FEDERAL COSTS	1
981-12 NAVIGATION PORTS AND HARBORS	1
99 CCSC -- BLOY MODIFICATIONS	1
991 NON-FEDERAL COSTS	1
991-02 RELOCATIONS	1

Description	UOM	Quantity	DirectCost	ContractCost	ProjectCost
Project Cost Summary Report			44,521,391	44,521,391	44,521,391
CC REMAINING FUTURE WORK (NON-FED COSTS)			44,521,391	44,521,391	44,521,391
95a CCSC -- PIPELINE REMOVALS AND RELOCATIONS (ASSOCIATED COSTS)	EA	1.00	44,521,391	44,521,391	44,521,391
95a1 NON-FEDERAL COSTS	LS	1.00	30,864,291	30,864,291	30,864,291
95a1-02 UTILITY RELOCATIONS AND REMOVALS	EA	1.00	30,864,291	30,864,291	30,864,291
96 CCSC - BERTHING AREA DREDGING	LS	1.00	30,864,291	30,864,291	30,864,291
961 CCSC -- BERTHING AREA DREDGING #6	EA	1.00	7,522,600	7,522,600	7,522,600
961-12 NAVIGATION PORTS AND HARBORS	CY	154,622.00	2,298,600	2,298,600	2,298,600
962 CCSC -- BERTHING AREA DREDGING #7	EA	5.00	2,298,600	2,298,600	2,298,600
962-12 NAVIGATION PORTS AND HARBORS	CY	360,733.00	5,224,000	5,224,000	5,224,000
98 CCSC -- BERTHING AREA MODIFICATIONS	EA	6.00	5,224,000	5,224,000	5,224,000
981 NON-FEDERAL COSTS	EA	11.00	5,982,500	5,982,500	5,982,500
981-12 NAVIGATION PORTS AND HARBORS	LS	1.00	5,982,500	5,982,500	5,982,500
99 CCSC -- BUOY MODIFICATIONS	EA	10.00	5,982,500	5,982,500	5,982,500
991 NON-FEDERAL COSTS	EA	19.00	152,000	152,000	152,000
991-02 RELOCATIONS	EA	19.00	152,000	152,000	152,000

LA QUINTA CHANNEL EXTENSION ASSOCIATED COSTS

Estimated by CFSWG-EC-PS
Designed by CFSWG-EC
Prepared by Jon Plymale
Preparation Date 3/20/2012
Effective Date of Pricing 3/20/2012
Estimated Construction Time Days

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Description	Page
Library Properties	i
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Project Cost Summary Report	1
63 LA QUINTA CHANNEL EXT. NON-FED COSTS, PIPELINES (COMPLETED)	1
63-02 RELOCATIONS AND REMOVALS (COMPLETED)	1
63-020318 CEMETERY, UTILITIES, & STRUCTURE	1
63-0203181 PIPELINE RELOCATIONS (NONE)	1
63-0203182 PIPELINE REMOVALS (COMPLETED)	1
64 LA QUINTA CHANNEL EXT. NON-FED COSTS, SHIP DOCKING TERMINAL	1
64-12 NAVIGATION PORTS AND HARBORS	1
64-1201 PORTS	1
64-120116 SHIP DOCKING TERMINAL DREDGING (ONLY)	1

<u>Description</u>	<u>UOM</u>	<u>Quantity</u>	<u>DirectCost</u>	<u>ContractCost</u>	<u>ProjectCost</u>
Project Cost Summary Report					
63 LA QUINTA CHANNEL EXT, NON-FED COSTS, PIPELINES (COMPLETED)	EA	4.00	16,076,000	16,076,000	16,076,000
63-02 RELOCATIONS AND REMOVALS (COMPLETED)	EA	4.00	2,701,000	2,701,000	2,701,000
63-020318 CEMETERY, UTILITIES, & STRUCTURE	EA	1.00	2,701,000	2,701,000	2,701,000
63-0203181 PIPELINE RELOCATIONS (NONE)	EA	4.00	0	0	0
63-0203182 PIPELINE REMOVALS (COMPLETED)	EA	5.00	2,701,000	2,701,000	2,701,000
64 LA QUINTA CHANNEL EXT, NON-FED COSTS, SHIP DOCKING TERMINAL	LS	1.00	13,375,000	13,375,000	13,375,000
64-12 NAVIGATION PORTS AND HARBORS	EA	1.00	13,375,000	13,375,000	13,375,000
64-1201 PORTS	EA	1.00	13,375,000	13,375,000	13,375,000
64-120116 SHIP DOCKING TERMINAL DREDGING (ONLY)	LS	1.00	13,375,000	13,375,000	13,375,000

APPENDIX G

TOTAL PROJECT COST SPREADSHEETS (TPSC) FOR PROJECT ASSOCIATED COSTS

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project - ASSOCIATED COSTS FOR ALL COMPONENTS DISTRICT: Galveston CHIEF, COST ENGINEERING, Willie Horza
 LOCATION: Corpus Christi, TX POC: CHIEF, COST ENGINEERING, Willie Horza PREPARED: 7/30/2012
 This Estimate reflects the scope and schedule in report. Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Ojuna Channel, Draft Engineering Appendix published in 2002

WBS NUMBER	WBS Structure	ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)			
		COST (\$K)	QNTG D	QNTG E	TOTAL (\$K)	ESC (%) G	COST (\$K) H	QNTG I	TOTAL (\$K) J	Spent Thru: 1/20/11 (\$K) K	COST M	QNTG N	FULL (\$K) O
02	RELOCATIONS - NON-FEDERAL	\$33,717	\$6,726	20%	\$40,453		\$33,717	\$6,726	\$40,453		\$33,307	\$7,252	\$43,559
1.2	NAVIGATION PORTS & HARBORS	\$26,680	\$6,720	25%	\$33,600		\$26,680	\$6,720	\$43,000		\$30,680	\$7,672	\$38,362
	CONSTRUCTION ESTIMATE TOTALS:	\$60,397	\$13,456		\$74,053		\$60,397	\$13,456	\$83,456		\$66,987	\$14,925	\$81,922
01	LANDS AND DAMAGES - NON-FEDERAL												
30	PLANNING, ENGINEERING & DESIGN	\$5,950	\$1,355	23%	\$7,309		\$5,950	\$1,359	\$7,309		\$7,028	\$1,514	\$8,642
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$2,371	\$534	23%	\$2,906		\$2,371	\$534	\$2,905		\$2,863	\$647	\$3,510
	PROJECT COST TOTALS:	\$88,918	\$15,349	22%	\$104,267		\$88,918	\$15,349	\$104,267		\$76,888	\$17,186	\$94,075

CHIEF, COST ENGINEERING, Willie Horza ESTIMATED FEDERAL COST: ESTIMATED NON-FEDERAL COST: 100% \$94,075
 PROJECT MANAGER, James Worthington ESTIMATED TOTAL PROJECT COST: \$94,075
 CHIEF, REAL ESTATE, Orlando Rosas
 CHIEF, PLANNING, Douan Dum
 CHIEF, ENGINEERING, Robert Howell
 CHIEF, OPERATIONS, Joseph Yizmetz
 CHIEF, CONSTRUCTION, Donald Caraback
 CHIEF, CONTRACTING, John Euglio
 CHIEF, PM-J, Valerie Miller
 CHIEF, DPM, Pete Perez

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project - ASSOCIATED COSTS FOR ALL COMPONENTS
 LOCATION: Corpus Christi, TX
 This Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston
 FOC: CHIEF, COST ENGINEERING, Willie Horza
 PREPARED: 7/30/2012
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix, published in 2002

WBS Structure	ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)			
	Estimate Prepared: Effective Price Level:	RISK-BASED	ESC	COST	CNTG	TOTAL	Program Year (Budget EC): Effective Price Level Date:	COST	CNTG	FILL		
	30-Jul-12 1-Oct-11	CNTG	(%)	(\$K)	(%)	(\$K)	2012 1 OCT 11	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)
		D	E	C	F	J	H	M	N	O		
Corpus Christi Ship Channel and Barge Shelves 02 RELOCATIONS 12 NAVIGATION PORTS & HARBORS 12 NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$1,016 \$6,196 20% \$37,212	\$10,860 \$3,376 25% \$16,881		\$31,016 \$6,196 \$37,212	\$13,565 \$3,376 \$17,466	\$48,873 \$10,564 \$59,437		\$33,400 \$6,671 \$40,071	\$16,273 \$3,683 \$19,467			
CONSTRUCTION ESTIMATE TOTALS: 01 LANDS AND DAMAGES	\$44,521 \$9,572 22% \$54,093			\$44,521 \$9,572 \$54,093		\$44,521 \$9,572 \$54,093						
30 PLANNING, ENG & DESIGN - NON-FEDERAL	\$3,665 \$798 22% \$4,463			\$3,665 \$798 \$4,463		\$3,665 \$798 \$4,463		\$4,273 \$936 \$5,209				
31 CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$1,546 \$332 21% \$1,878			\$1,546 \$332 \$1,878		\$1,546 \$332 \$1,878		\$1,639 \$396 \$2,235				
CONTRACT COST TOTALS:	\$48,732 \$10,702 \$59,434			\$48,732 \$10,702 \$59,434		\$48,732 \$10,702 \$59,434		\$55,089 \$11,896 \$66,985				

The costs for Lands and Damages and Pipeline Relocations and Removals are to be borne entirely by the Non-Federal Sponsor

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project - ASSOCIATED COSTS FOR ALL COMPONENTS
 LOCATION: Corpus Christi, TX
 This Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston DISTRICT: COST ENGINEERING, MARIS PREPARED: 7/26/2012
 POC: Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS NUMBER A	WBS Structure B	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)													
		Estimate Prepared: Effective Price Level		30-Jul-12 1-Oct-11		Program Year (Budget ECI) Effective Price Level Date		2012 1 Oct 11		ESC		COST		CNTG		TOTAL		Mid-Point Date		INFLATED		COST		CNTG		FILL	
		COST	CNTG	COST	CNTG	ESC	COST	CNTG	ESC	COST	CNTG	ESC	COST	CNTG	ESC	COST	CNTG	P	L	M	N	O	P	L	M	N	O
02	RELOCATIONS - NON-FEDERAL	\$2,701	\$540	20%	\$3,241		\$2,701	\$540		\$3,241												\$2,907	\$581				\$3,488
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$13,375	\$3,344	25%	\$16,719		\$13,375	\$3,344		\$16,719												\$15,117	\$3,779				\$18,897
CONSTRUCTION ESTIMATE TOTALS:		\$16,076	\$3,884		\$19,960		\$16,076	\$3,884		\$19,960												\$18,024	\$4,361				\$22,385
01	LANDS AND DAMAGES																										
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$2,285	\$561	25%	\$2,846		\$2,285	\$561		\$2,846												\$2,755	\$676				\$3,433
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$825	\$202	25%	\$1,027		\$825	\$202		\$1,027												\$1,024	\$251				\$1,275
CONTRACT COST TOTALS:		\$19,186	\$4,647		\$23,833		\$19,186	\$4,647		\$23,833												\$21,803	\$5,290				\$27,093

****** TOTAL PROJECT COST SUMMARY ******

PROJECT: Corpus Christi Ship Channel 62-Foot Project - ASSOCIATED COSTS
 LOCATION: Corpus Christi, TX
 DISTRICT: Galveston
 CHIEF: COST ENGINEERING, Willie Horza
 PREPARED: 5/17/2012
 POC: CHIEF, COST ENGINEERING, Willie Horza
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel. Draft Engineering Appendix published in 2002

This Estimate reflects the scope and schedule in report;

WBS NUMBER	WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Constant Dollar Basis)										TOTAL PROJECT COST (FULLY FUNDED)									
		COST _JBL_	CNTG D	CNTG E	TOTAL _JBL_	ESC G	COST H	CNTG I	TOTAL _JBL_	Spent Thru: 1-Oct-11 _JBL_	COST M	CNTG N	FULL _JBL_	COST _JBL_	CNTG O	FULL _JBL_	COST _JBL_	CNTG P	FULL _JBL_												
02	RELOCATIONS - NON-FEDERAL	\$31,016	\$8,168	20%	\$37,212	-	\$31,016	\$8,168	\$37,212	-	\$31,016	\$8,168	\$37,212	K	\$33,400	\$6,871	\$40,071	-	\$33,400	\$6,871	\$40,071										
12	NAVIGATION PORTS & HARBORS	\$13,565	\$3,278	25%	\$16,881	-	\$13,565	\$3,278	\$16,881	-	\$13,565	\$3,278	\$16,881	-	\$15,573	\$3,893	\$19,467	-	\$15,573	\$3,893	\$19,467										
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL																														
01	LANDS AND DAMAGES - NON-FEDERAL	\$44,521	\$9,572	-	\$54,093	-	\$44,521	\$9,572	\$54,093	-	\$44,521	\$9,572	\$54,093	-	\$48,973	\$10,564	\$59,537	-	\$48,973	\$10,564	\$59,537										
30	PLANNING, ENGINEERING & DESIGN	\$3,665	\$798	22%	\$4,463	-	\$3,665	\$798	\$4,463	-	\$3,665	\$798	\$4,463	-	\$4,273	\$698	\$5,209	-	\$4,273	\$698	\$5,209										
30	PLANNING, ENG & DESIGN - NON-FEDERAL																														
31	CONSTRUCTION MANAGEMENT	\$1,548	\$332	21%	\$1,878	-	\$1,548	\$332	\$1,878	-	\$1,548	\$332	\$1,878	-	\$1,838	\$368	\$2,235	-	\$1,838	\$368	\$2,235										
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL																														
PROJECT COST TOTALS		\$49,732	\$10,702	22%	\$60,434		\$49,732	\$10,702	\$60,434		\$49,732	\$10,702	\$60,434		\$55,086	\$11,895	\$66,882		\$55,086	\$11,895	\$66,882										

CHIEF, COST ENGINEERING, Willie Horza
 PROJECT MANAGER, James Worthington
 CHIEF, REAL ESTATE, Orlando Peas
 CHIEF, PLANNING, Dylan Durn
 CHIEF, ENGINEERING, Robert Howell
 CHIEF, OPERATIONS, Joseph Harnetz
 CHIEF, CONSTRUCTION, Donald Carebeck
 CHIEF, CONTRACTING, John Eugino
 CHIEF, PM-J, Valerie Miller
 CHIEF, DPM, Pete Prenz

ESTIMATED FEDERAL COST: _____
 ESTIMATED NON-FEDERAL COST: _____
 ESTIMATED TOTAL PROJECT COST: _____

The costs for Lands and Damages and Pipeline Relocations and Removals are to be borne entirely by the Non-Federal Sponsor

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 12-Foot Project - ASSOCIATED COSTS
 LOCATION: Corpus Christi, TX
 The Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston
 PREPARED: COST ENGINEERING, Mills
 5/11/2012
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Oleta Channel, Draft Engineering Appendix published in 2002

WBS Structure	ESTIMATED COST		PROJECT FIRST COST (Constant Dollar Basis)		TOTAL PROJECT COST (FULLY FUNDED)			
	Estimate Prepared Effective Final Cost	20-Apr-12 1-03-11	Program Year (Budget ED) Effective Final Cost	2012 1 OCT 11	Mid-Point Date	2016Q2		
WBS NUMBER	COST	CNTG	ESC	COST	CNTG	INFLATED COST	CNTG	FULL
A	C	D	E	H	I	L	M	O
B	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)	(\$K)
PIPELINE REMOVALS AND RELOCATIONS								
02 RELOCATIONS	\$30,894	\$6,173	20%	\$30,864	\$6,173	\$37,037	\$33,217	\$59,869
CONSTRUCTION ESTIMATE TOTALS:		\$30,894	\$6,173	20%	\$30,864	\$6,173	\$37,037	\$39,869
01 LANDS AND DAMAGES								
CONSTRUCTION ESTIMATE TOTALS:		\$30,894	\$6,173	20%	\$30,864	\$6,173	\$37,037	\$39,869
30 PLANNING, ENGINEERING & DESIGN								
1.0% Project Management	\$308	\$62	20%	\$309	\$62	\$371	\$341	\$410
0.9% Planning & Environmental Compliance	\$247	\$48	20%	\$247	\$48	\$268	\$273	\$327
3.0% Engineering & Design	\$626	\$165	20%	\$626	\$165	\$1,111	\$1,093	\$1,227
0.6% Engineering Tech Review ITR & VE	\$185	\$37	20%	\$185	\$37	\$222	\$204	\$245
0.9% Contracting & Photogramatics	\$154	\$31	20%	\$154	\$31	\$185	\$170	\$204
1.0% Engineering During Construction	\$309	\$62	20%	\$309	\$62	\$371	\$351	\$421
0.2% Planning During Construction	\$62	\$12	20%	\$62	\$12	\$74	\$70	\$85
0.2% Project Operations	\$62	\$12	20%	\$62	\$12	\$74	\$70	\$82
31 CONSTRUCTION MANAGEMENT								
2.0% Construction Management	\$617	\$123	20%	\$617	\$123	\$740	\$701	\$842
0.3% Project Operations	\$85	\$19	20%	\$85	\$19	\$112	\$106	\$127
1.0% Project Management	\$309	\$62	20%	\$309	\$62	\$371	\$351	\$421
CONTRACT COST TOTALS:		\$54,137	\$6,827	\$54,137	\$6,827	\$40,865	\$36,877	\$44,252

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 52-Foot Project - ASSOCIATED COSTS
 LOCATION: Corpus Christi, TX
 The Estimate reflects the scope and schedule in report;
 DISTRICT: Galveston
 PREPARED: 5/11/2012
 CHIEF: COST ENGINEERING, Willie Horcoza
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002
 DRAFT ENGINEERING APPENDIX PUBLISHED IN 2002

WBS NUMBER A	WBS Structure B	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Base)						TOTAL PROJECT COST (FULLY FUNDED)					
		ESTIMATE PREPARED: EFFECTIVE PRICE LEVEL:	26-Apr-12 1-Oct-11	COST (\$K)	CONTG (\$K)	ONTG (\$K)	TOTAL (\$K)	ESC %	COST (\$K)	CONTG (\$K)	TOTAL (\$K)	2012 1 OCT 11	INFLATED %	COST (\$K)	CONTG (\$K)	FULL (\$K)	MID-POINT DATE P		
12	NAVIGATION PORTS & HARBORS			\$5,983	\$1,406	25%	\$7,479			\$5,983	\$1,406	\$7,478	13.0%	\$6,762	\$1,690	\$8,452	2018Q1		
CONSTRUCTION ESTIMATE TOTALS:				\$5,983	\$1,406	25%	\$7,479			\$5,983	\$1,406	\$7,478		\$6,762	\$1,690	\$8,452			
01	LANDS AND DAMAGES																		
30	PLANNING, ENGINEERING & DESIGN			\$90	\$23	25%	\$113			\$90	\$23	\$113	21.1%	\$109	\$27	\$136	2016Q1		
1.5%	Project Management			\$90	\$23	25%	\$113			\$90	\$23	\$113	21.1%	\$109	\$27	\$136	2016Q1		
1.5%	Planning & Environmental Compliance			\$509	\$127	25%	\$636			\$509	\$127	\$636	21.1%	\$617	\$154	\$771	2016Q1		
1.5%	Engineering & Design			\$90	\$23	25%	\$113			\$90	\$23	\$113	21.1%	\$109	\$27	\$136	2016Q1		
1.5%	Engineering Tech Review ITR & VE			\$48	\$12	25%	\$60			\$48	\$12	\$60	21.1%	\$58	\$15	\$73	2016Q1		
0.5%	Contracting & Reprintographics			\$60	\$15	25%	\$75			\$60	\$15	\$75	25.4%	\$75	\$19	\$94	2019Q1		
1.0%	Real Estate In-House Labor			\$18	\$3	25%	\$23			\$18	\$3	\$23	25.4%	\$23	\$6	\$28	2019Q1		
0.3%	Engineering During Construction			\$30	\$8	25%	\$38			\$30	\$8	\$38	21.1%	\$36	\$9	\$45	2016Q1		
0.5%	Project Operations			\$269	\$52	25%	\$321			\$226	\$52	\$281	25.4%	\$262	\$66	\$325	2019Q1		
3.5%	Construction Management			\$30	\$8	25%	\$38			\$30	\$8	\$38	25.4%	\$38	\$9	\$47	2019Q1		
0.5%	Project Operations			\$50	\$23	25%	\$73			\$50	\$23	\$73	25.4%	\$113	\$28	\$141	2019Q1		
1.5%	Project Management			\$7,247	\$1,812		\$9,059			\$7,247	\$1,812	\$9,059		\$8,310	\$2,078	\$10,388			
CONTRACT COST TOTALS:				\$7,247	\$1,812		\$9,059			\$7,247	\$1,812	\$9,059		\$8,310	\$2,078	\$10,388			

**** TOTAL PROJECT COST SUMMARY ****

**** CONTRACT COST SUMMARY ****

PROJECT: Corpus Christi Ship Channel 32-Foot Project - ASSOCIATED COSTS
 LOCATION: Corpus Christi, TX
 The Estimate reflects the scope and schedule in report;
 DISTRICT: Galveston
 POC: CHIEF, COST ENGINEERING, Willie Hozza
 PREPARED: 5/11/2012
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix, published in 2002

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
WBS NUMBER	Civil Works Features & Sub-Feature Description	Estimate Prepared: Effective Price Level:		Program Year (Budget EC): Effective Price Level Date:		ESC		CNTG		MID-POINT		FULL		
		DATE	LEVEL	DATE	LEVEL	PERCENT	AMOUNT	PERCENT	AMOUNT	DATE	PERCENT	AMOUNT	AMOUNT	
02	RELOCATIONS	\$162	\$23	15%	\$175	\$152	\$23	15%	\$175	202Q3	20.3%	\$193	\$27	\$210
CONSTRUCTION ESTIMATE TOTALS:		\$162	\$23	15%	\$175	\$152	\$23	15%	\$175			\$193	\$27	\$210
01	LANDS AND DAMAGES													
30	PLANNING, ENGINEERING & DESIGN													
13.0%	Project Management	\$20	\$3	15%	\$23	\$20	\$3	15%	\$23	2021Q4	37.4%	\$27	\$4	\$32
6.5%	Planning & Environmental Compliance	\$10	\$2	15%	\$12	\$10	\$2	15%	\$12	2021Q4	37.4%	\$14	\$2	\$16
16.5%	Engineering & Design	\$25	\$4	15%	\$29	\$25	\$4	15%	\$29	2021Q4	37.4%	\$34	\$5	\$39
	Engineering Tech Review (TR & VE)													
	Contracting & Reprographics													
	Engineering During Construction													
	Planning During Construction													
	Project Operations													
31	CONSTRUCTION MANAGEMENT													
13.0%	Construction Management	\$20	\$3	15%	\$23	\$20	\$3	15%	\$23	2022Q3	40.7%	\$28	\$4	\$32
	Project Operations													
13.0%	Project Management	\$20	\$3	15%	\$23	\$20	\$3	15%	\$23	2022Q3	40.7%	\$28	\$4	\$32
CONTRACT COST TOTALS:		\$247	\$37		\$284	\$247	\$37		\$284			\$315	\$47	\$382

**** TOTAL PROJECT COST SUMMARY ****

PROJECT: CCSC - La Quinta Channel Extension - ASSOCIATED COSTS
LOCATION: Corpus Christi, TX

DISTRICT: Galveston
CHIEF: COST ENGINEERING, Willie Honza

PREPARED: 5/11/2012

This Estimate reflects the scope and schedule in report.

Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Appendix published in 2002

WBS NUMBER	WBS Structure	ESTIMATED COST										PROJECT FIRST COST (Contains Detail Status)										TOTAL PROJECT COST (FULLY FUNDED)									
		COST _BKOL C	CNTG _BKOL D	CNTG _BKOL E	TOTAL _BKOL F	ESC _BKOL G	COST _BKOL H	CNTG _BKOL I	TOTAL _BKOL J	Program Year (Budget EC): Effective Fiscal Level Date: 1 OCT 11	2012	Spent Thru: 1-04-11 _BKOL K	COST _BKOL M	CNTG _BKOL N	FULL _BKOL O																
02	RELOCATIONS - NON-FEDERAL	\$2,701	\$540	20%	\$3,241	-	-	-	-	\$2,701	\$540	\$3,241	-	-	-	\$2,907	\$581	\$3,488													
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$13,375	\$3,344	25%	\$16,719	-	-	-	-	\$13,375	\$3,344	\$16,719	-	-	-	\$15,117	\$3,779	\$18,897													
CONSTRUCTION ESTIMATE TOTALS:		\$16,076	\$3,884	-	\$19,960	-	-	-	-	\$16,076	\$3,884	\$19,960	-	-	-	\$18,024	\$4,361	\$22,385													
01	LANDS AND DAMAGES - NON-FEDERAL																														
30	PLANNING, ENGINEERING & DESIGN	\$2,285	\$561	25%	\$2,846	-	-	-	-	\$2,285	\$561	\$2,846	-	-	-	\$2,759	\$678	\$3,433													
31	CONSTRUCTION MANAGEMENT	\$625	\$202	24%	\$1,027	-	-	-	-	\$625	\$202	\$1,027	-	-	-	\$1,024	\$251	\$1,275													
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL																														
PROJECT COST TOTALS:		\$19,186	\$4,647	24%	\$23,833					\$19,186	\$4,647	\$23,833				\$21,804	\$5,260	\$27,063													

CHIEF, COST ENGINEERING, Willie Honza
PROJECT MANAGER, James Worthington
CHIEF, REAL ESTATE, Orioleto Rosas
CHIEF, PLANNING, Colin Dunn
CHIEF, ENGINEERING, Robert Howell
CHIEF, OPERATIONS, Joseph Hameitz
CHIEF, CONSTRUCTION, Donald Carneick
CHIEF, CONTRACTING, John Eglino
CHIEF, PM-J, Valerie Miller
CHIEF, JPM, Paul Perez

ESTIMATED FEDERAL COST: 100%
ESTIMATED NON-FEDERAL COST: \$27,093
ESTIMATED TOTAL PROJECT COST: \$27,093

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: CCSC - La Quinta Channel Extension - ASSOCIATED COSTS
 LOCATION: Corpus Christi, TX
 The Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston
 POC: CHIEF, COST ENGINEERING, Willie Horza
 PREPARED: 5/11/2012
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Draft Engineering Approvals published in 2002

WBS NUMBER A	WBS Structure B	ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)							
		COST J\$K\$ C	CNTG D	INFL E	TOTAL F	ESC G	COST H	CNTG I	TOTAL J	MIG-Point Date P	INFLATED L	COST M	CNTG N	FILL O			
02	PIPELINE REMOVALS RELOCATIONS	\$2,701	\$540	20%	\$3,241					\$2,701	\$540	\$3,241	2016Q2	7.6%	\$2,807	\$561	\$3,468
CONSTRUCTION ESTIMATE TOTALS:		\$2,701	\$540	20%	\$3,241					\$2,701	\$540	\$3,241			\$2,807	\$591	\$3,498
01	LANDS AND DAMAGES																
30	PLANNING, ENGINEERING & DESIGN	\$27	\$5	20%	\$32					\$27	\$5	\$32	2015Q3	10.5%	\$30	\$6	\$36
0.6%	Project Management	\$22	\$4	20%	\$26					\$22	\$4	\$26	2015Q3	10.5%	\$24	\$5	\$29
0.6%	Planning & Environmental Compliance	\$81	\$16	20%	\$97					\$81	\$16	\$97	2015Q3	10.5%	\$89	\$18	\$107
3.0%	Engineering & Design	\$16	\$3	20%	\$19					\$16	\$3	\$19	2015Q3	10.5%	\$18	\$4	\$21
0.6%	Engineering Tech Review ITR & VE	\$14	\$3	20%	\$17					\$14	\$3	\$17	2015Q3	10.5%	\$15	\$3	\$19
0.5%	Contracting & Repergraphics	\$27	\$5	20%	\$32					\$27	\$5	\$32	2016Q2	13.7%	\$31	\$5	\$37
1.0%	Engineering During Construction	\$5	\$1	20%	\$6					\$5	\$1	\$6	2016Q2	13.7%	\$6	\$1	\$7
0.2%	Planning During Construction	\$5	\$1	20%	\$6					\$5	\$1	\$6	2015Q3	10.5%	\$6	\$1	\$7
0.2%	Project Operations																
31	CONSTRUCTION MANAGEMENT	\$54	\$11	20%	\$65					\$54	\$11	\$65	2016Q2	13.7%	\$61	\$12	\$74
2.0%	Construction Management	\$36	\$2	20%	\$38					\$36	\$2	\$38	2016Q2	13.7%	\$39	\$2	\$41
0.3%	Project Operations	\$27	\$5	20%	\$32					\$27	\$5	\$32	2016Q2	13.7%	\$31	\$5	\$37
1.8%	Project Management																
CONTRACT COST TOTALS:		\$2,897	\$597		\$3,494					\$2,897	\$597	\$3,494			\$3,227	\$616	\$3,843

**** TOTAL PROJECT COST SUMMARY ****
**** CONTRACT COST SUMMARY ****

PROJECT: CCSS - La Quinta Channel Extension - ASSOCIATED COSTS
 LOCATION: Corpus Christi, TX
 This Estimate reflects the scope and schedule in report.
 DISTRICT: Galveston
 CHIEF: COST ENGINEERING, Willie Honza
 PREPARED: 5/11/2012
 Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quinta Channel, Civil Engineering Appendix published in 2002

WBS Structure	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)					
	WBS NUMBER A	Civil Works B	Estimate Prepared: Effective Price Level	26-Apr-10 1-Oct-11	ESC (\$K)	CNTG (\$K)	TOTAL (\$K)	ESC (\$K)	CNTG (\$K)	TOTAL (\$K)	Mid-Point Date P	INFLATED C	CONST M	CNTG N	FULL G			
SHIP DOCKING TERMINAL (DREDGING ONLY)																		
12	NAVIGATION PORTS & HARBORS		\$13,375	\$3,344	25%	\$16,719	\$13,375	\$3,344	\$16,719	2019Q1	13.0%	\$15,117	\$3,779	\$18,897				
CONSTRUCTION ESTIMATE TOTALS:																		
01	LANDS AND DAMAGES		\$13,375	\$3,344	25%	\$16,719	\$13,375	\$3,344	\$16,719			\$15,117	\$3,779	\$18,897				
30 PLANNING, ENGINEERING & DESIGN																		
1.5%	Project Management		\$201	\$50	25%	\$251	\$201	\$50	\$251	2018Q1	21.1%	\$243	\$61	\$304				
1.5%	Planning & Environmental Compliance		\$201	\$50	25%	\$251	\$201	\$50	\$251	2018Q1	21.1%	\$243	\$61	\$304				
6.5%	Engineering & Design		\$1,137	\$284	25%	\$1,421	\$1,137	\$284	\$1,421	2018Q1	21.1%	\$1,377	\$344	\$1,721				
1.5%	Engineering Tech Review ITR & VE		\$201	\$50	25%	\$251	\$201	\$50	\$251	2018Q1	21.1%	\$243	\$61	\$304				
0.8%	Contracting & Reprographics		\$107	\$27	25%	\$134	\$107	\$27	\$134	2018Q1	21.1%	\$130	\$32	\$162				
	Real Estate In-House Labor																	
1.0%	Engineering During Construction		\$134	\$34	25%	\$168	\$134	\$34	\$168	2019Q1	26.4%	\$168	\$42	\$210				
0.3%	Planning During Construction		\$40	\$10	25%	\$50	\$40	\$10	\$50	2019Q1	26.4%	\$50	\$13	\$63				
0.5%	Project Operations		\$67	\$17	25%	\$84	\$67	\$17	\$84	2018Q1	21.1%	\$81	\$20	\$101				
31 CONSTRUCTION MANAGEMENT																		
3.5%	Construction Management		\$468	\$117	25%	\$585	\$468	\$117	\$585	2019Q1	25.4%	\$587	\$147	\$734				
0.5%	Project Operations		\$67	\$17	25%	\$84	\$67	\$17	\$84	2019Q1	26.4%	\$84	\$21	\$105				
1.5%	Project Management		\$201	\$50	25%	\$251	\$201	\$50	\$251	2019Q1	25.4%	\$252	\$63	\$315				
CONTRACT COST TOTALS:																		
			\$16,199	\$4,050		\$20,249	\$16,199	\$4,050	\$20,249			\$18,577	\$4,644	\$23,221				

September 26, 2002

Environmental Section

Ms. Mary Orms
U.S. Fish and Wildlife Service
6300 Ocean Drive
Campus Box 338
Corpus Christi, Texas 78412

Dear Mary:

Please insert the following corrections into the Biological Assessment for the Corpus Christi Ship Channel, Texas - Channel Improvement Project. The text has been revised according to your discussions with Dr. Roberts over the phone and it should provide the information you need to concur with our conclusions of no adverse impacts to Threatened and Endangered Species and their Critical Habitat. Please note that we have indicated that the Corps will work with USFWS and the National Audubon Society during the design phase of the project to identify an armoring plan for Pelican Island that will meet your goals and be engineeringly constructable, depending on the foundation conditions, slope, and type of armoring.

Please let me know if you need any more information. Also, please provide an approximate date when you could provide your letter of concurrence on the project impacts to the Threatened and Endangered Species.

Sincerely,

Carolyn Murphy
Chief, Environmental Section

Enclosure

Enclosure 2

REVISION TO THE
BIOLOGICAL ASSESSMENT FOR THE
CORPUS CHRISTI SHIP CHANNEL, TEXAS
CHANNEL IMPROVEMENT PROJECT

On page C-9 in Section 2.3.4, insert the following after the first sentence:

Along the Texas coast, the following stranding information was recorded for Kemp's ridleys: 100 strandings in 2000, 115 strandings in 2001, and 93 strandings through September 2002 (Shaver, 2002).

On page C-10 in Section 2.3.4, following the first full sentence on the page, insert the following sentence:

Eight Kemp's ridley nests were found on the Texas coast in 2001, and 38 nests were found in 2002 (Shaver, 2002).

On page C-12 in Section 2.4.4, insert the following at the end of the first full paragraph:

Along the Texas coast, the following stranding information was recorded for green sea turtles: 90 strandings in 2000, 73 strandings in 2001, and 42 strandings through September 2002 (Shaver, 2002).

On page C-12 in Section 2.4.4, paragraph 3, replace the first three sentences with the following:

Green sea turtle nests are rare in Texas. Two green sea turtle nests were recorded in Texas in 2002. No green sea turtle nests were found on the Texas coast in 2001. A single nest occurred in 2000; no green sea turtle nests were recorded in 1999. In comparison, 8 Kemp's ridley and 3 loggerhead nests were recorded in 2001 and 38 Kemp's ridley and one loggerhead nest were recorded in 2002 (Shaver, 2002).

On page C-14 in Section 2.5.4, following the fourth sentence in that paragraph, insert the following:

The latest stranding information for loggerheads include 163 strandings in 2000, 165 strandings in 2001, and 101 strandings through September 2002 (Shaver, 2002).

On page C-14 in Section 2.5.4, following the ninth sentence in that paragraph, insert the following sentence:

Three loggerhead nests were found on the Texas coast in 2001, and one nest was found in 2002 (Shaver, 2002).

On page C-16 in Section 2.6.4, insert the following at the end of the paragraph:

Along the Texas coast, the following stranding information was recorded for hawksbills: 28 strandings in 2000, 30 strandings in 2001, and 45 strandings through September 2002 (Shaver, 2002).

On page C-18 in Section 2.7.4, insert the following at the end of the paragraph:

Along the Texas coast, the following stranding information was recorded for leatherbacks: 14 strandings in 2000, 6 strandings in 2001, and 17 strandings through September 2002 (Shaver, 2002).

On page C-21, substitute the following section in its entirety:

2.8.6 Effects of the Project

This species is expected to forage in the project area or general vicinity. An active nesting colony occurs on Pelican Island within the proposed project area. A beneficial use site (BU Site Pelican) is proposed and located adjacent to and south of the channel, on the east side and south of Pelican Island. In the past, dredged maintenance materials have been placed on the south side of the island after coordination with the National Audubon Society (NAS) and allowed to flow out into the open water as a part of the ongoing rookery island enhancement, and this practice will continue. Rock revetment (1,500 ft) was placed on the northeast corner of the island in 1984 to protect that part of the island from erosion, but it has since been lost over the years to erosion flanking the rock.

There is a potential for young pelicans not fully fledged to be washing into the channel by large waves on the north side of the island if they wander around from the back side of the island or fall over the edge of the 10-foot bluff overlooking the beach. The USFWS and National Audubon Society (NAS) have requested the USACE to armor the northeast corner of the island again to prevent erosion, but to pull the armoring away from the bluff and put it onto the beach or in the water. Additional requests include coordination with the USFWS and NAS on the location for placing dredged maintenance material and to delete and plans for fencing on the bluff to prevent young pelicans from falling over the edge.

The USACE will coordinate with the USFWS and NAS on the location and design of the armoring system during the design phase of the project. The USACE will determine the engineering feasibility of several armoring designs and the foundation conditions that could limit the armoring locations and present these to the USFWS. Also, the USACE will continue to coordinate the dredged material disposal locations on the island with the USFWS and NAS prior to disposal as it has in the past. Fencing will not be considered as a protection option for pelicans.

In addition to armoring the northeast corner of the island, approximately 2,200 linear ft of hydraulically filled embankment, protected by geotube and riprap, will extend bayward from the east end of the island. The purpose of this hydraulically filled embankment is to contain the dredged maintenance material flowing off the south side of the island to maintain an open-water channel between Pelican and Mustang Islands, thereby preventing land bridge access to Pelican Island from Mustang Island by predators. This embankment will also protect the island from shoreline erosion. This embankment alternative will be coordinated with the USFWS during the design phase, as well. Based on this analysis, the project is expected to have a beneficial impact on this endangered species.

On page C-29, substitute the following sentence for the last sentence in the last paragraph in Section 2.12.4:

"Critical habitat has recently been designated in Texas (see below)."

On page C-31, substitute the following section in its entirety:

2.12.6 Effects of the Project

The minor changes in salinity and tidal amplitude as a result of the project are not expected to have an impact on the piping plover. Impacts to other areas currently used by piping plover near the project will be eliminated by placing new-work dredged material in leveed upland areas or in coordinated open-water beneficial use

sites. Dredged maintenance material will be placed in existing PAs that are fully leveed or used beneficially to enhance other areas, such as nesting habitat for pelicans. Some beach nourishment may occur on San Jose Island via PA 2 which is designed to nourish the sand dune field near the jetty channel with the high sand content material from the jetty channel. However, this site is infrequently used and much of the sandy material remains in the dune field which is not piping plover habitat. Although some of the material can leave the semi-confined PA 2, it only flows onto a small area of the beach and replenishes this habitat as well. Placement of dredged materials in PA 6, located east of Pelican Island, will not affect adjacent critical habitat or piping plovers because the area is fully leveed. Based on these findings and the fact that any material reaching the critical habitat on San Jose Island is infrequent, temporary, and limited in size, the project is not expected to have any significant adverse impacts on the species and critical habitat for the piping plover is not expected to be significantly impacted as well.

In Section 3.0 References, please add:

Shaver, D.J. 2002. Padre Island National Seashore, field station leader. Electronic mail to Kari A. Jecker, PBS&J, 14 September 2002.



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
 c/o TAMU-CC, Campus Box 338
 6300 Ocean Drive
 Corpus Christi, Texas 78412

November 27, 2002

Carolyn Murphy
 Chief, Environmental Section
 Department of the Army
 Galveston District, Corps of Engineers
 P.O. Box 1229
 Galveston, TX 77553-1229

Cons.# 2-11-03-I-0071

Dear Ms. Murphy:

This responds to your September 26, 2002 letter providing the U.S. Fish and Wildlife Service (Service) with the additional information needed to concur with the U.S. Army Corps of Engineers' (COE) conclusion of no adverse impacts to threatened and endangered species and their critical habitat from the proposed Corpus Christi Ship Channel Improvement Project. A Biological Assessment (BA) was included in the November 2001, Draft Environmental Impact Statement (DEIS) for review and comment. Since that date, the Service and the COE have cooperatively worked to improve and finalize the BA and find measures that would avoid and minimize impacts to the brown pelican, green sea turtle and Kemp's ridley sea turtle and piping plover. The text was revised on May 2002 and the September 26th letter provided additional revisions discussed between Service and Dr. Terry Roberts of the Galveston District Office. The measures agreed upon to date are listed below.

Sea Turtles

- 1) To avoid or minimize impacts to sea turtles potentially incurred by dredging activities during construction or by maintenance activities after construction the COE will:
 - a) use a pipeline dredge in the bay.
 - b) use draghead deflectors on hopper dredges being used at the entrance channel.
 - c) schedule offshore dredging during the winter months when sea turtles are most likely to be elsewhere in warmer waters.
 - d) use National Marine Fisheries Service observers to monitor hopper dredge use and document that incidental take is not exceeded as per the Biological Opinion issued in 1995.

Brown Pelicans

- 1) To avoid and reduce the potential for young pelicans, not fully fledged, to be washed into the channel by large waves on the north side of the island, if they wander around from the back side of the island or fall over the edge of the 10-foot bluff overlooking the beach, the COE has agreed to:
 - a) armor the northeast corner of the island again to prevent erosion, but pull the armoring away from the bluff and put it onto the beach or in the water.
 - b) coordinate with the Service and National Audubon Society (NAS) on the location and design of the armoring system during the design phase of the project.
 - c) determine the engineering feasibility of several armoring designs and the foundation conditions that could limit the armoring locations and present these to the Service.
 - d) continue to coordinate the dredged material disposal locations on the island with the Service and NAS prior to disposal.

- 2) To contain dredged maintenance material from flowing off the south side of the island, to prevent erosion, and to maintain an open-water channel between Pelican and Mustang Islands preventing a land bridge across to Pelican Island from Mustang Island by predators the COE has agreed to:
 - a) extend bayward from the east end of the island a 2,200 linear foot hydraulically filled embankment, protected by geotube and/or riprap.
 - a) coordinate this embankment alternative with the Service during the design phase.

Piping Plover

- 1) To eliminate potential impacts to piping plover areas near the project the COE in coordination with the Service will:
 - a) place new-work dredged material in leveed upland areas, coordinate open-water beneficial use sites or enhance other areas such as nesting habitat for pelicans or other species.

The Service also contacted Gene Blacklock and Richard Gibbons from the Coastal Bend Bays and Estuary Program seeking further expertise on preventative measures. On October 9, 2002, both were able to provide some further recommendations. Although in some milder years pelicans have been known to appear as early as late January and mid-February, the historical window for pelicans nesting at Pelican Island is March 1 to September 1. Therefore, they recommended:

- 1) avoid construction and dredging activities between March 1 to September 1.

If the COE determines it is necessary to continue activities during that timeframe:

- a) the Service should be contacted immediately regarding proposed work.
- b) activities should not occur within 1,000 feet of a nesting pelican.
- c) the COE should schedule activities to commence at the shores of Pelican Island in the early fall and then steadily move outwards until they reach a distance of 1,000 feet from the island shores prior to March 1st to avoid impacting nesting pelicans.
- d) qualified biological monitors should survey the area for nesting pelicans prior to beginning activities.
- e) qualified biological monitors should be present to observe nesting pelicans to ensure the pelicans have acclimated to the noise and prevent harm or harassment of the pelicans.

The Service is aware that these additional recommendations, formulated with the input of the CBBEP biologists, were not presented to the COE prior to the September 26, 2002 letter. However, we do believe they are necessary measures. The Service requests that the COE review the additional measures and inform the Service if they agree to incorporate them into your proposed action. If the additional measures are acceptable, the Service could concur with your determination that the proposed project is not likely to adversely impact threatened and endangered species.

The Service appreciates the cooperative efforts to protect threatened and endangered species put forth by the COE during this informal consultation. We await your response. If you have any further questions please contact Mary Orms at (361) 994-9005 or by email at mary_orms@fws.gov.

Sincerely,



Allan Strand
Field Supervisor

cc Dr. Terrell W. Roberts, COE, Galveston



REPLY TO
ATTENTION OF.

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
 P.O. BOX 1229
 GALVESTON, TEXAS 77553-1229

December 13, 2002

Environmental Section

Mr. Allan M. Strand
 Field Supervisor
 U.S. Fish and Wildlife Service
 c/o TAMU-CC, Campus Box 338
 6300 Ocean Drive
 Corpus Christi, Texas 78412

Dear Mr. Strand:

We have reviewed your letter dated November 27, 2002, that provided measures coordinated between our agencies to modify the Biological Assessment (BA) for the Corpus Christi Ship Channel Improvements Project to avoid or minimize impacts to threatened and endangered (T&E) species. The measures were needed to enable the U.S. Fish and Wildlife Service (USFWS) to concur with the U.S. Army Corps of Engineers' (Corps) conclusion of no adverse impacts to T&E species. Since the coordination, however, the USFWS has contacted the Coastal Bend Bays & Estuary Program for more information on the brown pelican and has included additional measures for our review and acceptance.

In general, we have no concerns with accepting most of the measures. The measures that do concern us are related to sea turtles, piping plover, and dredging distance from Pelican Island.

Each of the four measures listed in the USFWS letter to minimize impacts to sea turtles are outside the authority of the USFWS. These measures are under the authority of the National Marine Fisheries Service (NMFS) and the Corps has just completed formal consultation under Section 7 of the Endangered Species Act with NMFS on the sea turtles. NMFS has issued a Biological Opinion which deals with each of the measures listed in your letter and the Corps has accepted the reasonable and prudent measures to qualify for the incidental take limits provided. Therefore, we see no need to accept these measures for USFWS concurrence with our BA.

The Corps accepts each of the six measures listed for minimizing project impacts to the brown pelican. Each of these measures have been added to the BA by amendment in a letter to the USFWS dated September 26, 2002.

The wording of the measure listed under the heading "Piping Plover" is not clear. The Corps letter dated September 26, 2002, explained that piping plover critical habitat would be avoided by placing new-work material in upland confined sites or in existing open-bay unconfined placement areas. In addition, much of the new-work material will be used beneficially to create shallow-water habitat for seagrass colonization and small emergent areas

for wetland habitat that has potential for bird use. There is no assurance that piping plovers will use these sites; rather, the intention of the Corps letter was to point out that this dredged material would not be placed in critical habitat. If this was the intent of the measure, then the Corps accepts the measure. If not, please provide additional explanation on the intent of the measure.

The Corps accepts the additional measure to avoid construction of the armoring and containment levee on Pelican Island during the nesting season from March 1 to September 1. However, we don't understand the need to avoid dredging within 1,000 feet of the island during the nesting season since a considerable amount of navigation traffic is already using this same section of the channel during the nesting season and pelicans have never been recorded as nesting on the island immediately adjacent to the navigation channel. None of the new-work material will be deposited on Pelican Island, so the only project "impacts" will be dredging in the ship channel, along with existing navigation traffic. In the past, maintenance material was deposited on the island to nourish it for bird use, but only during the non-nesting season. This practice will continue once the project is completed. However, since only about 1,500 feet of the ship channel is within 1,000 feet of the island, we will coordinate any new-work dredging along this portion of the ship channel with the USFWS prior to the nesting season, as requested in your letter, to avoid any disruption in the construction schedule.

We trust these responses are sufficient to allow the USFWS to concur with the Corps' determination that the proposed project is not likely to adversely impact T&E species. We appreciate the opportunity to work with the USFWS to fulfill our duties to protect T&E species. Please contact Dr. Terry Roberts at (409) 766-3035 if you have any additional questions.

Sincerely,

Carolyn Murphy
Chief, Environmental Section



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
 c/o TAMU-CC, Campus Box 338
 6300 Ocean Drive
 Corpus Christi, Texas 78412

Carolyn Murphy
 Chief, Environmental Section
 Department of the Army
 Galveston District, Corps of Engineers
 P.O. Box 1229
 Galveston, TX. 77553-1229

Cons.# 2-11-03-1-0071

Dear Ms. Murphy:

This responds to your letter dated December 13, 2002, regarding measures presented by the U.S. Fish and Wildlife Service (Service) to the Corps of Engineers (COE) in a November 27, 2002 letter to avoid and minimize impacts to threatened and endangered species the Corpus Christi Ship Channel Improvements Project. We requested your review of the measures outlined and added to the Biological Assessment per a September 26, 2002 letter and additional measures after coordination with the Coastal Bends Bays and Estuary Program. We requested the COE inform the Service if the COE agreed to incorporate them into the proposed action. If the additional measure were acceptable, the Service could concur with your determination that the proposed project is not likely to adversely impact the brown pelican, piping plover and/or sea turtles.

The COE has reviewed the measures and have provided these comments:

1. All measures outlined to avoid and minimize impacts to sea turtles have been addressed in a recently completed Biological Opinion with the National Marine and Fisheries Service (NMFS). The COE has accepted the reasonable and prudent measures in the Biological Opinion and therefore, the Service is assured all measures will be incorporated into the project to fulfill their obligation under the Biological Opinion.
2. The COE has accepted each of the six measures listed for minimizing project impacts to the brown pelican and accepts the additional measure to avoid construction of the armoring and containment levee on Pelican Island during the nesting season from March 1 to September 1. Also, since there is only a small portion of the ship channel within 1,000 feet of the island the COE will coordinate any new-work dredging along this portion of the ship channel with the Service and the Coastal Bend Bay and Estuary Program prior to the nesting season to avoid disruption in the construction schedule and harrassment of brown pelicans.
3. For the piping plover the COE has reiterated that piping plover critical habitat will be avoided by placing new-work material in upland confined sites or in existing open-bay unconfined placement areas.

Therefore, with the acceptance of all measures, the Service can concur with the COE's determination that the Corpus Christi Chip Channel Improvements Project may affect, but is not likely to adversely affect Federally-listed species.

The Service thanks the COE for their cooperative efforts to protect listed species. If we can be of any further assistance, please contact Mary Orms at (361) 994-9005 or by email at mary_orms@fws.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Allan M. Strand". The signature is fluid and cursive, with a large, sweeping flourish at the end.

Allan Strand
Field Supervisor

cc:
Terry Roberts, COE, Galveston, TX

January 25, 2006

Environmental Section

Mr. Allan Strand
Field Supervisor
U.S. Fish and Wildlife Service
6300 Ocean Drive, Campus Box 338
Corpus Christi, Texas 78412

Dear Mr. Strand:

The Galveston District, U.S. Army Corps of Engineers (Corps), coordinated with the U.S. Fish and Wildlife Service (USFWS) under Section 7 consultation in 2002, Consultation No. 2-11-03-I-0071, regarding potential impacts of the Corpus Christi Ship Channel-Channel Improvements Project to several threatened and endangered (T&E) species. As a result of this coordination, an agreement was reached that listed several measures that, if followed, would avoid adverse impacts to T&E species and enable the USFWS to issue a concurrence on a "may affect, but is not likely to adversely affect" assessment prepared by the Corps.

One of the measures derived from the consultation on the endangered brown pelican was to construct an armored levee on the east side of Pelican Island in Corpus Christi Bay to redirect dredged maintenance material placed on the island away from the channel between Pelican Island and Point of Mustang on Mustang Island. The concern with uninhibited flow into the channel is that it would eventually build a land bridge that would provide easy access to the pelican nesting sites for predators.

Subsequent to the consultation, the Corps performed bathymetric surveys of the channel and the surveys indicated that a land bridge is not forming between Pelican Island and Point of Mustang. Based on this evidence, the Corps determined the armored levee was not needed and the money saved could be better used on other environmental measures needed for the project.

A meeting between the Local Sponsor, USFWS, Audubon Society, and the Coastal Bend Bays and Estuary Program was held on November 28, 2005, to present this information and ask for your concurrence on deleting this measure from the list compiled during consultation. All participants at the meeting agreed that the armored levee on Pelican Island was not needed since the channel does not appear to be filling in and the levee would do little to physically inhibit predators from swimming to the island.

Based on the conclusions reached at this meeting and the concurrence of USFWS representatives, I am asking you to remove the measure requiring an armored levee on the east side of Pelican Island from the list provided in your letter dated 27 November 2002. The Corps accepts and will fulfill the conditions listed in the remaining measures in the letter to maintain a "not likely to adversely affect" opinion for T&E species in the project area.

Please do not hesitate to call Dr. Terry Roberts (409/766-3035) if you need more information. We appreciate the opportunity to streamline the agreement and eliminate adverse impacts to T&E species in the project area.

Sincerely,

Richard Medina
Chief, Planning and
Environmental Branch

CF:

Mr. Paul Carangelo
Port of Corpus Christi Authority
P.O. Box 1541
Corpus Christi, Texas 78403



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
c/o TAMU-CC, Campus Box 338
6300 Ocean Drive
Corpus Christi, Texas 78412

April 5, 2006

Richard Medina
Chief, Planning and Environmental Branch
Department of the Army
Galveston District, U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, TX 77553-1229

Consultation No. 2-11-03-I-0071

Dear Mr. Medina:

This responds to your January 25, 2006 letter requesting the removal of the measure requiring an armored levee on the east side of Pelican Island from the list provided in our letter dated 27 November 2002 concurring with a "not likely to adversely affect" determination on potential impacts of the Corpus Christi Ship Channel-Channel Improvements Project to the endangered brown pelican on Pelican Island in Corpus Christi Bay.

Originally, the measure was recommended to redirect dredged maintenance material placed on the island away from the channel between Pelican Island and Point of Mustang on Mustang Island because uninhibited flow into the channel could eventually build a land bridge that would provide easy access to the pelican nesting sites for predators. However, since that time, U.S. Army Corps of Engineers (Corps) has performed bathymetric surveys of the channel and the surveys indicated that a land bridge is not forming between Pelican Island and Point of Mustang. Therefore, based on that evidence, the Corps has determined the armored levee was not needed and the money saved could be better used on other environmental measures needed for the project.

Based on this information provided and the Corps acceptance to fulfill the conditions listed in the remaining measures, the Service concurs with the Corps assessment and agrees to remove this measure from the list of measures compiled during consultation to protect sea turtles, brown pelicans, and piping plovers. The removal of this one measure does not affect the Service's concurrence of "not likely to adversely affect" determination on the project.

The Service thanks the Corps for its cooperative effort in protecting endangered species. If you have any further questions please contact Mary Orms at (361) 994-9005 or by email at mary_orms@fws.gov.

Sincerely,

Mary Orms
for Allan M. Strand
Field Supervisor



DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF

CESWG-PE-PR

November 24, 2008

Mr. Allan Strand
Field Supervisor
U.S. Fish and Wildlife Service
6300 Ocean Drive, Campus Box 338
Corpus Christi, Texas 78412

Dear Mr. Strand:

The U.S. Army Corps of Engineers, Galveston District, prepared a Feasibility Report and Final Environmental Impact Statement (FEIS) describing the potential impacts of constructing, operating, and maintaining a channel improvement project at the Corpus Christi Ship Channel (CCSC) in April 2003. Based on the economic, engineering, and environmental analyses, the selected plan includes deepening the CCSC from the Viola Turning Basin to the end of the jetties in the Gulf of Mexico from -45 feet to -52 feet MLT, deepening the remainder of the channel into the Gulf of Mexico from -47 feet to -54 feet MLT, widening the Upper Bay and Lower Bay reaches from 400 feet to 530 feet, constructing 200-foot wide barge shelves to -12 feet MLT across the Upper Bay portion of the CCSC, and extending the La Quinta Channel 7,400 feet at a depth of -39 feet MLT.

The Feasibility Report and FEIS were approved by the Chief of Engineers in June 2003, but the project was not authorized for construction by Congress until the Water Resources Development Act of 2007 (WRDA 2007) was issued. Because the benefits and costs for the authorized project are now five years old, a Limited Reevaluation Report (LRR) is required to recalculate the economics of the project to ensure the project is still in the Federal interest. In addition, an update of the federally-listed threatened and endangered (T&E) species list is needed for compliance with the Endangered Species Act (ESA). The LRR will be the decision document used to support an amendment to the WRDA 2007 project authorization that is needed to initiate construction.

The Galveston District requests an update of the federally-listed species likely to occur in the project area (Figure 1) to help prepare the LRR. A table of T&E species listed for the study area that was used in preparing a Biological Assessment (B.A.) for the FEIS is attached as enclosure 1.

Correspondence is provided (Enclosure 2) to document a revision to the B.A. requested by your office. The revision was coordinated so that the USFWS could concur with the conclusion that the project "may affect, but is not likely to adversely affect" T&E species. The

ENCLOSURE

correspondence also documents the Galveston District's acceptance of several measures proposed by USFWS to further ensure that the project will not be likely to adversely affect T&E species. Finally, correspondence from 2006 is included that documents the removal of one of the measures that was coordinated that would construct an armored levee on the east side of Pelican Island in Corpus Christi Bay to redirect dredged maintenance material placed on the island away from the channel between Pelican Island and Point Mustang on Mustang Island. Bathymetric surveys showed that this feature was not needed since there is no shoaling occurring in the channel without the armored levee.

The Galveston District would appreciate a reply no later than December 5, 2008, if possible. Please feel free to contact Dr. Terry Roberts by phone at (409) 766-3035 or by e-mail at terrell.w.roberts@usace.army.mil if you need additional information. We appreciate your help in updating the T&E species information to stay in compliance with the ESA.

Sincerely,

Carolyn Murphy
Chief, Environmental Section

Enclosures

1. T&E Species in B.A.
2. USFWS and Galveston District Correspondence

(will be provided if necessary)



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
 c/o TAMU-CC, Campus Box 338
 6300 Ocean Drive
 Corpus Christi, Texas 78412
 December 5, 2008

Carolyn Murphy
 Chief, Environmental Section
 Department of the Army
 Galveston District, Corps of Engineers
 P.O. Box 1229
 Galveston, TX 77553-1229

Consultation No. 2-11-03-I-0071

Dear Ms. Murphy:

This responds to your letter, dated November 24, 2008, requesting comments from the U.S. Fish and Wildlife Service (Service) on an update to the federally-listed threatened and endangered species list under the Limited Reevaluation Report (LRR) that your office is preparing. The LRR is being prepared for the Corpus Christi Ship Channel improvement project in Nueces and San Patricio Counties.

The Service recommends that the northern aplomado falcon, mountain plover, and Eskimo curlew be taken off of the list you provided in Table I. None of these species are currently on the county list for either Nueces or San Patricio County. Also, the Service notes that in earlier reviews for this project, the whooping crane was included only on the list for San Patricio County, now this species is also included in the Nueces County list.

With regard to the bald eagle, the Bald eagle has been removed from the Federal Endangered and Threatened list (rule effective August 8, 2007). However, protections provided to the bald eagle under the Bald and Golden Eagle Protection Act (BGEPA) and the Migratory Bird Treaty Act (MBTA) will continue to remain in place after the species is delisted. Both Federal laws prohibit "take", and the BGEPA prohibits disturbance as a form of "take" as well. To help provide more clarity on the management of the bald eagle after delisting, the Service published a regulatory definition of "distur" (72 FR 31156). The management guidelines and further information on the bald eagle may be viewed at <http://www.fws.gov>.

The Service appreciates the opportunity to continue to coordinate with your office on this project. Thank you for including copies of previous correspondence with our office on this project. This facilitated a quick and efficient review by us. If we can be of further assistance, please contact Mary Orms or Pat Clements at 361-994-9005.

Sincerely,


 Allan M. Strand
 Field Supervisor

cc:
 Terry Roberts, USACE, Galveston, TX

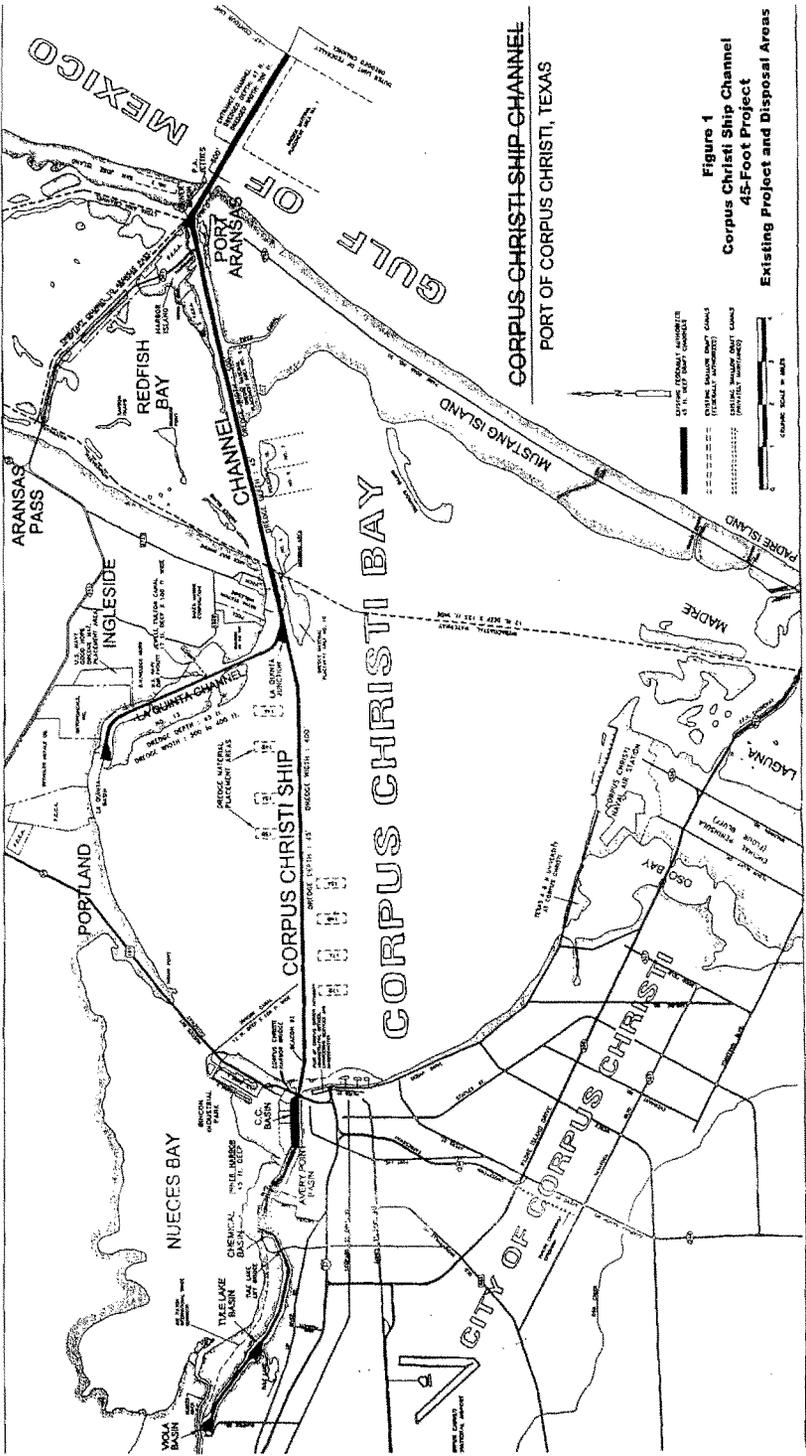


Figure 1
Corpus Christi Ship Channel
45-Foot Project
Existing Project and Disposal Areas

TABLE 1

FEDERALLY ENDANGERED AND THREATENED SPECIES OF POTENTIAL
 OCCURRENCE IN THE CORPUS CHRISTI SHIP CHANNEL
 IMPROVEMENTS PROJECT AREA
 IN NUECES AND SAN PATRICIO COUNTIES, TEXAS¹

Common Name	Scientific Name	Status ²
South Texas ambrosia	<i>Ambrosia cheiranthifolia</i>	E
Slender rush-pea	<i>Hoffmannseggia tenella</i>	E
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	E
Green sea turtle	<i>Chelonia mydas</i>	T
Loggerhead sea turtle	<i>Caretta caretta</i>	T
Hawksbill sea turtle	<i>Eretmochelys imbricata</i>	E
Leatherback sea turtle	<i>Dermochelys coriacea</i>	E
Brown pelican	<i>Pelecanus occidentalis</i>	E
Bald eagle	<i>Haliaeetus leucocephalus</i>	T/PDL
Whooping crane	<i>Grus americana</i>	E
Northern aplomado falcon	<i>Falco femoralis septentrionalis</i>	E
Piping plover	<i>Charadrius melodus</i>	T
Mountain plover	<i>Charadrius montanus</i>	PT
Eskimo curlew	<i>Numenius borealis</i>	E
Ocelot	<i>Leopardus pardalis</i>	E
Jaguarundi	<i>Herpailurus yagouaroundi</i>	E
West Indian manatee	<i>Trichechus manatus</i>	E

¹ According to U.S. Fish & Wildlife Service (FWS, 2000a).

² E Endangered; in danger of extinction.

T Threatened; severely depleted or impacted by man.

PT Proposed for listing as threatened.

T/PDL Currently classified as threatened but proposed for delisting in lower 48 states.

REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

November 30, 2011

CESWG-PE-PR

Mr. Allan Strand
Field Supervisor
U.S. Fish and Wildlife Service
6300 Ocean Drive, Campus Box 338
Corpus Christi, TX 78412

Dear Mr. Strand:

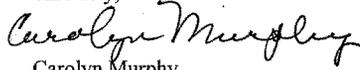
The U.S. Army Corps of Engineers, Galveston District, prepared a Feasibility Report and Final Environmental Impact Statement (FEIS) describing the potential impacts of constructing, operating, and maintaining a channel improvement project at the Corpus Christi Ship Channel (CCSC), Nueces and San Patricio Counties, Texas in April 2003. Based on the economic, engineering, and environmental analyses, the selected plan includes deepening the CCSC from the Viola Turning Basin to the end of the jetties in the Gulf of Mexico from -45 feet to -52 feet mean low tide (MLT), deepening the remainder of the channel into the Gulf of Mexico from -47 feet to -54 feet MLT, widening the Upper Bay and Lower Bay reaches from 400 feet to 530 feet, and constructing 200-foot wide barge shelves to -12 feet MLT across the Upper Bay portion of the CCSC. The extension of the La Quinta Channel 7,400 feet at a depth of -39 feet MLT is currently under construction as coordinated in the 2003 FEIS.

The Feasibility Report and FEIS were approved by the Chief of Engineers in June 2003, but the project was not authorized for construction by Congress until the Water Resources Development Act of 2007 was issued. Because the economic analysis for the authorized project was greater than five years old in November 2008, a Limited Reevaluation Report (LRR) was required to ensure that the project was still in the Federal interest. Corps policy also requires that Endangered Species Act (ESA) coordination be updated every three years, and so that coordination was re-initiated with you in November 2008 and a response from USFWS was received December 5, 2008 (Enclosed).

We have again reached the three year limit on ESA coordination. Since our last coordination in 2008, the brown pelican (*Pelecanus occidentalis*), has been delisted as an endangered species, but is still protected under the Migratory Bird Treaty Act. No other changes appear to have occurred to the Federal Threatened and Endangered Species list for Nueces and San Patricio Counties, and the proposed project has not changed. As such, we conclude that our previous ESA coordination and conclusions remain valid and that further consultation is not necessary.

In conclusion, we request your concurrence that no further ESA coordination is necessary for this project. We appreciate your assistance in this review and request your response no later than December 16, 2011, if at all possible. Please feel free to contact Mark Garza by phone at (409) 766-6348 or by e-mail at mark.garza@usace.army.mil if you need additional information.

Sincerely,



Carolyn Murphy
Chief, Environmental Section

Enclosure



DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF.

CESWG-PE-PR

November 24, 2008

Mr. David M. Bernhart
Assistant RA for Protected Resources
Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Mr. Bernhart:

The U.S. Army Corps of Engineers, Galveston District, prepared a Feasibility Report and Final Environmental Impact Statement (FEIS) describing the potential impacts of constructing, operating, and maintaining a channel improvement project at the Corpus Christi Ship Channel (CCSC) in April 2003. Based on the economic, engineering, and environmental analyses, the selected plan includes deepening the CCSC from the Viola Turning Basin to the end of the jetties in the Gulf of Mexico from -45 feet to -52 feet MLT, deepening the remainder of the channel into the Gulf of Mexico from -47 feet to -54 feet MLT, widening the Upper Bay and Lower Bay reaches from 400 feet to 530 feet, constructing 200-foot wide barge shelves to -12 feet MLT across the Upper Bay portion of the CCSC, and extending the La Quinta Channel 7,400 feet at a depth of -39 feet MLT.

The Feasibility Report and FEIS were approved by the Chief of Engineers in June 2003, but the project was not authorized for construction by Congress until the Water Resources Development Act of 2007 (WRDA 2007) was issued. Because the benefits and costs for the authorized project are now five years old, a Limited Reevaluation Report (LRR) is required to recalculate the economics of the project to ensure the project is still in the Federal interest. In addition, an update of the federally-listed threatened and endangered (T&E) species list is needed for compliance with the Endangered Species Act (ESA). The LRR will be the decision document used to support an amendment to the WRDA 2007 project authorization that is needed to initiate construction.

The Galveston District requests an update of the federally-listed species likely to occur in the project area (Figure 1) and any revisions to the Biological Opinion (B.O.) that may be needed based on current data to help prepare the LRR. A copy of the letter from your agency that was used in preparing a Biological Assessment for the FEIS is attached as enclosure 1. A copy of the B.O. prepared by your agency is attached as enclosure 2 to help you provide updated information for the LRR. The Galveston District would appreciate a reply no later than December 5, 2008, if possible.

Please feel free to contact Dr. Terry Roberts by phone at (409) 766-3035 or by e-mail at Terrell.w.roberts@usace.army.mil if you need additional information. We appreciate your help in updating the T&E species information to stay in compliance with the ESA.

Sincerely,

Carolyn Murphy
Chief, Environmental Section

Enclosures

1. NMFS Letter
2. NMFS Biological Opinion

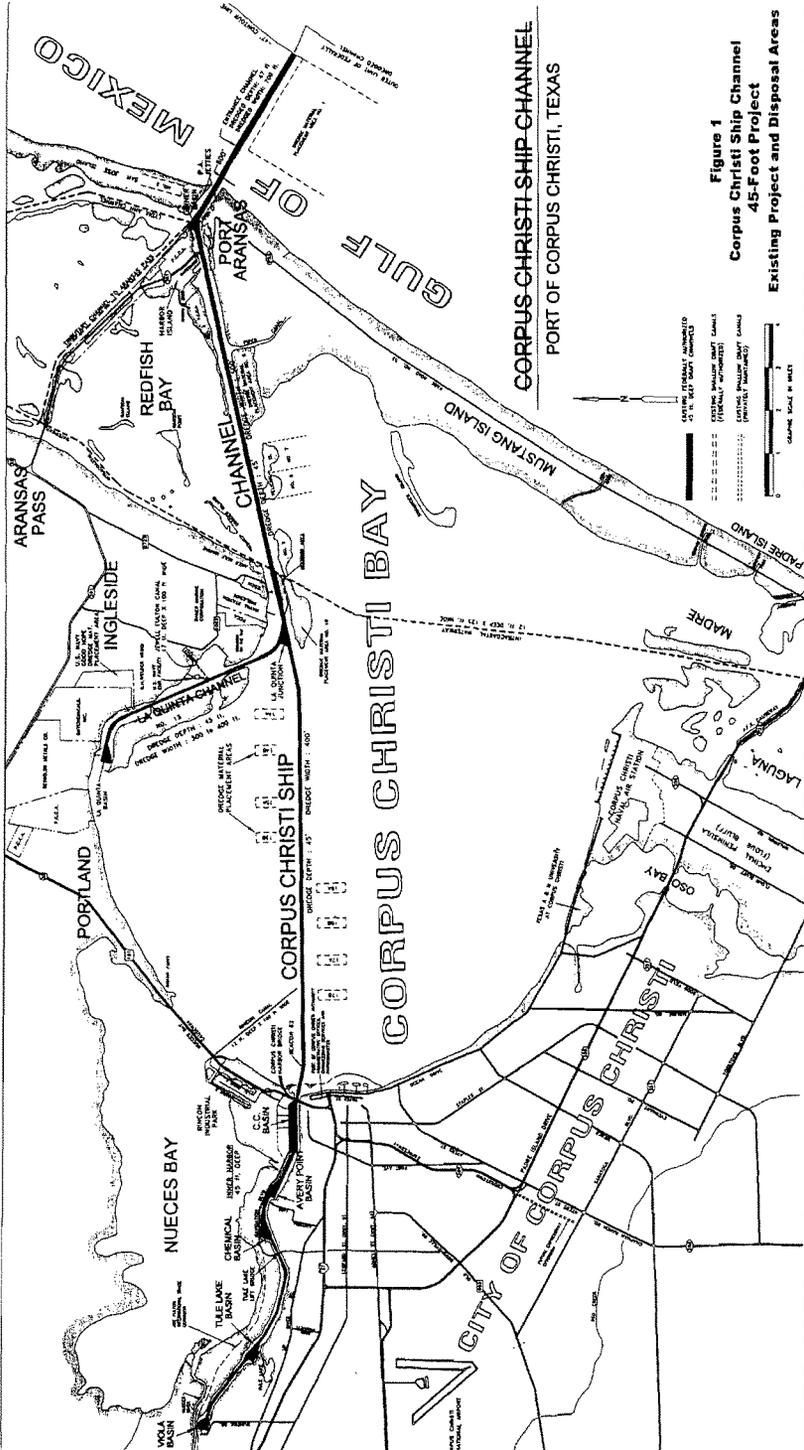


Figure 1
Corpus Christi Ship Channel
45-Foot Project
Existing Project and Disposal Areas



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33712
(727) 570-5312; Fax 570-5517

MAY 18 2001

F/SER3:TLG

Mr. Derek Green
Senior Staff Ecologist
206 Wild Basin Road - Suite 300
Austin, TX 78746

Dear Mr. Green:

In response to your letter dated May 8, 2001, enclosed is a list of species for the state of Texas that may be impacted by your proposed action to dredge the Corpus Christi Ship Channel in Nueces and San Patricio Counties, Texas. If you have any questions, please contact Eric Hawk, fishery biologist, at the telephone number listed above.

Sincerely,

Georgia Cranmore
Acting Regional Administrator for
Protected Resources

Enclosure

File: 1514-22 F.1 (TX)
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Enclosure

**Endangered and Threatened Species and Critical Habitats
under the Jurisdiction of the National Marine Fisheries Service**

Texas

Listed Species	Scientific Name	Status	Date Listed
Marine Mammals			
blue whale	<i>Balaenoptera musculus</i>	Endangered	12/02/70
finback whale	<i>Balaenoptera physalus</i>	Endangered	12/02/70
humpback whale	<i>Megaptera novaeangliae</i>	Endangered	12/02/70
sei whale	<i>Balaenoptera borealis</i>	Endangered	12/02/70
sperm whale	<i>Physeter macrocephalus</i>	Endangered	12/02/70
Turtles			
green sea turtle	<i>Chelonia mydas</i>	Threatened ¹	07/28/78
hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered	06/02/70
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	12/02/70
leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	06/02/70
loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	07/28/78

Species Proposed for Listing

None

Designated Critical Habitat

None

Proposed Critical Habitat

None

Candidate Species ²	Scientific Name
Fish	
dusky shark	<i>Carcharhinus obscurus</i>
sand tiger shark	<i>Odontaspis taurus</i>
night shark	<i>Carcharhinus signatus</i>
speckled hind	<i>Epinephelus drummondhayi</i>
saltmarsh topminnow	<i>Fundulus jenkensi</i>
jewfish	<i>Epinephelus itajara</i>
Warsaw grouper	<i>Epinephelus nigritus</i>

1. Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered.

2. Candidate species are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 Southeast Regional Office
 9721 Executive Center Drive North
 St. Petersburg, FL 33702
 (727) 570-5312; FAX 570-5517
<http://caldera.sero.nmfs.gov>

DEC - 5 2002

F/SER3:DK

Dr. Lloyd H. Saunders
 Chief, Planning, Environmental and Regulatory Division
 Galveston District, Corps of Engineers
 Department of the Army
 P.O. Box 1229
 Galveston, TX 77553-1229

SUBJECT: Endangered Species Act Section 7 Consultation on the Corpus Christi Ship Channel Improvement Project

Dear Dr. Saunders:

This document represents the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (Opinion) based on our review of the Corpus Christi Ship Channel Improvement Project to be conducted by the United States Army Corps of Engineers (COE), Galveston District and its effects on loggerhead turtles (*Caretta caretta*), Kemp's ridley turtles (*Lepidochelys kempii*), hawksbill turtles (*Eretmochelys imbricata*), green turtles (*Chelonia mydas*), and leatherback turtles (*Dermochelys coriacea*). This Opinion has been prepared in accordance with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1536 *et seq.*). The NOAA Fisheries' consultation number for this action is F/SER/2002/00731. Please refer to this number in any future correspondence regarding this consultation.

This Opinion is based on information provided in a draft environmental impact statement and draft feasibility report prepared by the COE, received by NOAA Fisheries' Protected Resources Division on July 1, 2002, additional information provided via email by Paul Carangelo of the Port of Corpus Christi, published and unpublished scientific information on the biology and ecology of threatened and endangered marine species within the action area, and other sources of information. A complete administrative record of this consultation is on file at the NOAA Fisheries' Southeast Regional Office in St. Petersburg, Florida.

The Opinion states NOAA Fisheries' belief that the proposed action is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, green, hawksbill, or leatherback sea turtles. However, NOAA Fisheries anticipates incidental take of these species and has issued an Incidental Take Statement (ITS) pursuant to section 7 of the ESA. This ITS contains reasonable and prudent measures with implementing terms and conditions to help minimize this take.

Pursuant to the essential fish habitat consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)(2) and 50 CFR 600.905-930, Subpart K), the NOAA Fisheries' Habitat Conservation Division (HCD) is being copied with this letter. The HCD biologist for this region is Rusty Swafford. If you have any questions about consultation regarding

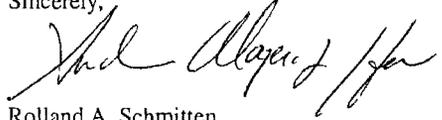


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essential fish habitat for this project, please contact Mr. Swafford at (409) 766-3699.

If you have any questions, please contact Dennis Klemm, fishery biologist, at the number above or by e-mail at Dennis.Klemm@noaa.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Rolland A. Schmitten". The signature is fluid and cursive, written over a white background.

Rolland A. Schmitten
Acting Regional Administrator

Enclosure

cc: F/PR3
F/SER42 - R. Swafford

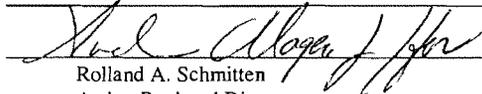
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Endangered Species Act - Section 7 Consultation

Agency: United States Army Corps of Engineers, Galveston District
Activity: Corpus Christi Ship Channel Improvement Project
Consultation Conducted By: National Marine Fisheries Service, Southeast Regional Office
(F/SER/2002/00731)

Date Issued:

Approved by:


Rolland A. Schmitt
Acting Regional Director

This document transmits the National Marine Fisheries Service (NOAA Fisheries), Southeast Regional Office, Protected Resources Division's biological opinion (Opinion) for the above referenced project. This Opinion is based on our review of the June 2002 Draft Feasibility Report and Draft Environmental Impact Statement (DEIS) for the Corpus Christi Ship Channel, Texas, Channel Improvement Project and its effects on marine mammals and sea turtles in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The DEIS along with a letter requesting consultation was received by NOAA Fisheries on July 1, 2002. A complete administrative record of this consultation is on file at the NOAA Fisheries SERO.

Consultation History

Informal consultation on the Corpus Christi Ship Channel, Channel Improvement Project was initiated in June 2002 by the Planning Division, Galveston District Corps of Engineers with the submittal of the BA that was prepared and incorporated as part of the Draft EIS that was transmitted June 28, 2002 and received July 1, 2002, pursuant to section 7 of the Act.

Additional information was received on September 6, 2002, from Paul Carangelo of the Port of Corpus Christi via e-mail. Mr. Carangelo sent a mock-up of a biological opinion including proposed action, conservation measures, and incidental take statement based upon the project parameters and results from past dredging projects to facilitate the completion of the Opinion.

BIOLOGICAL OPINION**I. Description of the Proposed Action**

The action area (defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action") for this action is Corpus Christi Bay, Texas, and nearshore approaches to Corpus Christi Bay from about 6 miles offshore. The Galveston District Corps of Engineers (COE) proposes deepening of the Corpus Christi Shipping Channel (CCSC) from Viola Basin in the Inner Harbor to the end of the jetties in the Gulf of Mexico to

-52 ft from -45 ft mean low tide (MLT), plus advanced maintenance and allowable overdepth; deepening the remainder of the channel into the Gulf of Mexico to 54 ft (depths will be increased roughly 10,000 ft into the Gulf of Mexico to the -56 ft isobath); widening of the Upper bay and Lower Bay reaches (from Port Aransas to Harbor Bridge) to 530 ft (existing widths are 500 ft between Port Aransas and La Quinta Junction and 400 ft between La Quinta Junction and the Harbor Bridge); construction of 200-ft wide barge shelves (-12 ft MLT) on both sides of the ship channel from La Quinta Junction to the Harbor Bridge, across the Upper bay portion of the CCSC; and extending La Quinta Channel 7,200 ft to a depth of -40 ft MLT and a width of 400 ft and including a turning basin.

It is estimated that approximately 40 million cubic yards of new work would require seven separate dredging contracts to complete. Dredged material management incorporates the use of existing placement areas, as well as newly designated placement areas including several beneficial use (BU) sites. BU sites will be constructed to create several hundred acres of shallow water habitat throughout the bay system; environmental enhancement features consist of construction of two breakwaters to protect and enhance existing habitat. The proposed work is to be conducted by pipeline dredges in the bay, and hopper dredges in the entrance channel. The dredged new material from the entrance channel described in the June 2002 Draft Feasibility Report and Draft EIS consists predominantly of medium to dense sand and soft clay.

The COE proposes to use hopper dredges to deepen the Corpus Christi Ship Channel Entrance Channel. The Entrance Channel includes the Inner Basin, the Jetty Channel Reach, and the Outer Bar Reach including the extended portion. The length of the Entrance Channel from the landward end of the Inner Basin and including the proposed extension of the Outer Bar Reach into the Gulf of Mexico is approximately 7 miles. The proposed work will also widen an approximately 1000-foot portion of the Jetty Channel Reach from 600 to 700 feet and deepen the area as described above. The Outer Bar Reach width will be extended at the same 700-foot width as existing and deepened as described above. The action area includes an offshore site for the placement of dredged materials. The Dredged Material Placement Area 1 (PA 1, also referred to as ODMPA 1) has been used continuously for such purpose since at least 1940. Use of PA 1 for maintenance material has been previously coordinated under the September 22, 1995, Regional Biological Opinion (RBO) on Channel Maintenance Dredging Using a Hopper Dredge (RBO). Two beneficial use sites are also proposed for one-time use: BU 1 (also referenced as Site MN) and BU 10 (also referenced as Navy Homeport Site); both are in near proximity to PA 1.

Maintenance dredging of the Corpus Christi Ship Channel is conducted every 1.5 years by contract or government-owned hopper dredge and requires approximately 2 months. One loggerhead was lethally taken during clean-up in the entrance channel in September 1995 and 3 additional turtles, all loggerheads, were lethally taken in June 1999.

The Corpus Christi Ship Channel Entrance Channel has been divided into two separate sections for planning purposes: the inshore section from the approximate beginning of the landward end of the Inner Basin east to approximately ½ mile seaward from the end of the submerged portion of the Aransas Pass south jetty, the Jetty Reach Channel (JRC); and the nearshore section from approximately ½ mile seaward from the submerged end of the Aransas Pass jetties east to the seaward end of the extension channel in the Gulf of Mexico, referred to the Outer Bar Reach (OBR). Maintenance dredging of the present Entrance Channel and use of PA 1 using hopper dredges is covered under the 1995 RBO, and therefore any takes are counted against the ITS for that RBO. The proposed extension of the OBR begins

approximately 2.6 miles offshore and ends about 4.6 miles offshore of the submerged end of the south jetty. NOAA Fisheries has determined that sea turtles may occur in the area of the OBR extension only as transients due to lack of structure to attract sea turtles or their prey species; however, hopper dredging in the JRC and OBR is likely to result in the taking of sea turtles, particularly loggerheads, and therefore, the OBR extension is included in this Opinion and incidental take statement. The COE will implement the following measures when hopper dredges are being used during new work dredging of the Corpus Christi Ship Channel Improvement Project JRC and OBR:

- One-hundred percent observer coverage by NOAA Fisheries-approved observers will be required. Additionally, while a hopper dredge is operating in the JRC and OBR, the COE and NOAA Fisheries will maintain close contact with the Sea Turtle Stranding and Salvage Network to determine whether beached sea turtles display evidence of impingement by the dredge.
- The COE expects to encounter soft clays and sands during new work dredging of the entrance channel and will use maintenance material dragheads. The maintenance draghead (sea turtle) deflector designed for use in soft sediments has been modified for use in hard virgin clay. It will be used for this project only if extensive areas of hard virgin clays are unexpectedly encountered unless the modified deflector results in substantially reduced production that will increase the amount of time the dredge will operate. The COE will inspect the appropriate draghead deflector prior to commencement of dredging to ensure that the selected deflector has been tailored appropriately for this project. Additionally, the COE will assess whether the dredge operator appears to be familiar with the operation of the applicable draghead deflector and will provide necessary training where appropriate. The COE will contact NOAA Fisheries to discuss any problems with the modified draghead deflector prior to authorizing removal during dredging of hard clay. If the modified draghead deflector proves unworkable in hard virgin clays encountered, the COE will discontinue dredging operations until an alternate solution has been agreed upon with NOAA Fisheries, such as having a contract trawler drag ahead of the hopper dredge to sweep the area clean of sea turtles.
- One-hundred percent overflow screening will be required and must be designed to maximize sampling of the dredged material. Additionally, modified inflow screening will be required. The draghead inflow screens should have 6- by 6-inch screening on the bottom and 4- by 4-inch screening on the top. If the dredge operator, in consultation with observers and any onboard COE or NOAA Fisheries personnel, determines that the draghead is clogging and reducing production substantially, the screens can be quickly modified to have 12- by 12-inch openings on the bottom and 8- by 8-inch openings on top. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether. In past consultations NOAA Fisheries has agreed that these flexible options are necessary, since the need to constantly clear the screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes that may have to be removed from the bottom to discharge the clay.
- Sea turtle takes are most likely to occur during dredging of the JRC and OBR. These areas will be dredged during winter months (mid-November through mid-April), when sea turtle abundance is lowest.

The COE will continue to coordinate with the COE's Waterways Experiment Station, the COE's South Atlantic Division, and dredge operators regarding additional measures to further reduce the likelihood of sea turtle takes. The diamond-shaped *pre-deflector*, or another promising design such as tickler chains or water jets, should be used wherever possible, as a means of alerting sea turtles that something is coming towards them before they encounter the deflecting draghead. Due to their experimental nature, use of pre-deflectors is not a requirement at this time.

II. Status of Listed Species and Critical Habitat

The following listed species under the jurisdiction of NOAA Fisheries are known to occur in waters of the Gulf of Mexico nearshore areas and bays in or near the action area.

Common Name	Scientific Name	Status
Sea turtles:		
Kemp's ridley	<i>Lepidochelys kempii</i>	E
Leatherback	<i>Dermochelys coriacea</i>	E
Hawksbill	<i>Eretmochelys imbricata</i>	E
Green	<i>Chelonia mydas</i>	E/T*
Loggerhead	<i>Caretta caretta</i>	T
Whales:		
Northern right	<i>Eubalaena glacialis</i>	E
Humpback	<i>Megaptera novaeangliae</i>	E
Sperm	<i>Physeter macrocephalus</i>	E
Fin whale	<i>Balaenoptera physalus</i>	E
Blue whale	<i>Balaenoptera musculus</i>	E
Sei whale	<i>Balaenoptera borealis</i>	E

* Green turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.

Of the listed species that may occur in the action area, only sea turtles are known to be taken by dredges. There are no documented takes of large whales by dredges. In addition, the proposed project will take place in Corpus Christi Bay and associated nearshore areas where large whales rarely occur. Based on this information, whales are not likely to be adversely affected by the proposed action and therefore, will not be considered further in this biological opinion. Summary information on the status and biology of the remaining species that may be affected by the proposed action is provided below.

There is no designated critical habitat for any listed species under the purview of NOAA Fisheries within the action area.

A. Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle was listed as a threatened species in 1978. This species inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans, and within the continental U.S. it nests from Louisiana to Virginia. The major nesting areas include coastal islands of Georgia, South Carolina, and North Carolina, and the Atlantic and Gulf coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida. Developmental habitat for small juveniles are the pelagic waters of the North Atlantic and the Mediterranean Sea.

There is no critical habitat designated for the loggerhead sea turtle.

Green Sea Turtle

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations which are endangered. The complete nesting range of the green turtle within the NOAA Fisheries Southeast Region includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina and at the U.S. Virgin Islands (U.S.V.I.) and Puerto Rico (NMFS and USFWS 1991a). Principal U.S. nesting areas for green turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington 1992). Regular green turtle nesting also occurs on St Croix, U.S.V.I., and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996, Díez pers. comm.).

Critical habitat for the green sea turtle has been designated for the waters surrounding Isla Culebra, Puerto Rico and its associated keys.

Kemp's Ridley Sea Turtle

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Zwinenberg 1977, Groombridge 1982). Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the Eastern Seaboard of the United States.

There is no designated critical habitat for the Kemp's ridley sea turtle.

Leatherback Sea Turtle

The leatherback was listed as endangered on June 2, 1970. Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, and Indian Oceans; the Caribbean Sea; and the Gulf of Mexico (Ernst and Barbour 1972). Adult leatherbacks forage in temperate and subpolar regions from 71°N to 47°S latitude in all oceans and undergo extensive migrations between 90°N and 20°S, to and from the tropical nesting beaches. In the Atlantic Ocean,

leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (see NMFS SEFSC 2001). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Suriname (see NMFS SEFSC 2001).

Critical habitat for the leatherback includes the waters adjacent to Sandy Point, St. Croix, U.S.V.I.

Hawksbill Sea Turtle

The hawksbill turtle was listed as endangered under the ESA (1973), and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN) based on global population declines of over 80% during the last three generations (105 years) (Meylan and Donnelly 1999). Only five regional nesting populations remain with more than 1,000 females nesting annually (Seychelles, Mexico, Indonesia, and two in Australia) (Meylan and Donnelly 1999). Most populations are declining, depleted, or remnants of larger aggregations. Although hawksbills are subject to the suite of threats that affect other marine turtles, the decline of the species is primarily attributed to centuries of exploitation for tortoiseshell, the beautifully patterned scales that cover the turtle's shell (Parsons 1972).

Critical habitat for the hawksbill includes the waters around Mona and Monito Islands, Puerto Rico.

B. Life history

Loggerhead Sea Turtle

Mating takes place in late March-early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern U.S. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/nesting individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more, but there is some variation in habitat use by individuals at all life stages. Turtles in this life history stage are called "pelagic immatures." Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to recruit to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico.

Benthic immature loggerheads, the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico. Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder et al. 1998) along the south and western coasts of Florida as compared with the rest of the coast, which could indicate that the larger animals are either more abundant in these areas or just more abundant within the area relative to the smaller turtles. Benthic immature loggerheads foraging in northeastern United States waters are known to migrate southward in the fall as water temperatures cool (Epperly et al. 1995, Keinath 1993, Morreale and Standora 1999, Shoop and Kenney 1992), and migrate northward in spring. Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; Frazer et al. 1994) and the benthic immature stage as lasting at least 10-25 years. However, NMFS SEFSC (2001) reviewed the literature and constructed growth curves from new

data, estimating ages of maturity ranging from 20-38 years and benthic immature stage lengths from 14-32 years.

Juveniles are omnivorous and forage on crabs, mollusks, jellyfish and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily coastal and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Green Sea Turtle

Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115. Females usually have 2-4 or more years between breeding seasons, while males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris.

Green turtle foraging areas in the southeast United States include any neritic waters having macroalgae or sea grasses near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997, NMFS and USFWS 1991a). Principal benthic foraging areas in the region include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984, Hildebrand 1982, Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957, Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon System, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven 1992, Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs. Age at sexual maturity is estimated to be between 20 to 50 years (Balazs 1982, Frazer and Ehrhart 1985).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but little data are available.

Kemp's Ridley Sea Turtle

Remigration of females to the nesting beach varies from annually to every 4 years, with a mean of 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Juvenile/subadult Kemp's ridleys have been found along the Eastern Seaboard of the United States and in the Gulf of Mexico. Atlantic juveniles/subadults travel northward with vernal warming to feed in the productive, coastal waters of Georgia through New England, returning southward with the onset of winter to escape the cold (Lutcavage and Musick 1985, Henwood and Ogren 1987, Ogren 1989). In the Gulf, juvenile/subadult ridleys occupy shallow, coastal regions. Ogren (1989) suggested that in the northern Gulf they move offshore to deeper, warmer water during winter. Studies suggest that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995). Little is known of the movements of the post-hatching, planktonic stage within the Gulf. Studies have shown the post-hatchling

pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). The TEWG (1998) estimates age at maturity to range from 7-15 years.

Stomach contents of Kemp's ridleys along the lower Texas coast consisted of a predominance of nearshore crabs and mollusks, as well as fish, shrimp and other foods considered to be shrimp fishery discards (Shaver 1991). Pelagic stage, neonatal Kemp's ridleys presumably feed on the available sargassum and associated infauna or other epipelagic species found in the Gulf of Mexico.

Leatherback Sea Turtle

Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic, with nesting occurring as early as late February or March. When they leave the nesting beaches, leatherbacks move offshore but eventually utilize both coastal and pelagic waters. Very little is known about the pelagic habits of the hatchlings and juveniles, and they have not been documented to be associated with the sargassum areas as are other species. Leatherbacks are deep divers, with recorded dives to depths in excess of 1,000 m (Eckert and Eckert 1989), but they may come into shallow waters if there is an abundance of jellyfish nearshore.

Although leatherbacks are a long-lived species (> 30 years), they are somewhat faster to mature than loggerheads, with an estimated age at sexual maturity reported of about 13-14 years for females, and an estimated minimum age at sexual maturity of 3-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NMFS SEFSC 2001). They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and, thus, can produce 700 eggs or more per nesting season (Schultz 1975).

Leatherback sea turtles feed primarily on jellyfish as well as cnidarians and tunicates. They are also the most pelagic of the turtles, but have been known to enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated.

Hawksbill Sea Turtle

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm straight carapace length (Meylan 1988, Meylan in prep.), followed by residency in developmental habitats (foraging areas where immatures reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over periods of time as great as several years (van Dam and Díez 1998).

Hawksbills may undertake developmental migrations (migrations as immatures) and reproductive migrations that involve travel over hundreds or thousands of kilometers (Meylan 1999b). Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest. Movements of reproductive males are less well known, but are presumed to involve migrations to the nesting beach or to courtship stations along the migratory corridor. Females nest an average of 3-5 times per season with some geographic variation in this parameter (see references on pp. 204-205 of Meylan and Donnelly 1999, Richardson et al. 1999). Clutch size is higher on average (up to 250 eggs) than that of green turtles

(Hirth 1980). Reproductive females may exhibit a high degree of fidelity to their nest sites. This, plus the tendency of hawksbills to nest at regular intervals within a season, make them vulnerable to capture on the nesting beach.

C. Population dynamics, status, and distribution

Loggerhead Sea Turtle

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans and are the most abundant species of sea turtle occurring in U.S. waters. Loggerhead sea turtles concentrate their nesting in the north and south temperate zones and subtropics, but generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (Magnuson et al. 1990).

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are 5 western Atlantic subpopulations, divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29° N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990) (approximately 1,000 nests in 1998) (TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year) (NMFS SEFSC 2001). Natal homing of females to the nesting beach provides the barrier between these subpopulations, preventing recolonization with turtles from other nesting beaches.

Based on the data available, it is difficult to estimate the size of the loggerhead sea turtle population in the United States or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the United States from 1989-1998 represent the best data set available to index the population size of loggerhead sea turtles. However, an important caveat for population trends analysis based on nesting beach data is that this may reflect trends in adult nesting females but not reflect overall population growth rates. Given this caveat, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually, with a mean of 73,751. On average, 90.7% of these nests were from the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to which subpopulation the turtles making these nests belong.

The number of nests in the northern subpopulation from 1989 to 1998 was 4,370 to 7,887, with a 10-year mean of 6,247 nests. With each female producing an average of 4.1 nests in a nesting season, the average number of nesting females per year in the northern subpopulation was 1,524. The total nesting and non-nesting adult female population is estimated as 3,810 adult females in the northern subpopulation (TEWG 1998, 2000). The northern population, based on number of nests, has been classified as stable or declining (TEWG 2000). Another consideration adding to the vulnerability of the northern subpopulation is that NOAA Fisheries scientists estimate that the northern subpopulation produces 65%

males, while the south Florida subpopulation is estimated to produce 80% females (NMFS SEFSC 2001).

The southeastern U.S. nesting aggregation is of great importance on a global scale and is second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979, Ehrhart 1989, NMFS and USFWS 1991b). The global importance of the southeast U.S. nesting aggregation is especially important because the status of the Oman colony has not been evaluated recently. It is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections (Meylan et al. 1995).

Ongoing threats to the western Atlantic populations include incidental takes from dredging, commercial trawling, longline fisheries, and gill net fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease.

Green Sea Turtle

The vast majority of green turtle nesting within the southeast United States occurs in Florida. In Florida from 1989-1999, green turtle abundance from nest counts ranges from 109-1,389 nesting females per year (Meylan et al. 1995 and Florida Marine Research Institute Statewide Nesting 2001 Database, unpublished data; estimates assume 4 nests per female per year, Johnson and Ehrhart 1994). High biennial variation and a predominant 2-year re-migration interval (Witherington and Ehrhart 1989, Johnson and Ehrhart 1994) warrant combining even and odd years into 2-year cohorts. This gives an estimate of total nesting females that ranges from 705-1,509 during the period 1990-1999. It is important to note that because methodological limitations make the clutch frequency number (4 nests/female/year) an underestimate (by as great as 50%), a more conservative estimate is 470-1,509 nesting females in Florida between 1990 and 1999. In Florida during the period 1989-1999, numbers of green turtle nests by year show no trend. However, odd-even year cohorts of nests do show a significant increase during the period 1990-1999 (Florida Marine Research Institute Statewide Nesting 2001 Database, unpublished data).

It is unclear how greatly green turtle nesting in the whole of Florida has been reduced from historical levels (Dodd 1981), although one account indicates that nesting in Florida's Dry Tortugas may now be only a small fraction of what it once was (Audubon 1926). Total nest counts and trends at index beach sites during the past decade suggest that green turtles that nest within the southeast United States are recovering and have only recently reached a level of approximately 1,000 nesting females. There are no reliable estimates of the number of green turtles inhabiting foraging areas within the southeast United States, and it is likely that green turtles foraging in the region come from multiple genetic stocks. These trends are also uncertain because of a lack of data. However, there is one sampling area in the region with a large time series of constant turtle-capture effort that may represent trends for a limited area within the region. This sampling area is at an intake canal for a power plant on the Atlantic coast of Florida where 2,578 green turtles have been captured during the period 1977-1999 (FPL 2000). At the power plant, the annual number of immature green turtle captures (minimum straight-line carapace length < 85 cm) has increased significantly during the 23-year period.

Status of immature green turtles foraging in the southeast United States might also be assessed from trends at nesting beaches where many of the turtles originated, principally, Florida, Yucatán, and

Tortuguero. Trends at Florida beaches are presented above. Trends in nesting at Yucatán beaches cannot be assessed because of irregularity in beach survey methods over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) show a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999).

The principal cause of past declines and extirpations of green turtle assemblages has been the over-exploitation of green turtles for food and other products. Although intentional take of green turtles and their eggs is not extensive within the southeast United States, green turtles that nest and forage in the region may spend large portions of their life history outside the region and outside United States jurisdiction, where exploitation is still a threat. Adult green turtles and immatures are exploited heavily on foraging grounds off Nicaragua and to a lesser extent off Colombia, Mexico, Panama, Venezuela, and the Tortuguero nesting beach (Carr et al. 1978, Nietschmann 1982, Bass et al. 1998, Lagueur 1998).

There are significant and ongoing threats to green turtles from human-related causes. Threats to nesting beaches in the region include beach armoring, erosion control, artificial lighting, and disturbance, which can be expected to increase with time. Pollution is known to have both direct (ingestion of foreign materials such as tar balls and plastics) and indirect (degradation of foraging grounds) impacts on green sea turtles. Foraging habitat loss also occurs as a result of direct destruction by dredging, siltation, boat damage, and other human activities. Green turtles are often captured and occasionally killed by interactions with fishing gear. Collisions with power boats and encounters with suction dredges have killed green turtles along the U.S. coast and may be common elsewhere where boating and dredging activities are frequent (Florida Marine Research Institute, Sea Turtle Stranding and Salvage Network Database). Threats from increasing incidences of disease, which may or may not have some relation to human influences, are also a concern. The occurrence of green turtle fibropapillomatosis disease was originally reported in the 1930s, when it was thought to be rare (Smith and Coates 1938). Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994, Jacobson 1990; Jacobson et al. 1991).

Kemp's Ridley Sea Turtle

L. kempii has a very restricted distribution relative to the other sea turtle species. Data suggests that adult Kemp's ridley turtles are restricted somewhat to the Gulf of Mexico in shallow near shore waters, and benthic immature turtles of 20-60 cm straight line carapace length are found in nearshore coastal waters including estuaries of the Gulf of Mexico and the Atlantic, although adult-sized individuals sometimes are found on the Eastern Seaboard of the United States. The post-pelagic stages are commonly found dwelling over crab-rich sandy or muddy bottoms. Juveniles frequent bays, coastal lagoons, and river mouths.

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the early 1970s, the world population estimate of mature female Kemp's ridleys had been reduced to 2,500-5,000 individuals. The population declined further through the mid-1980s. Recent observations of increased nesting suggest that the decline in the ridley population has stopped and the population is now increasing.

The TEWG (1998) identified three population trends in benthic immature ridleys. Benthic immatures are not yet reproductively mature but have recruited to feed in the nearshore benthic environment, where they are exposed to nearshore mortality sources that often result in strandings. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the U.S. Fish and Wildlife Service and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990, due in part to the introduction of turtle excluder devices (TEDs) in the U.S. and Mexican shrimping fleets. Adult ridley numbers have now grown, as shown in nesting increases at the main nesting sites in Mexico. Nesting at Tamaulipas and Veracruz increased from a low of 702 nests in 1985, to 1,930 nests in 1995, to 6,277 nests in 2000 (USFWS 2000). The population model used by the TEWG (1998) projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates used in their model are correct.

The largest contributor to the decline of the ridley in the past was commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the Gulf of Mexico trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches have allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

Leatherback Sea Turtle

Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, Caribbean, and the Gulf of Mexico (Ernst and Barbour 1972). The leatherback is the largest living turtle and it ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NMFS and USFWS 1995). Genetic analyses of leatherbacks to date indicate that within the Atlantic basin significant genetic differences occur among St. Croix (U.S. Virgin Islands), and mainland Caribbean populations (Florida, Costa Rica, Suriname/French Guiana) and between Trinidad and the mainland Caribbean populations (Dutton et al. 1999) leading to the conclusion that there are at least three separate subpopulations of leatherbacks in the Atlantic.

Nest counts are the only reliable population information available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NMFS and USFWS 1995). A population estimate of 34,500 females (26,200-42,900) was made by Spotila et al. (1996), who stated that the species as a whole was declining and local populations were in danger of extinction. Historically, it was due primarily to intense exploitation of the eggs (Ross 1979) but adult mortality has increased significantly from interactions with fishery gear (Spotila et al. 1996). The Pacific population is in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila et al. 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila et al. 1996), but numbers in the western Atlantic at that time were reported to be on the order of 18,800 nesting females. According to Spotila (pers. comm.), the western Atlantic population currently numbers about 15,000 nesting females, whereas current estimates for the Caribbean (4,000) and the eastern Atlantic, off Africa, (numbering ca. 4,700) have remained consistent with

numbers reported by Spotila et al. in 1996.

The nesting aggregation in French Guiana has been declining at about 15% per year since 1987. From 1979-1986, the number of nests was increasing at about 15% annually. The number of nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5%, respectively, per year since the early 1980s but the magnitude of nesting is much smaller than that along the French Guiana coast (see NMFS SEFSC 2001). In summary, the conflicting information regarding the status of Atlantic leatherbacks makes it difficult to conclude whether or not the population is currently in decline. Numbers at some nesting sites are up, while at others they are down.

Zug and Parham (1996) pointed out that the combination of the loss of long-lived adults in fishery-related mortality (especially entanglement in gear and drowning in trawls), and the lack of recruitment stemming from elimination of annual influxes of hatchlings because of intense egg harvesting, has caused the sharp decline in leatherback populations. Other important ongoing threats to the population include pollution, loss of nesting habitat, and boat strikes.

Hawksbill Sea Turtle

The hawksbill is a medium-sized sea turtle with adults in the Caribbean ranging in size from approximately 62.5 to 94.0 cm straight carapace length. The species occurs in all ocean basins although it is relatively rare in the Eastern Atlantic and Eastern Pacific, and absent from the Mediterranean Sea. Hawksbills are the most tropical of the marine turtles, ranging from approximately 30°N to 30°S. They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays and coastal lagoons. The diet is highly specialized and consists primarily of sponges (Meylan 1988) although other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (van Dam and Díez 1997, Mayor et al. 1998, León and Díez 2000).

In the Western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Península of Mexico, where several thousand nests are recorded annually in the states of Campeche, Yucatán, and Quintana Roo (Garduño-Andrade et al. 1999). Important but significantly smaller nesting aggregations are documented elsewhere in the region in Puerto Rico, the U.S. Virgin Islands, Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999a). Estimates of the annual number of nests for each of these areas are of the order of hundreds to a few thousand. Nesting within the southeastern U.S. and U.S. Caribbean is restricted to Puerto Rico (>650 nests/yr), the U.S. Virgin Islands (~400 nests/yr), and, rarely, Florida (0-4 nests/yr) (Eckert 1995, Meylan 1999a, Florida Statewide Nesting Beach Survey database). At the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out, populations appear to be increasing (Mona Island, Puerto Rico) or stable (Buck Island Reef National Monument, St. Croix, USVI) (Meylan 1999a).

E. Analysis of the Species Likely to be Affected

NOAA Fisheries believes that all five species of sea turtles may be potentially affected by the proposed action since all are susceptible to hopper dredge entrainment, and therefore, will further consider them in the remaining sections of this Opinion.

III. Environmental Baseline

This section contains an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, their habitat (including designated critical habitat), and ecosystem, within the action area. The environmental baseline is a snapshot of a species' health at a specified point in time and includes state, tribal, local and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated Federal actions affecting the same species or critical habitat that have completed formal or informal consultation are also part of the environmental baseline, as are Federal and other actions within the action area that may benefit listed species or critical habitat.

The environmental baseline for this Opinion includes the effects of several activities that affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation generally fall into the following three categories: vessel operations, fisheries, and recovery activities associated with reducing those impacts. Other environmental impacts include effects of discharges, dredging, military activities, oil and gas development activities, industrial cooling water intake, aquaculture, recreational fishing, and marine debris.

A. Status of the species within the action area

The five species of sea turtles that occur in the action area are all highly migratory. NOAA Fisheries believes that no individual members of any of the species are likely to be year-round residents of the action area. Individual animals will make migrations into nearshore waters as well as other areas of the North Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Therefore, the range-wide status of the five species of sea turtles, given in Section II above, most accurately reflects the species' status within the action area.

B. Factors affecting species environment within the action area.

As explained above, sea turtles found in the action area are not year-round residents of the area, and may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea. Therefore, individuals found in the action area (Corpus Christi Bay and associated nearshore waters) can potentially be affected by activities anywhere else within this wide range.

Federal Actions

In recent years, NOAA Fisheries has undertaken several ESA section 7 consultations to address the effects of federally-permitted fisheries and other Federal actions on threatened and endangered species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, recovery actions NOAA Fisheries has undertaken under the ESA are addressing the problem of take of sea turtles in the fishing and shipping industries. The following summary of anticipated sources of incidental take of turtles includes only those Federal actions which have undergone formal section 7 consultation.

Potential adverse effects from Federal vessel operations in the action area and throughout the range of sea turtles include operations of the Navy (USN) and Coast Guard (USCG), the Environmental

Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the COE. NOAA Fisheries has conducted formal consultations with the USCG, the USN, and NOAA on their vessel operations. Through the section 7 process, where applicable, NOAA Fisheries has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they represent potential for some level of interaction.

In addition to vessel operations, other military activities including training exercises and ordnance detonation also affect sea turtles. Consultations on individual activities have been completed, but no formal consultation on overall USCG or USN activities in any region has been completed at this time.

The construction and maintenance of Federal navigation channels has also been identified as a source of turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles, presumably as the drag arm of the moving dredge overtakes the slower moving turtle. A RBO with the COE's South Atlantic Division has been completed for the southeast Atlantic waters. Consultation on a new RBO for the COE's Gulf of Mexico hopper dredging operations is currently underway.

The COE and Minerals Management Service (MMS) (the latter is non-military) oil and gas exploration, well development, production, and abandonment/rig removal activities also adversely affect sea turtles. Both of these agencies have consulted with NOAA Fisheries on these types of activities. A biological opinion on the impacts of seismic arrays for oil and gas exploration in the Gulf of Mexico is currently being developed.

Adverse effects on threatened and endangered species from several types of fishing gear occur in the action area. Efforts to reduce the adverse effects of commercial fisheries are addressed through the ESA section 7 process. Gillnet, longline, trawl gear, and pot fisheries have all been documented as interacting with sea turtles. For all fisheries for which there is a Federal fishery management plan (FMP) or for which any Federal action is taken to manage that fishery, impacts have been evaluated under section 7. Several formal consultations have been conducted on the following fisheries that NOAA Fisheries has determined are likely to adversely affect threatened and endangered species: American lobster, monkfish, dogfish, southeastern shrimp trawl fishery, northeast multispecies, Atlantic pelagic swordfish/tuna/shark, and summer flounder/scup/black sea bass fisheries. Formal consultation is currently underway for the calico scallop trawl fishery.

On June 14, 2001, NOAA Fisheries issued a jeopardy opinion for the Highly Migratory Species (HMS) fisheries off the eastern United States. The HMS Opinion found that the continued prosecution of the pelagic longline fishery in the manner described in the HMS FMP was likely to jeopardize the continued existence of loggerhead and leatherback sea turtles. This determination was made by analyzing the effects of the fishery on sea turtles in conjunction with the environmental baseline and cumulative effects. The environmental baseline section of the HMS opinion is incorporated herein by reference and can be found at the following NOAA Fisheries website:

http://www.nmfs.noaa.gov/prot_res/readingrm/ESAsec7/HMS060801final.pdf

The environmental baseline for the June 14, 2001, HMS Opinion also considered the impacts from the North Carolina offshore spring monkfish gillnet fishery and the inshore fall southern flounder gillnet

fishery, both of which were responsible for large numbers of sea turtle mortalities in 1999 and 2000, especially loggerhead sea turtles. However, during the 2001 season NOAA Fisheries implemented an observer program that observed 100% of the effort in the monkfish fishery, and then in 2002 a rule was enacted creating a seasonal monkfish gillnet closure along the Atlantic coast based upon sea surface temperature data and turtle migration patterns. In 2001, NOAA Fisheries also issued an ESA section 10 permit with mitigative measures for the southern flounder fishery. Subsequently the sea turtle mortalities in these fisheries were drastically reduced. The reduction of turtle mortalities in these fisheries reduces the negative effects these fisheries have on the environmental baseline.

NOAA Fisheries has implemented a reasonable and prudent alternative (RPA) in the HMS fishery which would allow the continuation of the pelagic longline fishery without jeopardizing the continued existence of loggerhead and leatherback sea turtles. The provisions of this RPA include the closure of the Grand Banks region off the northeast United States and gear restrictions that are expected to reduce the by-catch of loggerheads by as much as 76% and leatherbacks by as much as 65%. Further, NOAA Fisheries is implementing a major research project to develop measures aimed at further reducing longline by-catch. The implementation of this RPA reduces the negative effects that the HMS fishery has on the environmental baseline. The conclusions of the June 14, 2001, HMS Opinion and the subsequent implementation of the RPA are hereby incorporated into the environmental baseline section of this Opinion.

Another action with Federal oversight which has impacts on sea turtles is the operation of electrical generating plants. Sea turtles entering coastal or inshore areas have been affected by entrainment in the cooling-water systems of electrical generating plants. Biological opinions have already been written for a number of electrical generating plants, and others are currently undergoing section 7 consultation.

State or Private Actions

Commercial traffic and recreational pursuits can have an adverse effect on sea turtles through propeller and boat strike damage. Private vessels participate in high speed marine events concentrated in the southeastern United States and are a particular threat to sea turtles, and occasionally to marine mammals as well. The magnitude of these marine events is not currently known. NOAA Fisheries and the USCG are in early consultation on these events, but a thorough analysis has not been completed.

Various fishing methods used in state fisheries, including trawling, pot fisheries, fly nets, and gillnets are known to cause interactions with sea turtles. Georgia and South Carolina prohibit gillnets for all but the shad fishery. Florida has banned all but very small nets in state waters, as has Texas. Louisiana, Mississippi, and Alabama have also placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in southeast waters, with the exception of North Carolina. Most pot fisheries in the Southeast are prosecuted in areas frequented by sea turtles.

Other Potential Sources of Impacts in the Environmental Baseline

A number of activities that may indirectly affect listed species include discharges from wastewater systems, dredging, ocean dumping and disposal, and aquaculture. The impacts from these activities are difficult to measure. Where possible, however, conservation actions are being implemented to monitor or study impacts from these elusive sources.

NOAA Fisheries and the USN have been working cooperatively to establish a policy for monitoring and managing acoustic impacts from anthropogenic sound sources in the marine environment. Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns.

Conservation and Recovery Actions Shaping the Environmental Baseline

NOAA Fisheries implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial fisheries. In particular, NOAA Fisheries has required the use of TEDs in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Charles, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. Recent analyses by Epperly and Teas (1999) indicate that the minimum requirements for the escape opening dimensions are too small, and that as many as 47% of the loggerheads stranding annually along the Atlantic seaboard and Gulf of Mexico were too large to fit through existing openings. On October 2, 2001, NOAA Fisheries published a proposed rule to require larger escape openings in TEDs and is planning to publish a final rule in 2002.

In 1993 (with a final rule implemented 1995), NOAA Fisheries established a Leatherback Conservation Zone to restrict shrimp trawl activities from the coast of Cape Canaveral, Florida, to the North Carolina/Virginia border. This provides for short-term closures when high concentrations of normally pelagic-distributed leatherbacks are recorded in more coastal waters where the shrimp fleet operates. This measure is necessary because, due to their size, adult leatherbacks are larger than the escape openings of most NOAA Fisheries-approved TEDs.

NOAA Fisheries is also working to develop a TED which can be effectively used in a type of trawl known as a fly net, which is sometimes used in the mid-Atlantic and northeast fisheries to target sciaenids and bluefish. Limited observer data indicate that takes can be quite high in this fishery. A prototype design has been developed, but testing under commercial conditions is still necessary.

In addition, NOAA Fisheries has been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. As well as making this information widely available to all fishermen, NOAA Fisheries recently conducted a number of workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue these outreach efforts and hopes to reach all fishermen participating in the pelagic longline fishery over the next one to two years. There is also an extensive network of Sea Turtle Stranding and Salvage Network participants along the Atlantic and Gulf of Mexico which not only collects data on dead sea turtles, but also rescues and rehabilitates any live stranded turtles.

IV. Effects of the Action

A. Factors considered and analyses for effects of the action

- **Water quality** impacts as a direct and indirect result of this project were considered. Impacts from sediment disturbance as a result of the proposed action are expected to be temporary, with suspended particles settling out within a short time frame. These sediment disturbance impacts will be minimal in

nature and will not have a significant effect on sea turtles. Additionally, past sampling of water column and elutriate chemistry in various locations within the project area demonstrated that dredging is not likely to significantly impact water quality. Potential changes in salinity and tidal amplitude are expected to be minimal. NOAA Fisheries does not expect significant impacts to sea turtles as a result of water quality impacts related to this project.

- **Habitat loss** can potentially occur as a direct result of dredging and through disposal of dredged materials. There is no designated critical habitat under NOAA Fisheries jurisdiction in the Gulf of Mexico; therefore, critical habitat is not likely to be destroyed or adversely modified by the proposed action. Channel widening and deepening will modify existing sea bottom and modify available foraging habitat for sea turtles. Mitigation plans call for the creation of seagrass habitat and shallow water habitat to offset the loss of shallow water bay bottom. Although potential long term positive impact may occur due to creation of shallow water habitat from dredged material and development of marsh submerged aquatic vegetation, negative impacts will occur as a result of physical changes in the bay due to deposition of dredged material and change in hydrodynamics from creation of channels. Through recruitment and local migrations, finfish, crustaceans, and benthic invertebrates that sea turtles feed on are expected to eventually repopulate the affected area. Habitat loss impacts as a result of this project are expected to be minimal to sea turtles and will not have a significant effect on them.

- **Dredge entrainment** is a documented source of sea turtle mortality. NOAA Fisheries believes that hopper dredging conducted within state waters of the Gulf of Mexico—especially between April and November, or when water temperatures are above 12°C—is a high risk for taking sea turtles, especially Kemp's ridleys. Injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal. Consequently, NOAA Fisheries believes that seasonal dredging windows and observer monitoring requirements for hopper dredges are necessary to minimize lethal takes of listed sea turtle species that occur in inshore and nearshore Gulf waters. These dredging windows have been in effect since 1995 for the COE's Galveston and New Orleans districts, as well as in the COE's South Atlantic Division districts, and have proven effective in keeping sea turtle take levels below the limits established in their respective biological opinion's incidental take statements. Based upon information from past dredging work, other biological opinions, the specifics of this project, and the assumption that all terms and conditions specified in the ITS will be adhered to, NOAA Fisheries expects injury or mortality of **three (3) Kemp's ridleys, three (3) green turtles, one (1) hawksbill, and five (5) loggerhead turtles** annually as a result of hopper dredging associated with the proposed project.

B. Species' response to the proposed action

Based on the year-round presence of sea turtles in the action area, it can be expected that the proposed action involving hopper dredging may result in the entrainment of sea turtles. Such entrainment can be expected to result in mortality of the individuals captured by the draghead.

Recent satellite telemetry work funded by COE and conducted by NOAA Fisheries' Galveston Laboratory, demonstrates the nearshore occurrence of Kemp's ridleys near northern Gulf channels. Ridleys remained within 10 nautical miles of shore for greater than 95% of the observed time, with 90% of the observed locations within 5 nautical miles (Renaud, NOAA Fisheries Galveston Laboratory, pers. comm.). Movements out of northern Gulf waters in response to cooling temperatures occurred during December, and ridleys returned with warming waters in March.

Seasonal abundance of sea turtles utilizing nearshore waters of the northwest Gulf of Mexico varies with species and location. Green turtles within subtropical habitats of the Laguna Madre are the region's only year-round, nearshore occupant. Other species, especially the Kemp's ridley, are transient users of the coastal zone who venture toward tidal passes and into bays during May-August when food sources and other environmental factors are favorable. The May-August period has yielded over 80% of the sea turtle captures (N=516) recorded by Texas A&M researchers (Landry et al., 1997).

NOAA Fisheries believes that hopper dredging conducted in state waters, especially between April and November, or when water temperatures are above 12 degrees Celsius, is a high risk for taking sea turtles, especially Kemp's ridleys. Injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal. Seasonal and observer monitoring requirements for hopper dredges are necessary to minimize effects of these removals on Kemp's ridleys and other listed sea turtle species that occur in inshore and nearshore northern Gulf waters.

NOAA Fisheries has requested the COE, in previous and present hopper dredging consultations by Galveston and New Orleans Districts, to conduct studies on seasonal abundance of sea turtles in Gulf channels, and to continue research to develop improved ('turtle-friendly') dredge draghead designs. NOAA Fisheries has previously indicated to the COE, and again in this consultation (Conservation Recommendation No. 1), that such seasonal abundance studies or new designs of a more effective draghead (to exclude turtles), if substantiated by adequate scientific data, could form the basis for relaxing the seasonal restrictions and observer requirements listed in the Incidental Take Statement of this biological opinion. Any future requests by the COE to lessen the dredging restriction on this project, based on submissions of new sea turtle distribution, temperature and draghead design data, will be carefully considered by NOAA Fisheries at that time to ensure that, if restrictions are relaxed, listed sea turtles will not be jeopardized.

V. Cumulative Effects

Cumulative effects are the effects of future state, local, or private activities that are reasonably certain to occur within the action area or within the range of sea turtles. Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Within the action area, major future changes are not anticipated in the ongoing human activities described in the environmental baseline. The present, major human uses of the action area are expected to continue at the present levels of intensity in the near future. Listed species of turtles, however, migrate throughout the Atlantic Ocean and Gulf of Mexico and may be affected during their life cycles by non-Federal activities outside the action area.

Throughout the coastal Gulf of Mexico the loss of thousand of acres of wetlands is occurring due to natural subsidence and erosion, as well as reduced sediment input from the Mississippi River. Impacts caused by residential, commercial, and agricultural developments appear to be the primary causes of wetland loss in Texas.

Oil spills from tankers transporting foreign oil, as well as the illegal discharge of oil and tar from vessels discharging bilge water will continue to affect water quality in the Gulf of Mexico, including Texas inshore and nearshore waters. Cumulatively, these sources and natural oil seepage contribute most of the oil discharged into the Gulf of Mexico. Floating tar sampled during the 1970s, when bilge discharge was still

legal, concluded that up to 60% of the pelagic tars sampled did not originate from northern Gulf of Mexico coast.

Marine debris will likely persist in the action area in spite of MARPOL prohibitions. In Texas and Florida, approximately half of the stranded turtles examined have ingested marine debris (Plotkin and Amos 1990; Bolten and Bjorndal 1991). Although fewer individual are affected, entanglement in marine debris may contribute more frequently to the death of sea turtles.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities, and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States, due to the large number of waste discharge point sources. The species of turtles analyzed in this biological opinion may be exposed to and accumulate these contaminants during their life cycles.

Beachfront development, lighting, and beach erosion control all are ongoing activities along the Atlantic and Gulf coasts. These activities potentially reduce or degrade sea turtle nesting habitats or interfere with hatchling movement to sea. Nocturnal human activities along nesting beaches may also discourage sea turtles from nesting sites. The extent to which these activities reduce sea turtle nesting and hatchling production is unknown. However, as conservation awareness spreads, more and more coastal cities and counties are adopting more stringent measures to protect hatchling sea turtles from the disorienting effects of beach lighting.

State-regulated commercial and recreational fishing activities in Atlantic Ocean and Gulf of Mexico waters currently result in the incidental take of threatened and endangered species. It is expected that states will continue to license/permit large vessel and thrill-craft operations which do not fall under the purview of a Federal agency, and issue regulations that will affect fishery activities. Any increase in recreational vessel activity in inshore and offshore waters of the Gulf of Mexico and Atlantic Ocean will likely increase the number of turtles taken by injury or mortality in vessel collisions. Recreational hook-and-line fisheries have been known to lethally take sea turtles. Future cooperation between NOAA Fisheries and the states on these issues should help decrease take of sea turtles caused by recreational activities. NOAA Fisheries will continue to work with coastal states to develop and refine ESA section 6 agreements and section 10 permits to enhance programs to quantify and mitigate these takes.

VI. Conclusion

After reviewing the current status of endangered green, leatherback, hawksbill, and Kemp's ridley sea turtles and threatened loggerhead sea turtles in the proposed action area, the environmental baseline, the effects of the proposed action, and the cumulative effects, it is NOAA Fisheries' biological opinion that the implementation of the proposed action, as described in the Proposed Action section of this Opinion, is not likely to jeopardize the continued existence of endangered green, leatherback, hawksbill, or Kemp's ridley sea turtles, or threatened loggerhead sea turtles. No critical habitat has been designated for these species within the action area; therefore, none will be affected.

Incidental Take Statement

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary and must be undertaken by the COE so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The COE has a continuing duty to regulate the activity covered by this incidental take statement. If the COE fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the COE must report the progress of the action and its impact on the species to NOAA Fisheries as specified in the incidental take statement. [50 CFR 402.14 (i) (3)]

Only incidental taking resulting from the agency action, including incidental takings caused by activities approved by the agency, that are identified in this statement and that comply with the specified reasonable and prudent alternatives, and terms and conditions, are exempt from the takings prohibition of section 9 (a), pursuant to section 7 of the ESA.

Amount or Extent of Anticipated Take

NOAA Fisheries foresees that hopper dredging activities in Corpus Christi Ship Channel Improvement Project navigation channels may result in the injury or mortality of loggerhead, Kemp's ridley, green and hawksbill turtles. While it is difficult to ascertain future take of sea turtles because of the inherent variability caused by seasonal, annual, and localized variations in sea turtle densities, and other factors, NOAA Fisheries bases the estimated anticipated take levels during new dredging (i.e. channel widening, deepening, and lengthening) on the following:

1. Previous sea turtle takes during Atlantic and Gulf of Mexico maintenance dredging, new work hopper dredging, and sand mining operations by the COE's New Orleans, Galveston, Jacksonville, Charleston, and Wilmington Districts, including dredging of southeastern U.S. channels, and Brazos Santiago Pass, Mansfield Channel, Aransas Pass, Freeport Channel, and Bolivar Roads Pass, Texas (see Appendix for tables summarizing previous hopper dredging takes in the Galveston District since the 1995 RBO);
2. The level of take anticipated in previous hopper dredging Opinions; and
3. COE adherence to recommended dredging windows and other terms and condition.

Therefore, pursuant to section 7(b)(4) of the ESA, NOAA Fisheries anticipates an annual incidental take as described below:

For the Corpus Christi Ship Channel Improvement Project navigation channel reaches referred to in this Opinion and statement as the entrance channel nearshore Outer Bar Reach (OBR) including the extension of the Outer Bar reach, and the inshore Jetty Reach channel (JRC), the anticipated annual incidental take, by injury or mortality, of **three (3) Kemp's ridleys, three (3) green turtles,**

one (1) hawksbill, and five (5) loggerhead turtles, is set pursuant to section 7 (b) (4) and the ESA. This take level represents a total anticipated take per fiscal or calendar year for all channel deepening, lengthening, and widening by hopper dredge of the Corpus Christi Ship Channel Improvement Project. If the actual incidental take exceeds this level, reinitiation of formal consultation must immediately be requested. The above annual totals are for new work only. Any takes during maintenance dredging will be counted against the allowable take for the 1995 Gulf of Mexico maintenance dredging RBO (or the new RBO when finished).

Effect of the Take

NOAA Fisheries believes that the aforementioned level of anticipated take is not likely to appreciably reduce either the survival or recovery of hawksbill, Kemp's ridley, green, or loggerhead sea turtles in the wild by reducing their reproduction, numbers, or distribution, even if all incidental takes are from the same species. In particular, NOAA Fisheries does not expect activities associated with the proposed action, when added to ongoing activities affecting these species in the action area and cumulative effects, to affect sea turtles in a way that measurably or significantly reduces the number of animals born in a particular year (i.e., a specific age-class), the reproductive success of adult sea turtles, or the number of young sea turtles that annually recruit into the adult breeding population.

Reasonable and Prudent Measures

Regulations (50 CFR 402.02) implementing section 7 of the ESA define reasonable and prudent measures as actions the Director believes necessary or appropriate to minimize the impacts, i.e., amount or extent, of incidental take. The reasonable and prudent measures that NOAA Fisheries believes are necessary to minimize the impacts of hopper dredging in the Gulf of Mexico have been discussed with the COE, and have largely been incorporated in COE regulatory projects and COE civil works projects throughout the Gulf of Mexico (Mobile District projects excepted) and South Atlantic for almost a decade. These measures include use of temporal dredging windows, intake and overflow screening, use of sea turtle deflector dragheads, observer and reporting requirements, and sea turtle relocation/abundance trawling. The following terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until re-initiation and conclusion of any subsequent section 7 consultation.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the COE must comply, and require any of their contractors to comply, with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. These terms and conditions are nondiscretionary.

1. Pipeline or hydraulic dredges must be used whenever possible between April 1 and November 30 in all Corpus Christi Ship Channel Improvement Project channels, since lethal takes of loggerheads have been documented using hopper dredges during summer months. The annual summary report, discussed below, must give a complete explanation of why alternative dredges were not used for dredging of channels during the April through November period.
2. Hopper dredging in the entrance channel JRC (the inshore section from the landward end of the Inner Basin to ½ mile seaward of the submerged end of the Aransas Pass jetties) and the OBR (the

nearshore section from ½ mile from the submerged end of the Aransas Pass jetties to the seaward end of the extension channel) shall be completed, whenever possible, between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal and inshore waters.

3. One-hundred percent observer coverage of hopper dredging operations by NOAA Fisheries-approved observers is required. The COE shall arrange for NOAA Fisheries-approved observers aboard hopper dredges to monitor the hopper spoil, screening, and dragheads for sea turtles and their remains, as appropriate. Observers shall be aboard hopper dredges whenever surface water temperatures are 12 degrees Celsius or greater, and between April 1 and November 30. Observer reports must be faxed to NOAA Fisheries' Southeast Regional Office (727-570-5517) within 24 hours of any sea turtle take observed. If no take is observed during December, observer coverage can be terminated until water temperature reaches 12 degrees Celsius or until April 1.
4. The COE shall maintain close communication with the Sea Turtle Stranding and Salvage Network (STSSN) state representative (contact information available at: <http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp>) and NOAA Fisheries Galveston Laboratory in order to be advised of any sea turtle strandings in the project area that show possible signs of draghead impingement. This monitoring will give the COE and dredge operators an additional tool to know if they are taking sea turtles, enable them to better evaluate the effectiveness of the onboard observers and operations of the draghead deflector and pre-deflector, and provide additional information on sea turtle presence. This stranding data will be used to augment monitoring and for information purposes only. It will not count against the incidental take. The COE will provide NOAA Fisheries' Southeast Regional Office with quarterly reports summarizing beach observer reports of stranded sea turtles that may indicate draghead impingement.
5. During periods in which hopper dredges are operating and NOAA Fisheries-approved observers are not required (i.e., when surface water temperatures are less than 12 degrees Celsius, or between December 1 and March 31), the COE must:
 - a. Advise inspectors, operators and vessel captains about the prohibitions on taking, harming, or harassing sea turtles, and the civil penalties that apply.
 - b. Instruct the captain of the hopper dredge to avoid any turtles encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the COE if sea turtles are seen in the vicinity.
 - c. Notify NOAA Fisheries if sea turtles are observed in the dredging area, to coordinate further precautions to avoid impacts to turtles.
 - d. Notify NOAA Fisheries immediately if a sea turtle is taken by the dredge.
6. When sea turtle observers are required on hopper dredges, in the areas and seasons that turtles may be present, 100% inflow screening of dredged material is required whenever possible, and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100% overflow screening is then required. NOAA Fisheries must be consulted prior to the action and an explanation must be included in the dredging report.

The hopper's inflow screens should have 4-inch by 4-inch screening. If the COE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified subsequently: mesh size may be increased to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case effective 100% overflow screening is mandatory. The COE shall notify NOAA Fisheries beforehand if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

NOAA Fisheries agrees that these flexible graduated screening options are necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes that may have to be removed from the bottom to discharge the clay.

7. Every effort must be made to disengage dredging pumps when the dragheads are not firmly on the bottom to prevent impingement of sea turtles resting or feeding on the bottom, or in the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.
8. The rigid sea turtle deflector draghead or the modified deflector draghead must be used on all hopper dredges operating in the Corpus Christi Ship Channel Improvement Project navigation channels. Other state-of-the-art designs will be considered for approval, prior to implementation, by NOAA Fisheries if shown to be of equal or greater effectiveness at excluding sea turtles.
9. Reporting: Observer reports of incidental take must be faxed to NOAA Fisheries Southeast Regional Office (727-570-5517) by onboard endangered species observers within 24 hours of any observed sea turtle take. A preliminary report summarizing the results of the dredging and any documented sea turtle takes must be submitted to NOAA Fisheries within 30 working days of completion of hopper dredging the entrance channel JRC or OBR. The report shall contain information on project location (specific channel/area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken, screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the COE deems relevant.

An annual report (based on either calendar or fiscal year) must be submitted to NOAA Fisheries summarizing hopper dredging results and documented incidental takes. Beach observer data provided by the STSSN or the Galveston Laboratory on stranded sea turtles showing evidence of draghead impingement should be included separately in the reach reports and yearly reports.

10. Relocation Trawling and Relative Abundance Trawling: Relocation trawling and relative abundance trawling in association with hopper dredging in the Corpus Christi Ship Channel Improvement Project navigation channels, conducted with NOAA Fisheries-approved endangered species observers, should be considered if: (a) takes are documented early in the project during a period in which large numbers of sea turtles may occur; (b) two or more turtles are taken in a 24-hour period;

(c) four or more turtles are taken per fiscal year of the project; (d) seawater temperatures are unseasonably warm; (e) large amounts of sea turtle prey species are being collected in the inflow screens; or (f) the authorized take limit for a particular species is close to being reached; (g) dredging is necessary outside the December 1 - March 31 window or when unseasonably warm temperatures exist during the window; (h) evidence exists indicating protected sea turtle species presence may be high; or (i) a combination of factors exists.

This Opinion authorizes the unlimited non-lethal, non-injurious take of sea turtles in association with assessment or relocation trawling deemed necessary by the COE to assess or temporarily reduce the abundance of these species prior to or during hopper dredging to reduce the possibility of lethal hopper dredge interactions, subject to the following conditions:

- a. Trawl tow-time durations shall be limited to not longer than 30 minutes (doors in - doors out).
- b. Turtles captured pursuant to assessment and relocation trawling shall be handled in a manner designed to ensure their safety and comfort.
- c. Captured turtles shall be kept moist, and, whenever possible, shaded, until they are released.
- d. Turtles shall not be kept longer than 12 hours prior to release and shall be released as far away as practicable from the dredge site.
- e. All turtles shall be measured prior to release (standard carapace measurements including body depth and total length), and weighed when it is possible to do so safely.
- f. All other tagging, external or internal sampling procedures (e.g., PIT tagging, blood letting, skin tag sampling, laparoscopies, gastric lavages, mounting satellite or radio transmitters, genetic sampling, etc.) for sea turtles are not permitted under this Opinion unless the observer holds a valid sea turtle research permit (pursuant to section 10 of the ESA, from the NOAA Fisheries Office of Protected Resources, Permits Division) authorizing the activity, either as the permit holder, or as a designated agent of the permit holder.
- g. Any endangered species injured or killed during or as a consequence of relocation trawling shall count toward the project's incidental take quota. Minor skin abrasions resulting from trawl capture are considered "non-injurious."

NOAA Fisheries anticipates that no more than **three (3) Kemp's ridleys, three (3) green turtles, one (1) hawksbill, and five (5) loggerhead turtles** will be taken annually (lethal or non-lethal) as a result of this action (with the exception of relocation trawling, for which only lethal takes and serious injuries will be counted). The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If during the course of the action this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The COE must cease the permitted activity, immediately request initiation of formal consultation, provide an explanation of the causes of the taking, and

review with NOAA Fisheries the need for possible modification of the reasonable and prudent measures.

Conservation Recommendations

Section 7(a)(1) of the ESA directs Federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat to help implement recovery plans or to develop information.

- (1) Channel-specific studies should be continued to identify the seasonal relative abundance of sea turtles within the Gulf channels. The dredging window and the associated observer requirements listed above may be adjusted (after consultation and authorization by NOAA Fisheries) on a channel specific basis, if (1) the COE can provide sufficient scientific evidence that turtles are not present or that levels of abundance are extremely low during other months of the year, or (2) the COE can identify seawater temperature regimes that ensure low abundance of sea turtles in coastal water, and can monitor water temperatures in a real-time manner.
- (2) The Galveston District should continue to supplement the efforts of the South Atlantic Division and Waterways Experiment Station to develop possible modifications to existing dredges which might reduce or eliminate the take of sea turtles, as well as develop methods to minimize sea turtle take during "cleanup" operations when the draghead maintains only intermittent contact with the bottom. Some method that level the "peaks and valleys" created by dredging would reduce the amount of time dragheads are off the bottom. Valid, replicable studies to estimate the effectiveness of the rigid draghead deflector and modified draghead deflector should be conducted in concert with dredging activities using the deflector. NOAA Fisheries should be consulted regarding the development of a protocol for draghead evaluation test. This conservation recommendation, anticipating the necessity of testing the effectiveness of new draghead designs under carefully monitored conditions in channels where sea turtles are present, was listed in prior consultations conducted on channel dredging along the Atlantic coast and channel maintenance dredging in the New Orleans and Galveston Districts. If the COE can provide evidence that an engineering solution, such as the modified sea turtle deflecting draghead, is significantly effective at excluding sea turtles from hopper dredge entrainment, such information may also be considered in extending the dredging window
- (3) NOAA Fisheries recommends that the Galveston District require that by the end of 2003 all dragheads on hopper dredges contracted by the COE for dredging projects in the Galveston District be outfitted with water ports located in the top of the dragheads or some other effective method to help prevent the dragheads from becoming plugged with sediments. When the dragheads become plugged with sediments, the dragheads are often raised off the bottom (by the dredge operator) with the suction pumps on, in order to take in enough water to help clear clogs in the dragarm pipeline. This increases the likelihood that sea turtles in the vicinity of the draghead will be taken by the dredge. Water ports located in the top of the dragheads may relieve the necessity of raising the draghead off the bottom to perform such an action, and reduce the likelihood of incidental take of sea turtles.

Reinitiation of Consultation

This concludes formal consultation on the Corpus Christi Ship Channel Improvement Project. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of taking specified in the incidental take statement is exceeded, (2) new information reveals effects of the action that may affect listed species or critical habitat (when designated) in a manner or to an extent not previously considered, (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion, or (4) a new species is listed or critical habitat designated that may be affected by the identified action. In instances where the amount or extent of incidental take is exceeded, the COE must immediately request reinitiation of formal consultation.

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Appendix. Summary of Takes by Hopper Dredges in the COE Galveston District since the 1995 RBO

TABLE 1
 MAINTENANCE DREDGING TURTLE TAKES BY FISCAL YEAR

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
<u>Fiscal Year 1995</u>				
Feb 19, 1995			1	
Feb 22, 1995			1	
Feb 26, 1995	1			
Aug 5, 1995	1			
Aug 31, 1995	1			
Sep 4, 1995	1			
Sep 16, 1995		1		
TOTAL FY 95	4	1	2	0
<u>Fiscal Year 1996</u>				
Oct 9, 1995		1		
Jun 28, 1996		1		
Jul 11, 1996		1		
Jul 13, 1996		1		
Jul 22, 1996		1		
TOTAL FY 96	0	5	0	0
<u>Fiscal Year 1997</u>				
Oct 13, 1996		1		
Mar 26, 1997	1			
Apr 29, 1997	1			
Jun 13, 1997		1		
TOTAL FY 97	2	2	0	0
<u>Fiscal Year 1998</u>				
TOTAL FY 98	0	0	0	0

<u>Fiscal Year 1999</u>				
Oct 29, 1998		1		
Feb 18, 1999			1	
Mar 2, 1999			1	
Jun 18, 1999		1		
Jun 19, 1999		1		
Jun 30, 1999		1		
TOTAL FY 99	0	4	2	0

<u>Fiscal Year 2000</u>				
Aug 10, 2000		1		
Aug 15, 2000		1		
TOTAL FY 00	0	2	0	0

<u>Fiscal Year 2001</u>				
TOTAL FY 01	0	0	0	0

<u>Fiscal Year 2002</u>				
Mar 18, 2002			1	
Mar 19, 2002			2	
Mar 20, 2002			1	
Aug 11, 2002		1		
TOTAL FY 02	0	1	4	0

TOTAL	6	15	8	0
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TABLE 2
NEW-WORK DREDGING TURTLE TAKES BY FISCAL YEAR

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
<u>Fiscal Year 1999</u>				
Jan 4, 1999	1			
Sep 29, 1999			1	
TOTAL FY 99	1	0	1	0
<u>Fiscal Year 2000</u>				
TOTAL FY 00	0	0	0	0
TOTAL	1	0	1	0

TABLE 3
TURTLE TAKES BY PROJECT

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
<u>Brazos Island Harbor</u>				
Feb 19, 1995			1	
Feb 22, 1995			1	
Feb 26, 1995	1			
Apr 29, 1997	1			
Jun 13, 1997		1		
Feb 18, 1999			1	
Mar 2, 1999			1	
Mar 18, 2002			1	
Mar 19, 2002			1	
TOTAL	2	1	6	0
<u>Corpus Christi Ship Channel</u>				
Sep 16, 1995		1		
Jun 18, 1999		1		
Jun 19, 1999		1		
Jun 30, 1999		1		
TOTAL	0	4	0	0

TABLE 3
TURTLE TAKES BY PROJECT

Date Taken	Kemp's ridley	Loggerhead	Green	Hawksbill
<u>Freeport Harbor</u>				
Oct 9, 1995		1		
Jun 28, 1996		1		
Jul 11, 1996		1		
Jul 13, 1996		1		
Jul 22, 1996		1		
Oct 29, 1998		1		
Aug 10, 2000		1		
Aug 15, 2000		1		
TOTAL	0	8	0	0
<u>Galveston Harbor and Channel /Houston-Galveston Navigation Channels</u>				
Aug 15, 1995	1			
Aug 31, 1995	1			
Sep 4, 1995	1			
Jan 4, 1999	1			
Sep 29, 1999			1	
TOTAL	4	0	1	0
<u>Matagorda Ship Channel</u>				
Oct 13, 1996		1		
TOTAL	0	1	0	0
<u>Sabine - Neches Waterway</u>				
Mar 26, 1997	1			
Aug 11, 2002		1		
TOTAL	1	1	0	0
<u>Port Mansfield Channel</u>				
Mar 19, 2002			1	
Mar 20, 2002			1	
TOTAL	0	0	2	0

Roberts, Terrell W SWG

From: Eric Hawk [Eric.Hawk@noaa.gov]
Sent: Tuesday, December 23, 2008 6:16 AM
To: Roberts, Terrell W SWG
Subject: Re: [Fwd: Re: Corpus Christi ship channel - request for update to 2002 biop, and species list, by COE GAL? Ring any bells?]

oh, sorry, guess that could be confusing. You are authorized take of each species **up to the take levels stated in the biop**. You must reinitiate consultation if take reaches that number and you plan to continue with the proposed action, since take beyond that level will not have been anticipated, analyzed for possible jeopardy to the species, nor authorized, and if it occurs would be illegal under section 9 of the ESA.

Basically, all you have to do is abide by the RPMs and Terms and Conditions of the biop. If you do that, you will be fine.
 Eric

Roberts, Terrell W SWG wrote:

Thanks for the quick reply Eric. However, I am a little puzzled since you state below that we must reinitiate consultation if a take occurs. The Biological Opinion issued in 2002 states that an incidental take of 3 Kemp's ridleys, 3 green turtles, one hawksbill, and 5 loggerhead turtles are authorized. It goes on to state that "...if this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation..." This is found at the bottom of p. 25 in the 2002 Biological Opinion. Please explain the difference in what requires reinitiation of consultation between your message below and the Biological Opinion. Thanks again for your help. I will now be out of the office until Jan. 5, 2009.

From: Eric Hawk [mailto:Eric.Hawk@noaa.gov]
Sent: Thursday, December 18, 2008 2:20 PM
To: Roberts, Terrell W SWG
Cc: Dennis Klemm
Subject: Re: [Fwd: Re: Corpus Christi ship channel - request for update to 2002 biop, and species list, by COE GAL? Ring any bells?]

Terri,

an update on our previous conversation, earlier this week.

I discussed this project/situation with my managers and the opinion is that you likely don't need to reconult with us, but you have to make that determination yourself. Am attaching a species list - you will see that no new species have been listed in the action area, nor critical habitat designated. If the following conditions are met, then you don't need to reconult on the 2002 biop (which, as I understand from you, was never implemented since the project has not yet started): simply make a no-effect determination to your files:

Consultation must be reinitiated if a take occurs or new information reveals effects of the action not previously considered, or the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat in a manner or to an extent not previously considered, or if a new species is listed or critical habitat designated that may be affected by the identified action.

If you have any further questions, give Dennis Klemm a call when you get back.

Eric



Endangered and Threatened Species and Critical Habitats
under the Jurisdiction of the NOAA Fisheries Service



Texas

Listed Species	Scientific Name	Status	Date Listed
Marine Mammals			
blue whale	<i>Balaenoptera musculus</i>	Endangered	12/02/70
finback whale	<i>Balaenoptera physalus</i>	Endangered	12/02/70
humpback whale	<i>Megaptera novaengliae</i>	Endangered	12/02/70
sei whale	<i>Balaenoptera borealis</i>	Endangered	12/02/70
sperm whale	<i>Physeter macrocephalus</i>	Endangered	12/02/70
Turtles			
green sea turtle	<i>Chelonia mydas</i>	Threatened ¹	07/28/78
hawksbill sea turtle	<i>Eretmochelys imbricata</i>	Endangered	06/02/70
Kemp's ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	12/02/70
leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	06/02/70
loggerhead sea turtle	<i>Caretta caretta</i>	Threatened	07/28/78
Fish			
smalltooth sawfish	<i>Pristis pectinata</i>	Endangered	04/01/03

Designated Critical Habitat

None

Species Proposed for Listing

None

Proposed Critical Habitat

None

¹ Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered



Texas

Candidate Species ²	Scientific Name
none	

Species of Concern ³	Scientific Name
Fish	
dusky shark	<i>Carcharhinus obscurus</i>
largetooth sawfish	<i>Pristis pristis</i>
night shark	<i>Carcharhinus signatus</i>
saltmarsh topminnow	<i>Fundulus jenkinsi</i>
sand tiger shark	<i>Carcharias taurus</i>
speckled hind	<i>Epinephelus drummondhayi</i>
Warsaw grouper	<i>Epinephelus nigritus</i>
white marlin	<i>Tetrapturus albidus</i>
Invertebrates	
ivory bush coral	<i>Oculina varicosa</i>

² The Candidate Species List has been renamed the Species of Concern List. The term "candidate species" is limited to species that are the subject of a petition to list and for which NOAA Fisheries Service has determined that listing may be warranted (69 FR 19975).

³ Species of Concern are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided.



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

November 30, 2011

CESWG-PE-PR

Mr. David M. Bernhart
Assistant RA for Protected Resources
Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

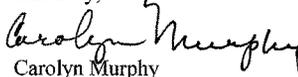
The U.S. Army Corps of Engineers, Galveston District, prepared a Feasibility Report and Final Environmental Impact Statement (FEIS) describing the potential impacts of constructing, operating, and maintaining a channel improvement project at the Corpus Christi Ship Channel (CCSC), Nueces and San Patricio Counties, Texas, in April 2003. Based on the economic, engineering, and environmental analyses, the selected plan includes deepening the CCSC from the Viola Turning Basin to the end of the jetties in the Gulf of Mexico from -45 feet to -52 feet mean low tide (MLT), deepening the remainder of the channel into the Gulf of Mexico from -47 feet to -54 feet MLT, widening the Upper Bay and Lower Bay reaches from 400 feet to 530 feet, and constructing 200-foot wide barge shelves to -12 feet MLT across the Upper Bay portion of the CCSC. The extension of the La Quinta Channel 7,400 feet at a depth of -39 feet MLT is currently under construction as coordinated in the 2003 FEIS.

The Feasibility Report and FEIS were approved by the Chief of Engineers in June 2003, but the project was not authorized for construction by Congress until the Water Resources Development Act of 2007. Because the economic analysis for the authorized project was greater than five years old in November 2008, a Limited Reevaluation Report (LRR) was required to ensure that the project was still in the Federal interest. Corps policy also requires that Endangered Species Act (ESA) coordination be updated every three years, and so that coordination was re-initiated with you in November 2008 (Enclosed).

We have again reached the three year limit on ESA coordination. Since our last coordination in 2008, there have been no changes to the proposed project; however, the large-tooth sawfish (*Pristis pristis*) has been added to the National Marine Fisheries Service Candidate Species list, and the white marlin (*Tetrapturus albidus*) has been removed from the Species of Concern list. Because it is unlikely that the large-tooth sawfish or its habitat occurs in this project area in Texas, we conclude that there will be no impacts to the large-tooth sawfish or its habitat as a result of the construction of this project. We further conclude that the project Biological Opinion dated December 5, 2002 (F/SER/2002/00731) and its requirements remain unchanged, and that it is not necessary to reinitiate Section 7 consultation.

We request your concurrence that further ESA consultation is not necessary for this project. We appreciate your assistance in this review and request your response no later than December 16, 2011, if at all possible. Please feel free to contact Mark Garza by phone at (409) 766-6348 or by e-mail at mark.garza@usace.army.mil if you need additional information.

Sincerely,

A handwritten signature in cursive script that reads "Carolyn Murphy".

Carolyn Murphy
Chief, Environmental Section

Enclosure

Project Name:	Corpus Christi Ship Channel, Texas
Date Prepared:	12/17/2012

Total Authorized Cost:	\$188,110,000
Authorized Cost for Construction	\$182,428,000
Authorized Cost for Real Estate	\$5,682,000
Date of Authorized Price Level:	10/1/2006
First Year of Expenditure:	10/1/2002

Current Cost Estimate (At Current price level):	\$344,610,000
Current Cost for Construction (Construction Portion of Current Cost):	\$335,407,000
Current Cost for Real Estate (Real Estate Portion of Current Cost):	\$9,203,000
Current Fully Funded Cost Estimate (Inflated thru mid-point of Construction):	\$381,854,000
Date of Current Price Level:	10/1/2012

Costs of modifications specified by Law	\$0
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Project Purpose:	COMPOSITE INDEX
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Date of EM 1110-2-1304 Used	Sep-12
Type of CWCCIS Used	Quarterly Cost Indices (1st Quarter)
Date of Real Estate Index Used	Dec-12
Type of Real Estate Index Used	Unadjusted CPI - All Urban Consumers - U.S. City Average (Series ID CUUR0000SEHA)

INDEX INPUTS		
Fiscal Year	CWCCIS Index	Rent-Residential Index
FY 07	657.490	228.000
FY 08	687.900	237.135
FY 09	705.870	245.855
FY 10	713.390	248.888
FY 11	739.860	249.618
FY 12	769.230	255.651
FY 13	777.570	262.707

EXPENDITURE INPUTS		
Fiscal Year	Construction Expenditures	Real Estate Expenditures
FY 03	\$6,306.00	\$0.00
FY 04	\$212,300.00	\$0.00
FY 05	\$990,499.00	\$0.00
FY 06	\$335,851.00	\$0.00
FY 07	\$142,477.00	\$0.00
FY 08	\$49,441.00	\$0.00
FY 09	\$512,385.00	\$0.00
FY 10	\$1,789,602.00	\$0.00
FY 11	\$935,326.00	\$0.00
FY 12	\$18,722,357.00	\$0.00

CWBS - FEATURE CODES (EM 1110-2-1304)

COMPOSITE INDEX

02 - RELOCATIONS

03 - RESERVOIRS

04 - DAMS

05 - LOCKS

06 - FISH & WILDLIFE FACILITIES

07 - POWER PLANT

08 - ROADS, RAILROADS & BRIDGES

09 - CHANNELS & CANALS

10 - BREAKWATER & SEAWALLS

11 - LEVEES & FLOODWALLS

12 - NAVIGATION PORTS & HARBORS

13 - PUMPING PLANT

14 - RECREATION FACILITIES

15 - FLOODWAY CONTROL & DIVERSION STRUCTURE

16 - BANK STABILIZATION

17 - BEACH REPLENISHMENT

18 - CULTURAL RESOURCE PRESERVATION

19 - BUILDINGS, GROUNDS & UTILITIES

20 - PERMANENT OPERATING EQUIPMENT

Table G-2 (ER 1105-2-100 Appendix G)

		CPI Index(s)							
Item	(b)	(c)	(d)	(e)	(f)	(h)	(i)	(j)	
Date of Price Level		10/1/2006							
Authorized Estimate		5,682,000	228,000						
							1		
First Fiscal year		FY 07		0.040066			1.0200329	1.0200329	
1st Qtr, 2nd yr	FY 08		237.135		1.040066				
Second Fiscal year		FY 08		0.036772		1.040066	1.0183862	1.0591886	
1st Qtr, 3rd yr	FY 09		245.855		1.078311				
Third Fiscal year		FY 09		0.012337		1.078311	1.0061683	1.0849627	
1st Qtr, 4th yr	FY 10		248.888		1.091614				
Fourth Fiscal year		FY 10		0.002933		1.091614	1.0014665	1.0932149	
1st Qtr, 5th yr	FY 11		249.618		1.094816				
Fifth Fiscal year		FY 11		0.024169		1.094816	1.0120845	1.1080461	
1st Qtr, 6th yr	FY 12		255.651		1.121276				
Sixth Fiscal year		FY 12		0.0276		1.121276	1.0138001	1.13675	
1st Qtr, 7th yr	FY 13		262.707		1.152224				

Table G-4 (ER 1105-2-100 Appendix G)
MAXIMUM COST INCLUDING INFLATION THROUGH CONSTRUCTION
FY 12 - Thousands Dollars (000's)

Line 1		
a.	Current Project estimate at current price levels:	\$344,610,000
b.	Current project estimate, inflated through construction:	\$381,854,000
c.	Ratio: Line 1b / line 1a	1.1081
d.	Authorized cost at current price levels: (Column (h) plus (i) from table G-3)	\$221,936,737
e.	Authorized cost, inflated through construction: (Line c x Line d)	\$245,922,726
Line 2		
	Cost of modifications required by law:	\$0
Line 3		
	20 percent of authorized cost: .20 x (table G-3, columns (f) + (g))	\$37,622,000
Line 4		
	Maximum cost limited by section 902: Line 1e + line 2 + line 3	\$283,544,726

benefits in the 2003 Feasibility Report are still relevant today. While tonnage has remained fairly steady since the 2003 Feasibility Report for those commodities, the commodity forecasts created in 2003 were quite optimistic, and those forecasts have not all come to fruition in comparison to the actual tonnage levels. The forecast that was created for the economic update is based on a combination of Global Insight and AEO forecasts, which show a smaller growth rate over the next 50 years, but benefits have remained fairly steady. The project is still economically justified. The BCR for this economic update is 2.2 for the widening and deepening and 18.9 for the barge shelves using October 2012 prices and a 3.750 percent interest.

10. Provide detailed explanation of the status of the project. **The updated economic and environmental re-evaluation study received ATR certification in early 2011. In December 2011 an In-Progress Review (IPR) was held with HQ, SWD, and Galveston District. Construction funds have been authorized and appropriated for the LaQuinta Channel portion of the project. Per the IPR Project Guidance Memorandum a revised cost estimate updated to FY 2012 (1 October 2011 price levels) was re-certified by Walla Walla Cost PCX on 31 August 2012. The Report, which has been revised per the IPR PGM, underwent ATR in July 2012; ATR certification is dated 27 July 2012. Per November-December 2012 HQ Policy Review the report has been updated to 4.75% interest rate and FY 13 (October 2012) price levels. The current cost of the entire project exceeds the Section 902 Limit for the project.**

* Line 1e from Table G-4, less the authorized cost.

** This includes cost of external credit under Section 104 of WRDA '86, for example.

*** Line 1b from Table G-4.

NOTE: Real Estate costs – property bought by Port; however, we haven't been given ownership yet for those properties and have not therefore given the NFS credit. These are technically future expenditures.

Exhibit G-11 - Project Cost Increase Fact Sheet
(17 December 2012)

1. Name of Project: **Corpus Christi Ship Channel, Texas**
2. Section and Law That Authorized or Modified the Project: **Section 1001(40) of WRDA 2007 authorized modifications to the Corpus Christi Ship Channel with the following language: *CORPUS CHRISTI SHIP CHANNEL, CORPUS CHRISTI, TEXAS.—(A) IN GENERAL.—The project for navigation and ecosystem restoration, Corpus Christi Ship Channel, Texas: Report of the Chief of Engineers dated June 2, 2003, at a total cost of \$188,110,000, with an estimated Federal cost of \$87,810,000 and an estimated non-Federal cost of \$100,300,000. (B) NAVIGATIONAL SERVITUDE.—In carrying out the project under subparagraph (A), the Secretary shall enforce the navigational servitude in the Corpus Christi Ship Channel (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of section 101 of the Water Resources Development Act of 1986 (33 U.S.C. 2211).***
3. Section 902 Limit on Project Cost:
 - a. Authorized Project Cost:(Price Level) **\$188,110,000 (WRDA 2007); (Price Level Oct 2005)**
 - b. Price level increases from date of authorized cost:* **\$57,812,726**
 - c. Current cost of modifications required by law:** **\$0**
 - d. 20% of line 3a: **\$37,622,000**
 - e. Maximum project cost limited by Section 902: **\$283,544,726**
4. Current Project Cost Including inflation through construction: ***** 381,854,000**
5. Computation of Percentage Increase:
 - a. Current Estimate (Line 4 above): **\$381,854,000(entire project cost including interest and escalation)**
 - b. Less total of lines 3a, b, and c: **\$245,922,726**
 - c. Subtotal: **\$135,931,274**
 - d. Percent increase: (line 5c/3a) **72.3%**
6. Explain cost indexes used in 3b; whether national or regional for real estate, and single state or two state average for construction.
 - a. **The Real Estate Index used in the analysis is the Unadjusted Consumer Price Index – All Urban Consumers-US City Average. This was stated to be the most common Real Estate Index used in the Required Data listed on the Instruction Tab for the 902 Tool.**
 - b. **The Civil Works Construction Cost Index System used was the Yearly Cost Indexes by Composite Index (Weighted Average) since the project is a dual purpose project for both Navigation and Ecosystem Restoration.**
7. Explain increases in 3c; Legislation requiring the modification, and how accommodated. **No project modifications have been directed by congress.**

8. Explain reasons for cost changes other than inflation. **Those key factors for cost increases, as considered in the updated project cost estimate, are included below.**

Account Code 01 – Lands and Damages: The significant factors affecting the lands and damages costs are increased labor costs and a slight increase in land costs.

Account Code 02 – Relocations: The significant factors affecting the relocation costs are increased labor and material costs.

Account Code 12 - Navigation, Ports, and Harbors: The most significant increase in cost for the project is under the 12 Code Account. The price of fuel assumed in the original estimate (October 2002 price level) was \$1.00 per gallon. When the project cost was updated for the WRDA 2007 authorization the original project cost was simply inflated to the October 2005 price level by applying inflation and consumer price index adjustment factors. The updated costs did not reflect increases in fuel prices which fluctuated from a recorded low of \$1.67 a gallon to a high of \$2.86 a gallon in 2005. This approximate doubling of the fuel price typically results in an approximately 50 to 55 percent increase in the unit price of dredging. Additionally, the higher fuel price also translates to higher mobilization and demobilization costs for the dredge plant.

Assumed Bank Heights also have an impact on cost. The term bank height in dredging practices represents the face of material to be dredged. In the original cost estimate the bank height assumed for pipeline dredging was seven feet whereas the updated cost estimate (October 2012) was assumed to be a more conservative five to six feet bank height. When fuel prices are high, the lower bank height can dramatically increase dredging costs.

Again, labor and material costs have risen considerably. For example, the cost to place rock in the original estimate at 2001 prices was \$56.50 per ton. At the October 2012 price level, the cost to place stone is estimated at \$87.00 per ton. Thus, even after accounting for inflation in the cost of placing stone to October 2005 prices, the cost has increased considerably faster than the rate of inflation.

Account Code 16 – Bank Stabilization: The significant factors affecting the bank stabilization costs are increased labor and material costs. The estimated cost of placing stone for breakwaters and shoreline revetments today for example is 50% higher than what was estimated in the original cost estimate.

Account Code 18 - Cultural Resources Preservation: The increase in costs of Cultural Resources is due to this cost being included in account code 30 for the original cost estimate. This cost has now been reflected under the cultural resources account code.

9. Explain any changes in benefits and provide current BCR. **Explain any changes in benefits and provide current BCR. The same commodities that attributed for**

APPENDIX F - ACRONYMS AND ABBREVIATIONS

AEO	Annual Energy Outlook
BA	Biological Assessment
BCR	Benefit-Cost-Ratio
CAGR	Compounded Average Annual Growth Rate
CCSC	Corpus Christi Ship Channel
CG	Construction General
CIAP	Coastal Impact Assistance Program
DEIS	Draft Environmental Impact Statement
District	Galveston District
DOE	Department of Energy
DWT	Dead weight Ton
EC	Engineer Circular
EGM	Economic Guidance Manual
EFH	Essential Fish Habitat
EIA	Energy Information Administration
EIS	Environmental Impact Statement
EM	Engineer Manual
ER	Engineering Regulation
ERDC	Engineering Research and Development Center
ESA	Endangered Species Act of 1973, as amended
ETL	Engineering Technical Letter
FEIS	Final Environmental Impact Statement
FY	fiscal year
GDP	Gross Domestic Product
GIWW	Gulf Intracoastal Waterway
GNF	General Navigation Feature
LERRD or LERR	Land, Easements, Rights-Of-Way, and Relocation
LNG	Liquified Natural Gas
LOA	Length Overall
LRR	Limited Reevaluation Report
MHW	Mean High Water
MLLW	Mean Lower Low Water
MLT	Mean Low Tide
NAS	National Audubon Society
NAVD 88	North American Vertical Datum of 1988
NED	National Economic Development
NMFS	National Marine Fisheries Service

NOAA	National Oceanic and Atmospheric Administration
PA	Placement Area
PCA	Project Cooperation Agreement
POCCA	Port of Corpus Christi Authority
ROD	Record of Decision
RO/RO	Roll-On/Roll-Off
SHPO	State Historical Preservation Officer
SWD	Southwestern Division
TCEQ	Texas Commission on Environmental Quality
T&E	Threatened and Endangered
TCOON	Texas Coastal Ocean Observation Network
TPI	Tons per Inch
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USCG	United States Coast Guard
USFWS	U.S. Fish and Wildlife Service
VLCC	Very Large Crude Carrier
WRDA	Water Resources Development Act



Beft. to
Attention of

DEPARTMENT OF THE ARMY
SOUTHWESTERN DIVISION, CORPS OF ENGINEERS
1100 COMMERCE STREET, SUITE 831
DALLAS, TEXAS 75242-1317

21 NOV 2012

CESWD-PD-P

MEMORANDUM FOR Headquarters USACE (CEMP-SWD/Ms. Yvonne Haberer), 441 G Street NW, Washington DC 20314-1000

SUBJECT: Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, Texas. (PWI # 008530) - Final Limited Reevaluation Report (LRR)

1. References:

a. ER 1105-2-100, Appendix H, 20 November 2007.

b. Memorandum, CESWG-PE, 17 September 2012, subject: Request for Approval of Final Limited Reevaluation Report, Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, TX, PWI # 010383.

2. The subject LRR complies with all applicable policy and laws in place at the time of its completion. The report includes a Section 902 WRDA 86 analysis and current cost estimate to support obtaining the additional authority to construct the project due to cost increases that have occurred since the project was authorized. No changes to the project are proposed; project construction is to be completed as authorized. I concur with the findings and recommendations of the Galveston District Commander.

3. The subject report with all other required enclosures was mailed to you directly from Galveston District. The Post Authorization Decision Document checklist signed by Southwestern Division is enclosed.

4. Please submit the subject report to the Director of Civil Works for approval.

5. If you have any questions, please contact Margaret Johanning at 469-487-7045.

Encl

Thomas W. Kula
THOMAS W. KULA
Brigadier General, USA
Commanding

CF:
CESWG-PE (Heinly) (w/encl)



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON TX 77553-1229

17 SEP 2012

CESWG-PE

MEMORANDUM FOR Regional Integration Team (CEMP-SWD/Haberer)

SUBJECT: Request for Approval of Final Limited Reevaluation Report. Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, Texas, PW1 #010383.

1. Ten copies of the Final Limited Reevaluation Report with Environmental update are enclosed; Request Approval.

2. The submittal package was addressed to Regional Integration Team, ATTN: CEMP-SWD/Yvonne Haberer/Cubicle 3T42, U.S. Army Corps of Engineers, 441 G Street, NW, Washington, D.C. 20314-1000. FedEx tracking numbers are as follows: 8992 6085 7640 and 8992 6085 7650. Two copies of the Final Limited Reevaluation Report with Environmental update were also sent to SWD to Margaret Johanning, CESWD-PDS-P, USACE, 1100 Commerce Street, Suite 831, Dallas, Texas 75242-0216. The FedEx tracking number is 8992 6085 7661.

3. The submittal package also includes one hardcopy of the following items:

Project Study Issue Checklist

Post Authorization Decision Document Checklist

Documentation and Certification of Peer Review and IEPR Exclusion Approval

Cost Estimate Certification

Legal Review certification

Sponsor's signed letter indicating support for the recommended plan.

Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents

PGM Compliance Memorandum

M-CACES cost estimate summary, cost risk analysis and project risk management plan

Project Map (3 copies)

4. Request an In-Progress Review (IPR) if necessary. If an IPR is needed, we would request it to be held via teleconference.

CESWG-PE-P

5. If you have any questions, please contact Robert W. Heinly, CESWG-PE-PI., at 409-766-3992 or Ms. Cheryl Jaynes, CESWG-PE-PI., at 409-766-3804.



CHRISTOPHER W. SALLESE
COL, EN
Commanding

Enclosures

- a) 10 Copies to
CEMP-SWD
- b) 2 Copies to
CESWD-PDS-P

Corpus Christi Ship Channel Deepening and Barge Shelves
Corpus Christi, Texas
Limited Reevaluation Report
7 September 2012

Post Authorization Decision Document Checklist

ER 1165-2-562, 31 March 2007, Appendix A
POST-AUTHORIZATION DECISION DOCUMENT CHECKLIST

I. BASIC INFORMATION:

- a. **Name of Authorized Project:** Corpus Christi Ship Channel, Corpus Christi, Texas
- b. **Name of Separable Element:** CCSC Main Channel, Barge Shelves, LaQuinta Extension, and Ecosystem Restoration.
- c. **PWI Number:** 010383
- d. **Authorizing Document:** Corpus Christi Ship Channel, Texas, Report of the Chief of Engineers dated June 2, 2003.
- e. **Law/Section/Date of Project Authorization (attach copy):** Section 1001(40) of WRDA, 2007 authorized modifications to the Corpus Christi Ship Channel with the following language:

CORPUS CHRISTI SHIP CHANNEL, CORPUS CHRISTI, TEXAS.

(A) IN GENERAL.—The project for navigation and ecosystem restoration, Corpus Christi Ship Channel, Texas: Report of the Chief of Engineers dated June 2, 2003, at a total cost of \$188,110,000, with an estimated Federal cost of \$87,810,000 and an estimated non-Federal cost of \$100,300,000.

(B) NAVIGATIONAL SERVITUDE.—In carrying out the project under subparagraph (A), the Secretary shall enforce the navigational servitude in the Corpus Christi Ship Channel (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of section 101 of the Water Resources Development Act of 1986 (33 U.S.C. 2211).

- f. **Laws/Sections/Dates of Any Post-Authorization Modification:** N/A
- g. **Non-Federal Sponsor(s):** Port of Corpus Christi Authority (PCCA)
- h. **Project/Separable Element Purpose(s):** Navigation/Ecosystem Restoration
- i. **Congressional Interests (Senator(s), Representative(s) and District(s)):** Senators Cornyn and Hutchison (TX); Representative Farenthold (TX-27)

II. Project Documents:

- a. **Type of Decision Document:** Limited Reevaluation Report (LRR)
- b. **Approval Authority of Decision Document:** Director of Civil Works (DCW)
- c. **Project Management Plan Approval Date:** March 2007
- d. **Agency Technical Review (ATR) Approval Date:** 27 July 2012

e. Mitigation Authorized: Yes No Cost of Mitigation: \$721,429

Describe type of mitigation and whether included in project report: Mitigation for displacing 5 acres of Sea Grass and 40 acres of shallow bay bottom was included in prior project updates. Construction of mitigation features has been completed.

f. Current M-CACES Estimate: \$336,791,000 (without escalation & interest during construction)
 Explanation: *In the Total Project Cost Summary (TPCS) certified on 31 August 2012, the Total Project First Cost (October 2011) is shown as \$336,791,000. This cost does not include the \$1,161,000 for expended costs for PA 14 construction for La Quieta Channel Extension. **Addition of the \$1,161,000 expended costs brings the Total Project First Cost to \$337,952,000.** Note that the expended costs were included in the TPCS fully funded project cost (which includes escalation and interest during construction).*

Date Prepared and Price level: 31 August 2012 (1 October 2011)

g. Section 902 Cost Limit: \$281,312,745

h. Date of Latest Economic Analysis: 2 August 2012

i. Current Economics: BCR: 2.2 @ 4.000% FY 12 (2014-2064 Period of Analysis)

RBRCR: N/A @ _____ % FY

(Note: List period of analysis) 50-year period of analysis

III. COST SHARING SUMMARY: Entire project cost summary (cost does not include escalation and interest during construction)

Project First Cost for the Entire Corpus Christi Ship Channel, Texas Channel Improvement Project (\$000's)			
	Federal	Non Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors ¹	\$125,506	\$102,890	\$228,397
Bank Stabilization	\$17,395	\$16,969	\$34,364
Engineering and Design	\$9,506	\$7,015	\$16,521
Construction Management	\$7,279	\$5,347	\$12,626
Total GNF	\$159,687	\$132,220	\$291,908
Ecosystem Restoration			
Bank Stabilization	\$5,526	\$2,975	\$8,501
Engineering and Design	\$526	\$284	\$810
Construction Management	\$276	\$149	\$425
Total Ecosystem Restoration	\$6,328	\$3,408	\$9,736
Federal 100% for Cultural Resource Preservation			
Cultural Resources Preservation	\$288	\$0	\$288
Non-Federal Costs (100%)			
Lands	\$0	\$8,210	\$8,210
Non-Creditable Costs for LERRDS	\$0	\$861	\$861
Pipeline Relocation Costs (includes E&D & CM)	\$0	\$26,950	\$26,950
Total²	\$166,303	\$171,649	\$337,952

¹ Includes \$1,161 in expended costs for PA 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded).

² Total does not include Associated Non-Federal Costs (\$94,704)

- a. Projected Credit for Section 215 Work, and Date Section 215 Agreement Signed: N/A
- b. Projected Credit for Section 104 or Other Authorized Creditable Work, and Date Work Approved by ASA(CW) or Agreement Addressing Work Signed: N/A

IV. FUNDING HISTORY:

c. Appropriations History for Project/Separable Element:

Table I – Funding Since Authorization (as of 1/30/2012) Corpus Christi Ship Channel – Construction General Federal Funding						
	PED FY 03-08	FY 2009	FY 2010	FY 2011	FY 2012	TOTAL
OMB Budget	\$0	\$0	\$0	\$0	\$0	\$0
Appropriated	\$1,614,000	\$1,148,000	\$921,000	\$58,477,000	\$0	\$62,160,000
American Recovery & Reinvestment Act	\$0	\$1,500,000	\$751,000		\$0	\$2,251,000
Other Adjustment	(\$3,000)	\$0	\$0		\$0	(\$3,000)
Rescission	(\$5,000)	\$0	\$0	(\$121,205)	\$0	(\$126,205)
Savings & Slippage	(298,000)	\$0	\$0		\$0	(\$298,000)
5% Holdback	\$0	\$0	\$0		\$0	\$0
Allocated	\$1,308,000	\$2,648,000	\$1,672,000	\$58,355,794	\$0	\$63,983,794
Total Reprogramming	\$255,676	\$0	(\$1,324,171)	\$0	(\$14,987,507)	(\$16,056,003)
Total Allocated	\$1,563,676	\$2,648,000	\$347,829	\$58,355,794	(\$14,987,507)	\$47,927,791
Cumulative Total	\$1,563,676	\$4,211,676	\$4,559,505	\$62,915,299	\$47,927,791	

IV. CERTIFICATION FOR DELEGATED DECISION DOCUMENTS: YOU MUST ANSWER "YES" TO ALL OF THE FOLLOWING QUESTIONS TO APPROVE THE DECISION DOCUMENT UNDER DELEGATED AUTHORITY.

a. PROJECT PLAN

- Y**] Has the project study issue checklist been completed and all issues resolved?
- Y**] Does the non-Federal sponsor concur in the project plan as submitted?
- Y**] Has project plan as submitted been reviewed and concurred in by the non-Federal sponsor's counsel?

b. AUTHORITY

- N**] Has authority been delegated to the MSC for approval of the project report?
- N**] Is authority adequate to complete the project as proposed?

Current cost estimate to complete the project as authorized exceeds the WRDA 86 902 limit.
Additional authority is required for the current estimated cost.

c. POLICY/LEGAL/TECHNICAL COMPLIANCE

- [Y] Has the District Counsel reviewed and approved the decision document for legal sufficiency?
- [Y] Have all aspects of ATR been completed with no unresolved issues remaining?
- [Y] Has the District Commander documented policy/legal/technical compliance of the decision document?
- [Y] Has the MSC certified the policy/legal/technical compliance of the decision document?

V. AUTHENTICATION:

[Signature] Date: 8/14/12
 Project Manager

[Signature] Date: 9/14/12
 Chief, Planning, Environmental and Reg. Division

[Signature] Date: 17 Sep 12
 District Counsel

[Signature] Date: 9-17-12
 Active DDE(PM)

[Signature] Date: 9/11/12
 MSC Planning and Policy CoP

[Signature] Date: 11/21/12
 MSC Counsel

[Signature] Date: 11/21/12
 MSC Commander

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (CIVIL WORKS)

SUBJECT: Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project, Limited Reevaluation Report (LRR) dated November 2012.

1. Purpose: Request your review and approval of the Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project, LRR (enclosure 1) which documents the need to modify the project authorization to increase the authorized cost to \$344,610,000.

2. Post Authorization Change: Section 1001(40) of Water Resources Development Act (WRDA) of 2007 originally authorized the project at a total cost of \$188,110,000. The revised estimated total project first cost (without inflation), is \$344,610,000 (October 2012 prices). The revised cost is the result of increases in costs for construction components such as rock and fuel. There are no changes in project location, purpose, or scope. The currently estimated total project cost inflated to the midpoint of scheduled future construction period is \$381,854,000. The maximum cost for the authorized project, adjusted for allowable inflation in accordance with Section 902 of the WRDA of 1986, is \$283,544,726 (October 2012 price levels); the revised total project cost exceeds the Section 902 limit.

3. Background and Discussion:

a. The authorized project consists deepening and widening of the Corpus Christi Ship Channel from 45 feet to 52 feet, construction of Barge Shelves adjacent to the open bay portion of the CCSC, extension of the La Quinta Channel at a depth of 39 feet and construction of two separate ecosystem restoration features. After completion the components will generate significant savings with reductions in shipping costs. The restoration components will protect and restore habitats of national significance.

b. A Project Partnership Agreement with the non-Federal sponsor, the Port of Corpus Christi, for construction of the LaQuinta Channel Extension and Ecosystem Restoration Features was executed on August 13, 2009. Funds to initiate construction of the La Quinta Extension and Ecosystem Restoration components were appropriated in Fiscal Year (FY) 2009. As of November 2012, project construction was about 50 percent complete. Remaining construction includes deepening and widening of the CCSC and construction of the Barge Shelves.

c. At the October 2012 price level, the estimated total project first costs is \$344,610,000. The Corps of Engineers Cost Engineering Directory of Expertise completed a Cost and Schedule Risk Analysis for the project and certified the revised total project cost estimate by memorandum dated August 23, 2012. By memorandum dated April 16, 2012, the Acting Chief of Engineers

granted an Exclusion from the requirements to conduct a Type I Independent External Peer Review.

d. A total economic update was completed for the subject LRR. The project continues to be economically justified based principally on a reduction in shipping costs and ecosystem restoration benefits. At the October 2012 price level, a 3.75 percent discount rate, and a 50-year period of economic analysis, the estimated total equivalent annual costs for the remaining construction are \$23,655,000 and total equivalent annual benefits are \$51,943,000. Net benefits are estimated at \$28,288,000 and the benefit cost ratio is 2.2 to 1.

e. In accordance with the cost sharing provisions of Section 103(a) of the WRDA of 1986, deep-draft navigation is cost shared differently depending on the depth of the modification. Construction of the barge lanes is cost-shared at 90 percent Federal and 10 percent, non-Federal. Construction of the La Quinta Extension is cost-shared on a prorated amount of 79.5 percent Federal and 20.5 percent non-Federal due to its crossing of cost share boundaries. The widening of the main channel of the CCSC is cost shared at 50 percent Federal and 50 percent, non-Federal. The construction of the ecosystem restoration features is cost-shared 65 percent Federal and 35 percent, non-Federal, all in accordance with the original project authorization. The Federal share of the project first cost is estimated to be \$169,593,000 and the non-Federal share is estimated at \$175,017,000. The USACE will be responsible for the operation, maintenance, repair, replacement, and rehabilitation of the Barge Shelves after construction, at a cost currently estimated at \$16,000 per year. The USACE will be responsible for the operation, maintenance, repair, replacement, and rehabilitation of the La Quinta Extension after construction, at a cost currently estimated at \$1,256,000 per year. The Port of Corpus Christi and the USACE will share equally the responsibility for the operation, maintenance, repair, replacement, and rehabilitation of the Corpus Christi Ship Channel after construction, at a cost currently estimated at \$5,705,000 per year. The Port of Corpus Christi, the non-Federal sponsor, will be responsible for operation, maintenance, repair, replacement, and rehabilitation of the ecosystem restoration features of the project after construction, at a cost currently estimated at \$166,260 per year.

4. Conclusions: The Galveston District prepared the LRR, dated November 2012, in accordance with ER 1105-2-100, Appendix G, to document the increase in the project cost and recommend an increase in the authorized project cost. The HQUSACE policy compliance review of the LRR concluded that there are no unresolved policy issues and that the project is technically sound, environmentally acceptable, and economically justified. Documentation of Headquarters review is at enclosure 2.

5. Recommendation: I recommend that the enclosed LRR be transmitted to Congress as a basis for increasing the authorized project cost of the Corpus Christi Ship Channel, Texas, Deep-Draft Navigation and Ecosystem Restoration Project to \$344,610,000 (October 2012 price levels). Documents necessary to coordinate this recommendation with the Office of Management and Budget will be developed in coordination with your staff and provided under separate cover.

Corpus Christi Ship Channel Deepening and Barge Shelves
Corpus Christi, Texas
Limited Reevaluation Report
12 September 2012

Project Study Issue Checklist

Exhibit H-2 - Project Study Issue Checklist

This list includes sensitive policy areas that require vertical team coordination – preferably, early in the study process. The list should be filled out based on knowledge available at the time about the selected or most likely selected plan. Any items that will not be known or addressed until later in the study should be marked as “Pending.” For items that are not applicable, such as questions about existing project aspects when there is no existing Federal project, enter “NA” for not applicable. Any non-pending response with an asterisk (*) requires coordination and issue resolution through the vertical team using an issue paper as outlined in paragraph H-2.f. All issues need to be resolved before requesting approval of the decision document.

Corpus Christi Ship Channel Deepening and Barge Shelves
Limited Reevaluation Report
Corpus Christi, Texas

1. Will the report clearly articulate how the selected plan will be consistent with each of the Chief of Engineers Actions for Change for Applying Lessons Learned during Hurricanes Katrina and Rita issued 24 August 2006? YES X NO ___ *.
2. Will the report clearly articulate how the selected plan will be consistent with each of the USACE Environmental Operating Principles? YES X NO ___ *.
3. Has a NEPA document been completed? YES X NO ___ *.
4. Will the NEPA Documentation be more than 5 years old at the time of PCA signing or construction initiation? YES ___ * NO X .
5. Will the ESA Findings be more than 3 years old at the time of PCA signing or construction initiation? YES ___ * NO X .
6. Is ESA coordination complete? YES X NO ___ *.
7. If an EIS/EA was completed for the selected plan, will anything prevent signing the Record of Decision (ROD) or Finding of No Significant Impact (FONSI)? YES ___ * NO X .
8. Is the selected plan consistent with the ROD/FONSI? YES X NO ___ * .
9. Have there been any changes in Federal environmental laws or Administration or Corps policy since original project authorization that make updating necessary; e.g., change to the Clean Air Act status for the project area...going from attainment to non-attainment? YES ___ *
NO X .
10. Are the feasibility-level planning, selection and justification of mitigation plans for fish and wildlife, induced flood damages, cultural or historic preservation, or recreation incomplete or deferred to the PED Phase? YES ___ * NO X .
[Issue papers must describe what is being mitigated, the likely mitigation plan, the likely cost of mitigation, and why the analyses are being deferred.]
11. For reevaluations that conclude further authorization is unnecessary, are the proposed mitigation plan(s) for fish and wildlife, induced flood damages, cultural or historic preservation, or recreation the same as the previously authorized plan? YES X NO ___ *.

12. Is there an incremental analysis/cost effectiveness analysis of proposed fish and wildlife mitigation features based on an approved method and using an accepted model? YES ____ * NO ____ . N/A (*an incremental cost analysis of the mitigation locations was performed but it did not include modeling*).
13. Were cost risk analysis methods applied to develop contingencies for the estimated total project costs (see Engineering and Construction Bulletin issued 10Sep07)? YES X NO ____ *.
14. Was the peer (technical) review of the cost estimates duly coordinated with the cost estimate center of expertise and addressed in the review documentation and certification? YES X NO ____ *
15. Would the selected plan cause the previously authorized project's fully funded cost to exceed the cost limit of Section 902 of WRDA 1986? [Note: for coastal storm damage reduction projects there are two separate 902 limits, one for initial project construction and one for periodic renourishment] YES X * NO ____ . [Issue paper must provide the authorized project cost, price level, and current and fully funded project cost estimates and price levels] (See Issue Summary: Issue #1).
16. Does the selected plan involve HTRW clean-up? YES ____ * NO X .
17. Does the selected plan involve CERCLA covered materials? YES ____ * NO X .
18. Are the proposed project purposes different than the previously authorized project? [Note: different than specifically noted in authorization or noted in Chief's report and is it measured by project outputs] YES ____ * NO X .
19. Are there any scope changes proposed for the previously authorized project? YES ____ * NO X . [Issue paper must describe the authority that would enable the project to proceed without additional Congressional modification].
20. If the selected plan includes crediting a non-Federal entity for in-kind services provided either before or after authorization, has a request for a Secretary determination of credit eligibility been forwarded to HQUSACE? [Note: In order to credit a non-Federal sponsor for in-kind services, the credit must be based upon a particular Congressional authority and ASA(CW) must approve a credit eligibility request before the services are provided. The issue paper must describe the scope of the in-kind services, the schedule for providing the services, the authority for providing credit, the status of the request for ASA(CW) approval, and the resulting elements of the non-Federal cost-share (LERRD, cash and credit). If the credit is based on an existing authority, the issue paper must include a copy of the authority if it is not a general authority such as Sec 215. If there is no existing authority to credit the in-kind services, as determined by Counsel, the issue paper should present the rationale for recommending such credit in the decision document for specific Congressional authorization.] YES ____ * NO X .
21. Would the project cost sharing involve reimbursement to the sponsor? [Note: The issue paper must identify the circumstances and authority for recommending reimbursement.] YES ____ * NO X .
22. Is an Ability to Pay cost sharing reduction included in the selected plan? [If yes, fully describe the proposal in the issue paper, citing how this authority is applicable. Include a table showing the cost sharing by project purpose and expected Ability to Pay reductions.] YES ____ * NO X .

23. Is a Locally Preferred Plan recommended without an exception granted by ASA(CW) to recommend plan different from the NED, NER or NED/NER Plan prior to the release of the draft decision document for public review? [Note: if this answer is yes, then a series of questions arise that will need to be addressed in the issue paper...is plan less costly than NED plan, is the plan more costly with the same cost sharing the same as NED plan (exception), is plan more costly with all costs exceeding the cost of the NED plan at 100% non-Federal cost, or has ASA(CW) already granted an exception] YES ___ * NO X . Remarks:

24. Was a standard accepted Corps methodology/model used to calculate NED benefits? YES X NO ___ *.

25. Are non-standard benefit categories used to select or justify the recommended plan? YES ___ * NO X .

26. Was the planning effort conducted in a systems/watershed context and was this reflected in the presentation of the without-project conditions, problem and opportunity statements, and the plan formulation, evaluation and selection? YES X NO ___ *.

27. Were the alternatives formulated, evaluated, and selected using the four P&G evaluation accounts – NED, EQ, RED, and Other Social Effects? YES X NO ___ *.

28. Did the planning effort collaborate with other Federal, state, Tribal, and local entities to develop solutions that integrate expertise, policies, programs, and projects across public entities? YES X NO ___ *.

29. Were the types and degrees of risk and uncertainty clearly characterized for the selected plan and were the various adjustments included in the selected plan to reduce risk and uncertainty also described clearly? YES X NO ___ *.

Navigation Component (Inland or Harbor)

30. Is there a navigation component (inland or harbor) in the selected plan? YES X NO ___ * . If Yes, answer each of the following questions for the selected plan:

31. Is there land creation? YES ___ * NO X .

32. Is there a single owner and/or beneficiary which are not a public body? [Public body as defined by Section 221 of WRDA 1970] YES ___ * NO X .

33. Are there proposals for Federal cost sharing of Local Service Facilities [e.g., dredging of non-Federal berthing areas] work? YES ___ * NO X .

34. Is there sediment remediation proposed under Sec. 312 authority? [i.e., Section 312 of WRDA 1990 as amended by Section 205 of WRDA 1996] YES ___ * NO X .

35. Is there dredged material placement on beaches where the use is not the least costly environmentally acceptable plan? YES ___ * NO X .

36. Will the dredged material be used for ecosystem restoration where the recommended plan is not the least costly environmentally acceptable plan? YES ___ * NO X .

37. Are there recreation navigation benefits? YES ___ * NO X .

38. Does the selected plan involve inland navigation harbor development? YES ___ * NO X .

39. Can the resale or lease of lands used for disposal of excavated material recover the cost of the selected improvements? YES _____ * NO X .
40. Will acquisition of land outside the navigation servitude be necessary for construction of the proposed improvements (either the project or non-Federal facilities that will use or benefit from the project) and will this permit local entities to control access to the project? [The latter case is assumed to exist where the proposed improvement consists of a new channel cut into lands.] YES _____ * NO X .

Flood Damage Reduction Component

41. Is there a flood damage reduction component in the selected plan? YES _____ NO X . If Yes, answer each of the following questions for the selected plan:
42. Is the selected plan for protection of a single property or beneficiary? YES _____ * NO _____ .
43. Would the selected plan produce land development opportunities/benefits? [Issue paper must describe whether special cost sharing should apply.] YES _____ * NO _____ .
44. Is there any recommendation to cost share any interior drainage facilities? YES _____ * NO _____ .
45. Are there any windfall benefits that would accrue to the project sponsor or other parties? [Issue paper must describe whether special cost sharing should apply.] YES _____ * NO _____ .
46. Are there non-structural buyout or relocation recommendations? YES _____ * NO _____ .
47. Is the selected plan likely to change the existing allocated storage in lake projects? YES _____ * NO _____ .
48. Do the proposed changes to the project include any significant risks to public safety related to uncontrolled flooding? YES _____ * NO _____ .
49. Have all the public safety issues related to uncontrolled flooding been fully resolved with the district/MSD Dam Safety Officers? YES _____ * NO _____ .
50. Have all the changes in residual public safety risks related to uncontrolled flooding been communicated to the public and incorporated into their emergency response plan? YES _____ * NO _____ .

Coastal Storm Damage Reduction Component

51. Is there a coastal storm damage reduction component in the selected plan? YES _____ * NO X . If Yes, answer each of the following questions for the selected plan:
52. Does the selected plan protect privately owned shores? YES _____ * NO _____ .
53. Does the selected plan protect undeveloped lands? YES _____ * NO _____ .
54. Does the selected plan protect Federally owned shoreline at Federal cost? [If yes, describe what is to be protected and who bears the Federal cost.] YES _____ * NO _____ .
55. Does the selected plan involve tidal or fluvial flooding; i.e., is it clear what the project purpose is and has the project been formulated as a coastal storm damage reduction project or flood damage reduction project? YES _____ * NO _____ .

56. Is there any recommendation to cost share any interior drainage facilities?
YES _____ * NO _____ .
57. Is recreation more than 50% of total project benefits needed to justify the project?
YES _____ * NO _____ .
58. Are there any parking or public access issues [no public access or none provided within 1/2 mile increments]? YES _____ * NO _____ .
59. Are easements being provided to ensure public use and access? YES _____ * NO _____ .
59. Is there a Sec. 934 of WRDA 1986 extension of the period of authorized Federal participation?
YES _____ * NO _____ .
60. Are there any Sec. 111 of Rivers and Harbors Act of 1958, as amended proposals?
YES _____ * NO _____ .
61. Do the proposed changes to the project include any significant risks to public safety related to uncontrolled flooding? YES _____ * NO _____ .
62. Have all the public safety issues related to uncontrolled flooding been fully resolved with the district/MSD Dam Safety Officers? YES _____ * NO _____ .
63. Have all the changes in residual public safety risks related to uncontrolled flooding been communicated to the public and incorporated into their emergency response plan? YES _____ * NO _____ .

Aquatic Ecosystem Restoration Component

64. Is there an aquatic ecosystem restoration component of the selected plan? YES X NO ____ .
If Yes, answer each of the following questions for the selected plan:
65. Has the selected plan been formulated using cost effectiveness and incremental analysis techniques? YES _____ NO _____ *. *N/A (HEP modeling was performed to document existing future without and future with benefits).*
66. Was "IWR Plan" used to do cost effectiveness/incremental analysis?
YES _____ NO _____ *. *N/A (EIS prepared in 2003.)*
67. Are the restoration features justified by aquatic habitat restoration benefits (exclude preservation and enhancement benefits, and terrestrial habitat benefits)? YES X NO _____ *.
68. Is the project purpose for restoration of cultural or historic resources as opposed to ecosystem restoration? YES _____ * NO X _____ .
69. Is mitigation authorized or recommended? YES X * NO _____ .
70. Are there recommendations for other than restoring a degraded aquatic ecosystem [e.g., creating new habitat where it has never been]? YES _____ * NO X _____ .
71. Is the significance of the habitat clearly identified using the categories and criteria defined in Section 3.4.3 of Principles and Guidelines and in paragraph 16.b of EP 1165-2-502? YES X NO _____ *.
72. Has the restoration project been formulated for biological/habitat values as opposed to, for example, water quality? YES X NO _____ *.

73. Is the selected plan on non-public lands? YES ____ * NO X .
74. Does the selected plan involve land acquisition where the value exceeds 25% of total project cost? YES ____ * NO X .
75. Are all the proposed recreation features in accord with ER 1105-2-100, Appendix E, Exhibit E-3? YES ____ * NO ____ . N/A
76. Are there recommendations to include water quality improvement? YES ____ * NO X .
77. Is the monitoring & adaptive management period proposal beyond 5 years after completion of construction? YES ____ * NO X .
78. Does the selected plan involve land acquisition in other than fee title? YES ____ * NO X .
74. Are there recommendations for non-native species? YES ____ * NO X .
79. Does the selected plan propose the use of navigation servitude? YES ____ * NO X .
80. Does the recommendation include monitoring costs greater than 1% of the total first cost of aquatic ecosystem restoration? YES ____ * NO X .
81. Does the recommendation include adaptive management costs greater than 3% of the total first cost of aquatic ecosystem restoration, excluding monitoring costs? YES ____ * NO ____ . N/A

Recreation Component

82. Is there a recreation component of the selected plan? YES ____ NO X . If Yes, answer each of the following questions for the selected plan:
83. Is the cost of proposed recreation development more than 10 % of the Federal project cost without recreation [except for nonstructural flood damage reduction and coastal storm damage projects]? YES ____ * NO ____ . [Issue paper must describe the proposal and whether ASA(CW) approval has been granted.]
84. Are there recreation features located on other than project lands? YES ____ * NO ____ .
85. Does the selected plan involve/provide for waterfront development? YES ____ * NO ____ .
86. Does the selected plan involve the need to reallocate authorized storage (see Section III, Appendix E, ER 1105-2-100)? YES ____ * NO ____ .
87. Does the selected plan include non-standard recreation facilities (refer to ER 1105-2-100, Appendix E, Exhibit E-2)? YES ____ * NO ____ .

Water Supply Component

88. Is there a water supply component of the selected plan? YES ____ NO X . If Yes, answer each of the following questions for the selected plan:
89. Does the component include features other than Corps reservoir storage space for M&I water supply? YES ____ * NO ____ .
90. Do the outputs meet other needs other than M&I water supply, such as agricultural water supply? YES ____ * NO ____ .
91. Does the selected plan use non-standard pricing for reallocated storage? YES ____ * NO ____ .

92. Are there exceptions to model contract/agreement language? YES ___ * NO ___

Concurrences

Project Manager [Signature] Date: [Signature]

District Planning and Policy CoP leader [Signature] Date: 9/14/12

District Counsel [Signature], Acting Date: 17 SEP 12

^{As Trust}
DDE (PM) [Signature] Date: 9-17-12

MSC Planning and Policy CoP Leader _____ Date: _____

MSC Counsel _____ Date: _____

Project Study Issue Paper
Corpus Christi Ship Channel Deepening and Barge Shelves
August 2012

Issue #1 (Checklist Question #15)

ISSUE: The selected plan will cause the previously authorized project's fully funded cost to exceed the cost limit of Section 902. At this time, the 902 limit for the entire project is \$281,312,745 at FY12 (October 2011) price level. The following table compares: 1) the first cost of the authorized project; 2) project as authorized by congress; 3) project as authorized by congress at current FY12 price levels (October 2011), and the current project first cost at FY12 price levels (October 2011).

IMPACT: Project costs exceed the Section 902 limit requiring re-authorization of project costs.

DISCUSSION: Latest project costs have been updated and were certified on 31 August 2012 by the cost PCX. Congressional authority will be sought to get a new authorized Section 902 cost limit.

Entire Corpus Christi Ship Channel, Texas Channel Improvement Project Comparison (\$000)			
Project First Cost for Project Being Recommended ¹ (Oct 2002 Price Level)	Project as Authorized by Congress ² (Oct 2005 Price Level)	Authorized Project Updated to Current Price Levels ³ (Oct 2011 Price Level)	Current Project First Cost (Oct 2011 Price Level)
\$153,808	\$188,110	\$235,173	\$337,952 ⁴

¹This cost is from the 2003 Chief's Report.

²Cost from Chief's Report updated to October 2005 price level).

³This is the 188,110 cost updated to October 2011 price level using EM 1110-2-1304.

⁴Includes \$1,161 in expended costs for PA 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded).

Project Study Issue Paper
Corpus Christi Ship Channel Deepening and Barge Shelves
August 2012

Issue #2 (MLT vs. MLLW)

ISSUE: USACE requirements for developing a national datum will require all decision documents use the new Datum description Mean Lower Low Water (MLLW) when submitting water resource projects. All elevation datum references in this report are in Mean Low Tide.

IMPACT: All elevation MLT references in the report are also defined in reference to MLLW. MLLW should/does vary in locations from Port Aransas through the Inner Harbor.

DISCUSSION: The project was authorized per MLT. The project is to be constructed as authorized; conversion of datum to MLLW will be accomplished through the district's ongoing conversion effort for the entire Texas coast.

UPDATED DISCUSSION: Subsequent to the In-Progress Review (IPR) Conference in December 2011, the District was directed via the IPR Project Guidance Memorandum (PGM) Required Action to include a discussion in the LRR on the district's ongoing conversion efforts. This discussion was added in the LRR and addressed in the district Compliance Memorandum.

Project Study Issue Paper
Corpus Christi Ship Channel Deepening and Barge Shelves
August 2012

Issue #3 Overall Project and Separable Elements

ISSUE: The Corpus Christi Ship Channel project authorized by WRDA 2007 included the following separable elements:

- a. CCSC Main Channel
- b. Barge Shelves
- c. La Quinta Channel Extension
- d. Ingleside Ecosystem Restoration

IMPACT: The presented LRR provides an environmental and economic update for the CCSC Main Channel and the Barge Shelves. The Ingleside Ecosystem Restoration and the La Quinta Channel portion of the project were updated by LRR approved on 10 February 2010. Construction of the Ecosystem Restoration element is complete, and construction of the La Quinta Extension is underway and scheduled for completion in 2013.

DISCUSSION: The 2003 Feasibility Report details all four project components; however, this LRR document updates the economics for only two of those (CCSC Main Channel and Barge Shelves). Ecosystem restoration and mitigation, though part of the overall project, are not included in the attached checklist as they are exclusive to the La Quinta Channel Extension and Ingleside Ecosystem Restoration components that were evaluated in the previously approved LRR and subsequently entered into the construction phase.

Corpus Christi Ship Channel Deepening and Barge Shelves
Corpus Christi, Texas
Limited Reevaluation Report
17 December 2012

Post Authorization Decision Document Checklist

ER 1165-2-502, 31 March 2007, Appendix A
 POST-AUTHORIZATION DECISION DOCUMENT CHECKLIST

I. BASIC INFORMATION:

- a. **Name of Authorized Project:** Corpus Christi Ship Channel, Corpus Christi, Texas
- b. **Name of Separable Element:** CCSC Main Channel, Barge Shelves, LaQuinta Extension, and Ecosystem Restoration.
- c. **PWI Number:** 010383
- d. **Authorizing Document:** Corpus Christi Ship Channel, Texas, Report of the Chief of Engineers dated June 2, 2003.
- e. **Law/Section/Date of Project Authorization (attach copy):** Section 1001(40) of WRDA 2007 authorized modifications to the Corpus Christi Ship Channel with the following language:

CORPUS CHRISTI SHIP CHANNEL, CORPUS CHRISTI, TEXAS.—

(A) IN GENERAL.—The project for navigation and ecosystem restoration, Corpus Christi Ship Channel, Texas; Report of the Chief of Engineers dated June 2, 2003, at a total cost of \$188,110,000, with an estimated Federal cost of \$87,810,000 and an estimated non-Federal cost of \$100,300,000.

(B) NAVIGATIONAL SERVITUDE.—In carrying out the project under subparagraph (A), the Secretary shall enforce the navigational servitude in the Corpus Christi Ship Channel (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of section 101 of the Water Resources Development Act of 1986 (33 U.S.C. 2211).

- f. **Laws/Sections/Dates of Any Post-Authorization Modification:** N/A
- g. **Non-Federal Sponsor(s):** Port of Corpus Christi Authority (PCCA)
- h. **Project/Separable Element Purpose(s):** Navigation/Ecosystem Restoration
- i. **Congressional Interests (Senator(s), Representative(s) and District(s)):** Senators Cornyn and Hutchison (TX); Representative Farenthold (TX-27)

II. Project Documents:

- a. **Type of Decision Document:** Limited Reevaluation Report (LRR)
- b. **Approval Authority of Decision Document:** Director of Civil Works (DCW)
- c. **Project Management Plan Approval Date:** March 2007
- d. **Agency Technical Review (ATR) Approval Date:** 27 July 2012

e. Mitigation Authorized: Yes No Cost of Mitigation: \$721,429

Describe type of mitigation and whether included in project report: Mitigation for displacing 5 acres of Sea Grass and 40 acres of shallow bay bottom was included in prior project updates. Construction of mitigation features has been completed.

f. **Current M-CACES Estimate:** \$336,791,000 (without escalation & interest during construction)
Explanation: In the Total Project Cost Summary (TPCS) certified on 31 August 2012, the Total Project First Cost price leveled to October 2012 is \$344,610,000. This price leveled cost does include the \$1,161,000 for expended costs for PA 14 construction for La Quinta Channel Extension.

Date Prepared and Price level: 31 August 2012 (1 October 2011), price leveled to 2012 per HQ Policy Review.

g. **Section 902 Cost Limit:** \$283,544,726

h. **Date of Latest Economic Analysis:** 17 December 2012 – price leveled to October 2012 per HQ Policy Review

i. **Current Economics:** BCR: @ % FY

RBRCR: 2.3 @ 3.750% FY 13 price levels (2014-2064 Period of Analysis)

(Note: List period of analysis) 50-year period of analysis

III. **COST SHARING SUMMARY:** Entire project cost summary (*cost does not include escalation and interest during construction*)

Project First Cost for the Entire Corpus Christi Ship Channel, Texas Channel Improvement Project (\$000's)			
	Federal	Non Federal	Total
General Navigation Features (GNF)			
Navigation Ports & Harbors ¹	\$127,998	\$104,943	\$232,941
Bank Stabilization	\$17,743	\$17,307	\$35,050
Engineering and Design	\$9,687	\$7,149	\$16,835
Construction Management	\$7,416	\$5,450	\$12,868
Total GNF	\$162,844	\$134,849	\$297,695
Ecosystem Restoration			
Bank Stabilization	\$5,636	\$3,035	\$8,671
Engineering and Design	\$538	\$288	\$825
Construction Management	\$281	\$152	\$433
Total Ecosystem Restoration	\$6,455	\$3,474	\$9,929
Federal 100% for Cultural Resource Preservation			
Cultural Resources Preservation	\$294	\$0	\$294
Non-Federal Costs (100%)			
Lands	\$0	\$8,326	\$8,326
Non-Creditable Costs for LERRDS	\$0	\$877	\$877
Pipeline Relocation Costs (includes E&D & CM)	\$0	\$27,490	\$27,490
Total²	\$169,593	\$175,017	\$344,610

¹ Includes \$1,161 in expended costs for PA 14 construction under La Quinta Extension component not included in TPCS project first cost. These expended costs are included in the TPCS total project cost (fully funded)

²Total does not include Associated Non-Federal Costs (\$85,953 for entire project). Associated non-Federal costs are comprised of 100 percent pipeline removals cost (owner), 50 percent of pipeline relocation costs (owner), Berthing Area Modifications, Berthing Area Dredging, and Buoy Modifications

- a. **Projected Credit for Section 215 Work, and Date Section 215 Agreement Signed:** N/A
- b. **Projected Credit for Section 104 or Other Authorized Creditable Work, and Date Work Approved by ASA(CW) or Agreement Addressing Work Signed:** N/A

IV. FUNDING HISTORY:

c. Appropriations History for Project/Separable Element:

Table 1 – Funding Since Authorization (as of 9/30/2012) Corpus Christi Ship Channel – Investigation and Construction Federal Funding						
	PEP FY 03-08	FY 2009	FY 2010	FY 2011	FY 2012	TOTAL
OMB Budget	\$0	\$0	\$0	\$0	\$0	\$0
Appropriated	\$1,614,000	\$1,148,000	\$921,000	\$58,477,000	\$0	\$62,160,000
American Recovery & Reinvestment Act	\$0	\$1,500,000	\$751,000		\$0	\$2,251,000
Other Adjustment	(\$3,000)	\$0	\$0		\$0	(\$3,000)
Rescission	(\$5,000)	\$0	\$0	(\$121,206)	\$0	(\$126,206)
Savings & Slippage	(298,000)	\$0	\$0		\$0	(\$298,000)
5% Holdback	\$0	\$0	\$0		\$0	\$0
Allocated	\$1,308,000	\$2,648,000	\$1,672,000	\$58,355,794	\$0	\$63,983,794
Total Reprogramming	\$255,676	\$0	(\$1,324,171)	(\$24,951)	(\$14,987,507)	(\$16,080,953)
Total Allocated	\$1,563,676	\$2,648,000	\$347,829	\$58,330,843	(\$14,987,507)	47,902,841
Cumulative Total	\$1,563,676	\$4,211,676	\$4,559,505	\$62,890,348	\$17,902,841	

IV. CERTIFICATION FOR DELEGATED DECISION DOCUMENTS: YOU MUST ANSWER "YES" TO ALL OF THE FOLLOWING QUESTIONS TO APPROVE THE DECISION DOCUMENT UNDER DELEGATED AUTHORITY.

a. PROJECT PLAN

Y | Has the project study issue checklist been completed and all issues resolved?

Y | Does the non-Federal sponsor concur in the project plan as submitted?

Y | Has project plan as submitted been reviewed and concurred in by the non-Federal sponsor's counsel?

b. AUTHORITY

N | Has authority been delegated to the MSC for approval of the project report?

N | Is authority adequate to complete the project as proposed?

Current cost estimate to complete the project as authorized exceeds the WRDA 86 902 limit. Additional authority is required for the current estimated cost.

c. POLICY/LEGAL/TECHNICAL COMPLIANCE

- | Y | Has the District Counsel reviewed and approved the decision document for legal sufficiency?
- | Y | Have all aspects of ATR been completed with no unresolved issues remaining?
- | Y | Has the District Commander documented policy/legal/technical compliance of the decision document?
- | Y | Has the MSC certified the policy/legal/technical compliance of the decision document?

V. AUTHENTICATION:

Sharon M. Timpale
Project Manager

Date: 18 Dec 12

Carina J. Laird
Chief, Planning, Environmental and Reg. Division

Date: 18 Dec 12

David F. Carter
District Counsel

Date: 15 Dec 12

[Signature]
DDE(PM)

Date: 18 Dec 12

MSC Planning and Policy CoP

Date: _____

MSC Counsel

Date: _____

MSC Commander

Date: _____



DEPARTMENT OF THE ARMY
MOBILE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 2288
MOBILE, ALABAMA 36628-0001

REPLY TO
ATTENTION OF:

CESAM-PD-D (1105-2-40a)

27 July 2012

MEMORANDUM FOR MS. CHERLY JANES, PLANNING LEAD, (CESWG-PE-PL),
USACE GALVESTON DISTRICT, 2000 FORT POINT ROAD, GALVESTON, TEXAS
77550-3211

SUBJECT: Certification of Completion of Agency Technical Review, Corpus Christi Ship
Channel Deepening and Barge Shelves Limited Reevaluation Report, Corpus Christi, Texas

1. References:

- a. EC 1165-2-209, Civil Works Review Policy, 31 January 2010
- b. EC 1105-2-412, Assuring Quality of Planning Models, 31 March 2011
- c. Memorandum, CECW-CP, 30 March 2007, Subject: Peer Review Process
- d. Supplemental information for the "Peer Review Process" Memo, dated March 2007

2. In accordance with EC 1165-2-209, "Civil Works Review Policy," dated 31 January 2010, Agency Technical Review (ATR) of the Corpus Christi Ship Channel Deepening and Barge Shelves Limited Reevaluation Report has been coordinated with and executed through the Deep Draft Navigation Planning Center of Expertise (DDN-PCX) in DrChecks.

3. We concur that such peer review of the report documents have been completed and certified. All outstanding issues have been addressed and satisfied. The point of contact is Mr. Johnny L. Grandison, CESAM-PD-D, (251)-694-3804.

BERNARD E. MOSEBY
Technical Director
Deep Draft Navigation Planning Center
Expertise

Encls

CF:
CESAD-PD-S/PAYNE
CESAD-PD-/SMALL
CESAD-PD-S/STRATTON
CESWG/LAIRD
CESWG/HEINLEY

Comment Report: All Comments
 Project: Corpus Christi Ship Channel LRR
 Review: CCSC LRR ATR (post IPR w/SWD & HQ)
 Displaying 26 comments for the criteria specified in this report.

Id ▲	Discipline	Section/Figure	Page Number	Line Number
4725535	Environmental	Section 3.0	66	N/A
<p>The environmental portion of this project is currently up to date with no issues to report. Endangered species coordination with the U.S. Fish and Wildlife Service (FWS) and National Marine Fishery Service (NMFS) was recently conducted and is properly documented within the Limited Reevaluation Report--Section 3.0 Environmental Update. No further action is required.</p>				
<p>Submitted By: Michael Matsom (251-690-2023). Submitted On: 16-Jul-12</p>				
1-0	Evaluation Concurred	<p>Great, thanks!</p> <p>Submitted By: Mark Garza (409-766-6348) Submitted On: 16-Jul-12</p>		
1-1	Backcheck Recommendation Close Comment	<p>Closed without comment.</p> <p>Submitted By: Michael Matsom (251-690-2023) Submitted On: 16-Jul-12</p>		
<p>Current Comment Status: Comment Closed</p>				
4731073	Real Estate	6 Description of LER	3	n/a
<p>Recommend clarification as confined upland sites are typically not subject to navigational servitude as this right extends only to lands below the ordinary high water mark. I also typically include a section for nav. servitude especially if it is a critical part of the proposed project. Past reports, for your reference, have used the following language concerning servitude: The navigation servitude is the dominant right of the Government under the Commerce Clause of the U.S. Constitution (U.S. CONST. Art. I, §8, cl.3) to use, control and regulate the navigable waters of the United States and the submerged lands hereunder for various commerce-related purposes including navigation and flood control. In tidal areas, the servitude extends to all lands below the mean high water mark. In non-tidal areas, the servitude extends to all lands within the bed and banks of a navigable stream that lie below the ordinary high water mark. United States v. Cress, 243 U.S. 316, 37 S.Ct. 380, 61 L.Ed. 746 (1917), Kaiser Aetna v. United States, 444 U.S. 164, 100 S.Ct. 383, 62 L.Ed.2d 332 (1979). The Government's rights under the navigation servitude exist irrespective of the ownership of the banks and bed of a stream below the ordinary high water mark and irrespective of western water rights under prior appropriation doctrine.</p>				
<p>Submitted By: Russell Blount (251-694-3675). Submitted On: 18-Jul-12</p>				
1-0	Evaluation For Information Only	<p>1) The language for the upland sites was taken from the approved 2003 REP, which resulted in the funding of the project. The first two components are complete (La Quinta Extension & EcoRestor) and RE was asked to update the \$ in the REP on the last two components (Main Channel Deepening & Widening & Barge Shelves). Typically, when revising a REP we rely on the language of the previously approved REP. If I can't rely on the language in the approved 2003 REP, I will have to go back and do a substantial amount of research to determine independently whether the 2003 REP language was in error or correct. I have no reason, other than your comment, to assume it is an error. I recommend we rely on the language in the 2003 REP. 2) Suggested language regarding navigation servitude has been add to the REP in Section 6.</p> <p>Submitted By: Jody Rowe ((409) 766-3192) Submitted On: 25-Jul-12</p>		
1-1	Backcheck Recommendation Close Comment	<p>Concur. Due to the facts that language was approved in the 2003 REP and that subject LRR REP is to only update funding requirements, comment is closed. Confirmed Navigational Servitude language was added to revised REP in Section 6.</p> <p>Submitted By: Russell Blount (251-694-3675) Submitted On: 26-Jul-12</p>		
<p>Current Comment Status: Comment Closed</p>				

4731096	Real Estate	5 Purpose of the REP	3	n/a
<p>"The plan will also address the estate to be acquired in the various tracts for this Project. The NFS already owns all lands needed for the Project." These two sentences appear to contradict each other since it says REP will address the estate to be acquired and then NFS already owns all lands needed. May want to revisit Section 5 and clarify for the reader.</p>				
Submitted By: <u>Russell Blount</u> (251-694-3675). Submitted On: 18-Jul-12				
1-0	<p>Evaluation Concurred The two sentences cited have been removed and replaced with the following, "All lands needed for the project are available by virtue of either navigation servitude or previous acquisition by the Sponsor."</p>			
Submitted By: <u>Jody Rowe</u> ((409) 766-3192) Submitted On: 25-Jul-12				
1-1	<p>Backcheck Recommendation Close Comment Comment Closed. Confirmed revision of REP.</p>			
Submitted By: <u>Russell Blount</u> (251-694-3675) Submitted On: 26-Jul-12				
Current Comment Status: Comment Closed				
4731120	Real Estate	7	5	n/a
<p>Unless the District is adamant about obtaining a perpetual easement from the NFS for a PA, which you have made a brief argument as to why, it is typically recommended that Corps accept an Authorization for Right-of-Entry for Construction (attached) from the NFS which allows the Government and/or its contractors to use the lands, but allows the Government to avoid a perpetual interest and potential future expense. If a perpetual easement is definitely required from the NFS to the Government, may want to bolster argument as to why. The proper easement estate, even if held by the sponsor, should still serve the purposes of the project.</p>				
(Attachment: <u>SAM Packet-SECTION 9-Authorization for Entry for Construction.DOC</u>)				
Submitted By: <u>Russell Blount</u> (251-694-3675). Submitted On: 18-Jul-12				
1-0	<p>Evaluation Concurred It is the practice of the District to required the Non-Federal Sponsor to acquire disposal areas in fee and provide perpetual disposal easements to the Government, due to the significant economic impact that could occur should there be a failure to perform required dredging maintenance.</p>			
Submitted By: <u>Jody Rowe</u> ((409) 766-3192) Submitted On: 25-Jul-12				
1-1	<p>Backcheck Recommendation Close Comment Closed without comment.</p>			
Submitted By: <u>Russell Blount</u> (251-694-3675) Submitted On: 26-Jul-12				
Current Comment Status: Comment Closed				
4731139	Real Estate	9	6	n/a
<p>Since there are apparently estates to be acquired by the sponsor (i.e. pipeline easement for Suntime PA) and you are also recommending conveyance of disposal area easements from the NFS to the Government, then the estates should be listed. Recommend EC404-1-11 Standard Estates which provides the following: UTILITY AND/OR PIPELINE EASEMENT. A perpetual and assignable easement and right?of?way in, on, over and across (the land described in Schedule A) (Tracts Nos. _____ and _____), for the location, construction, operation, maintenance, alteration; repair and patrol of (overhead) (underground) (specifically name type of utility or pipeline); together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines. There is no "standard estate" for dredge material disposal easements. However, I and NO District have used the following estate language which should be typically approved by OC and Chief of RE via memorandum since it is deemed non-standard. DREDGED MATERIAL DISPOSAL EASEMENT A perpetual and assignable right and easement to construct, operate, and maintain a dredged material disposal area on (the land described in Schedule "A") (Tracts Nos. _____, _____ and _____) including the right to construct and maintain dikes and buffer zone; to deposit dredged material and accomplish any alterations of contours on the land as necessary in</p>				

connection with such works; to clear, borrow, excavate and remove soil, dirt, and other materials including dredged material from the land; title to and the continuing right to grow, plant, replant, cut, fell, harvest and remove all timber, trees and other vegetation thereon; to remove and dispose of any and all buildings, and/or other obstructions therefrom; and for such other purposes as may be required in connection with said works within the limits of subject tract; provided that no structures for human habitation shall be constructed or maintained on the land, that no other structures shall be constructed or maintained on the land except as may be approved in writing by the representative of the United States in charge of the project, subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines; reserving, however, to the landowner, his heirs and assigns, all such rights and privileges as may be used and enjoyed without interfering with the use of the project for the purpose authorized by Congress or abridging the rights and easement hereby acquired.

Submitted By: [Russell Blount](#) (251-694-3675). Submitted On: 18-Jul-12

1-0 Evaluation **Concurred**
The proposed language has been added to Section 9.

Submitted By: [Jody Rowe](#) ((409) 766-3192) Submitted On: 25-Jul-12

1-1 Backcheck Recommendation **Close Comment**
Comment Closed. Confirmed estates have been added to Section 9.

Submitted By: [Russell Blount](#) (251-694-3675) Submitted On: 26-Jul-12

Current Comment Status: Comment Closed

4731149

Real Estate

n/a

n/a

n/a

(Document Reference: n/a)

See attached. All RE comments are further noted in the attached for author's specific reference along w/ minor grammatical errors.

(Attachment: [CCSC REP LRR 12 July 2012 V2 \(4\)-FinalATRcomments7-18-12.pdf](#))

Submitted By: [Russell Blount](#) (251-694-3675). Submitted On: 18-Jul-12

1-0 Evaluation **For Information Only**
Comments have been reviewed.

Submitted By: [Jody Rowe](#) ((409) 766-3192) Submitted On: 25-Jul-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: [Russell Blount](#) (251-694-3675) Submitted On: 26-Jul-12

Current Comment Status: Comment Closed

4732242

Economics

Table 32

n/a

n/a

It would be more significant here to show the nautical miles from the 4 trade regions since these are the numbers used in the calculations.

Submitted By: [Robert Finch](#) (808-835-4144). Submitted On: 18-Jul-12

1-0 Evaluation **Concurred**
The mileage from the 4 trade regions will be included in Table 32.

Submitted By: [Kathleen Williams](#) (409-766-3146) Submitted On: 23-Jul-12

1-1 Backcheck Recommendation **Close Comment**
Closed without comment.

Submitted By: [Robert Finch](#) (808-835-4144) Submitted On: 23-Jul-12

Current Comment Status: Comment Closed				
4732243	Economics	Table 36	n/a	n/a
Cannot verify Total Voyage Cost \$407,025 and 410,113 from spreadsheet model; instead it would appear to be \$581,993 (F:141) and \$582,411 (M:147), tanker direct shipment tab.				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
1-0	Evaluation Concurred Table 36 will be corrected to show the accurate Total Voyage Costs of \$581,993 and \$582,411. Submitted By: <u>Kathleen Williams</u> (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732245	Economics	Table 40	n/a	n/a
The percentages by trade route here do not match those in the Grain tab (C19:H28) of the spreadsheet model.				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
1-0	Evaluation Concurred Table 40 actually includes information from the detailed records for all grain exports by trade route, whereas, the percentages in the spreadsheet model are only for grain exports by trade route for drafts >=42 feet. Therefore, the information is not meant to match. Submitted By: <u>Kathleen Williams</u> (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment After kicking this one back and forth a couple of times, I think we have arrived at a reasonable explanation of why this has no impact on the results. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732246	Economics	Table 43	n/a	n/a
Explain why you use "minimum" for Mexico and South America, while you use "average" for Africa and North Sea (called Africa/EU in spreadsheet) and Middle East (Mideast and Far East). Consistency in these trade routes identifiers would be helpful.				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
1-0	Evaluation Concurred The minimum, which is for a 120,000 DWT vessel, was used for Mexico and South America because the greatest savings for these two routes is through direct transportation. It is expected that vessels up to 120,000 from these two routes will come to typically traverse the channel. However, for Africa and the Middle East, the greatest savings is through lightering and vessels that will be lightered will generally be in the 120,000-150,000 DWT range, which is the average used to calculate such savings. Submitted By: <u>Kathleen Williams</u> (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			

Current Comment Status: Comment Closed				
4732247	Economics	Table 44	n/a	n/a
Table does not total to 100% as shown. Problem seems to be that Middle East and Asia is shown here to be zero, yet they equal 10% according to economic spreadsheet model ("Crude Oil" Tab, G26:H26).				
Submitted By: Robert Finch (808-835-4144) Submitted On: 18-Jul-12				
1-0	Evaluation Concurred Table 44 will be corrected to show Middle East and Asia as 10% and the table will equal 100%. Submitted By: Kathleen Williams (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Robert Finch (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732248	Economics	Table 45-49	n/a	n/a
"Dollars in \$1,000" need to be added in the headings of these tables.				
Submitted By: Robert Finch (808-835-4144) Submitted On: 18-Jul-12				
1-0	Evaluation Concurred The headings in the tables will include "In 1,000's". Submitted By: Kathleen Williams (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Robert Finch (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732250	Economics	Table 50	n/a	n/a
First line of data should begin with project first cost so reader sees exactly how much is IDC and how much is total project cost. Or just show what IDC amounts to.				
Submitted By: Robert Finch (808-835-4144) Submitted On: 18-Jul-12				
1-0	Evaluation Concurred Table 50 will be revised to show the project first cost as well as the IDC. Submitted By: Kathleen Williams (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Robert Finch (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732261	Economics	Table 50	n/a	n/a
IDC in the spreadsheet model uses 94 months to construct. Does this go back in time a few years to account for past years of being in PED and Construction, or is the assumption that it will take 7+ years to finish the project.				

Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
1-0	Evaluation Concurred The assumption is that it will take 7+ years to finish the project. The subject project has not gone through stages of PED or construction. Submitted By: <u>Kathleen Williams</u> (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732266	Economics	In general	n/a	n/a
Overall I think there is a disproportional amount of economic space in the LRR dedicated to the 2003 results. The LRR would benefit from more data present day update and current projections and less on the past. Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
1-0	Evaluation Concurred An attempt will be made to minimize the data from 2003 in order to focus more on the current data for the economic update. Submitted By: <u>Kathleen Williams</u> (409-766-3146) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732267	Project Management	902 Limit	n/a	n/a
There is no consistency with total project cost: 902 sheet has it as \$350,151,000; Cost appendix \$350,540,000; and Economics is using \$346,460,000. Fully funded costs also do not match: 902 sheet has it as \$388,903,000; Cost appendix \$379,139,000. Difference is the real estate estimate \$9,764,000. But Cost Appendix has \$25,000 of real estate (Lands and Damages-Non-Federal). This may need to come out before adding the \$9,764,000. Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
1-0	Evaluation Concurred Concur; total project first costs in report, economics and cost appendix post ATR should agree once the cost estimate is revised to include all real estate costs. Submitted By: <u>Thelma Jaynes</u> (409-766-3804) Submitted On: 23-Jul-12			
1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			
Current Comment Status: Comment Closed				
4732269	Project Management	902 Limit--Fact Sheet, number 6.	n/a	n/a
The 902 analysis shows the current cost for real estate (RE) to be \$9,764,000. Expenditures to date are shown as \$0. Explain at what point in time RE expenditures will be incurred. If past RE costs have been added to construction costs, it will need to be split out. If RE expenditures have been \$0, calculating the Real Estate Index seems pointless.				

Submitted By: Robert Finch (808-835-4144). Submitted On: 18-Jul-12				
	1-0	Evaluation Concurred The Real Estate costs are for property purchased by the non-Federal sponsor; however, since we have yet to issue credit for any LERRDS all of these costs would be future real estate costs, not expended. As to the calculation of the Real Estate Index in the 902 when we don't have Real Estate expenditures shown...my understanding is that you still have to put all the indices in the 902 tool, otherwise there are errors. Submitted By: Thelma Jaynes (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment You seem to be saying that the non-Federal has purchased property but because there has yet to be LERRDS credit issued for these purchases, the real estate expenditure to date is still considered to be zero. This is outside my area of expertise so I will accept this explanation, close the comment and defer to others if this is not correct. Submitted By: Robert Finch (808-835-4144) Submitted On: 23-Jul-12		
Current Comment Status: Comment Closed				
4732270	Project Management	902 Limit--Fact Sheet, number 3	n/a	n/a
It would seem logical that $3.a + 3.b + 3.d = 3.e$; that is, $\$188,110,000 + \$39,298,452 + \$37,622,000 = \$264,088,922$, but it does not--it is $\$941,530$ off. Should they not be equal?				
Submitted By: Robert Finch (808-835-4144). Submitted On: 18-Jul-12				
	1-0	Evaluation Concurred Agreed - 3b was incorrectly calculated. This will be revised to correctly reflect the calculation for 3b subsequent to ATR. 3b calculation should have been the Line 1e from Table G-4 in tool less authorized cost. Submitted By: Thelma Jaynes (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: Robert Finch (808-835-4144) Submitted On: 23-Jul-12		
Current Comment Status: Comment Closed				
4732274	Project Management	902 Limit--Fact Sheet, No.8, Assumed Bank Heights	n/a	n/a
This is quite confusing and seems intuitively backwards. It seems like lower bank heights would decrease costs, not increase them. Further explanation of how lower effective bank heights raises cost is warranted here.				
Submitted By: Robert Finch (808-835-4144). Submitted On: 18-Jul-12				
	1-0	Evaluation Concurred Will revise LRR to further explain. Higher head banks, up to an optimum height of nine feet, result in increased dredging production efficiencies. This is because the pipeline dredge cutter head would be cutting into more soil with an appropriate amount of water introduced into the slurry mix to efficiently pump the material. Consequently, a greater volume percentage of the material is pumped. Assume for example that a 30-inch dredge is cutting into a bank that is only two feet high. In this instance, the pipe at the cutter head would be sucking more water than if the bank were higher which reduces the percentage of solid material being pumped. When cutting into high banks, the cutter head can be more freely moved about and still get a high percentage of material. Submitted By: Thelma Jaynes (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment		

	Closed without comment.			
	Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12			
	Current Comment Status: Comment Closed			
4732279	Project Management	902 Limit--Fact Sheet, No.8, Assumed Placement Area Work	n/a	n/a
This section is confusing. First costs were low, then they were high, and now they are back to where they were before. It reads like this LRR is not the "Update" referred to herein, i.e., there was an earlier update. Please look into rewording the paragraph to make it clear and check the use of words like "update" and "original" and "the update estimate estimates."				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
	1-0	Evaluation Concurred This is a confusing paragraph and it appears this will not be needed. This paragraph will be deleted.		
		Submitted By: <u>Thelma Jaynes</u> (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment Closed without comment.		
		Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12		
	Current Comment Status: Comment Closed			
4732281	Project Management	902 Limit--Fact Sheet, No.8, Composition of Material to be Dredged	n/a	n/a
Need a conclusion here of how this affects costs.				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
	1-0	Evaluation Concurred Pumping loose fine sand a great distance modestly increases the unit price of dredging over pumping loose silt and clay the same distance. A last sentence will be added to the rationale: "Consequently, this will result in a modest increase in the cost of dredging for this particular reach."		
		Submitted By: <u>Thelma Jaynes</u> (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment Closed without comment.		
		Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12		
	Current Comment Status: Comment Closed			
4732285	Project Management	902 Limit--Fact Sheet, No.8, Increase in Labor and Material Costs	n/a	n/a
((Document Reference: 4th sentence))				
Awkward (4th) sentence. It would be clearer to say something to the effect that costs have increased faster than the rate of inflation.				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				

Revised 18-Jul-12.				
	1-0	Evaluation Concurred The 4th sentence will be deleted or replaced with "Thus, even after accounting for inflation in the cost of placing stone to October 2005 prices, the cost has increased considerably faster than the rate of inflation." Submitted By: <u>Thelma Jaynes</u> (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12		
Current Comment Status: Comment Closed				
4732288	Project Management	902 Limit--Fact Sheet, No.8, Increase in Labor and Material Costs	n/a	n/a
(Document Reference: last paragraph)				
For a LRR actual estimates should be used for PED and CM costs instead of basing them on percentages.				
Submitted By: <u>Robert Finch</u> (808-835-4144). Submitted On: 18-Jul-12				
	1-0	Evaluation Concurred The spreadsheet used to account for these costs is developed on percentages; however, those percentages can be adjusted to account for actual estimates. This said, the last paragraph will be deleted as it doesn't really impart the reason for the increase in labor and material costs. Submitted By: <u>Thelma Jaynes</u> (409-766-3804) Submitted On: 23-Jul-12		
	1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 23-Jul-12		
Current Comment Status: Comment Closed				
4734552	Project Management	902 Limit Tool	n/a	n/a
By entering a FY 12 expenditure, which you hard-keyed in cell F54, I think you have distorted your 902 results. As I understand it, the spreadsheet does not ask for FY 12 expenditures, neither up to date or projected to the end of the FY. That is why the spreadsheet does not populate cell E54 with "FY 12," and maybe why you could enter your index value for FY 12, cell C54. You need to have a value in C54; otherwise you have problems with your inflation rate (F26, Table G-2), and other subsequent calculations. I recommend taking the \$3,499,233 (F54) out and adding the FY 12 real estate index as the most recent month available. This will change table G-4, lines 1.d., 1.e. and 4. ER 100 says that the number in Fact Sheet, line 3e should be the same as line 4 of Table G-4. This fixes that problem.				
Submitted By: <u>Robert Finch</u> (808-835-4144), Submitted On: 19-Jul-12				
Revised 19-Jul-12.				
	1-0	Evaluation Concurred This makes sense. I will make this revision once the revised cost is certified. Submitted By: <u>Thelma Jaynes</u> (409-766-3804) Submitted On: 24-Jul-12		
	1-1	Backcheck Recommendation Close Comment Closed without comment. Submitted By: <u>Robert Finch</u> (808-835-4144) Submitted On: 24-Jul-12		

Current Comment Status: Comment Closed				
4734557	Project Management	902 Limit Tool	n/a	n/a
Given your problem identifying and separating out real estate expenditures from the early 2000s, the 902 tool ends up escalating all expenditures by the construction index only. The only way to get the analysis right is to somehow fix this and enter the actual real estate expenditures. That will change beginning with the "first year of expenditure" (D27).				
Submitted By: Robert Finch (808-835-4144). Submitted On: 19-Jul-12				
1-0	Evaluation Non-concurred The land was purchased previous to 2001; however, in this particular case the real estate has not been credited so it is essentially a future real estate cost.			
Submitted By: Thelma Jaynes (409-766-3804) Submitted On: 24-Jul-12				
1-1	Backcheck Recommendation Close Comment Closed without comment.			
Submitted By: Robert Finch (808-835-4144) Submitted On: 24-Jul-12				
Current Comment Status: Comment Closed				
4734601	Project Management	902 Limit	n/a	n/a
You are using the CWCCIS index numbers from EM 1110-2-1304, dated March 2011, when the March 2012 has been available for some time.				
Submitted By: Robert Finch (808-835-4144). Submitted On: 19-Jul-12				
1-0	Evaluation Concurred How embarrassing. The Planning Community Toolbox has not been updated with the latest EM 1110-2-1304 version. I just confirmed that as of today it is still reflecting March 2011. I just went searching the internet for the EM and sure enough, there is a March 2012 version. I will use the March 2012 CWCCIS index numbers in the revision post ATR.			
Submitted By: Thelma Jaynes (409-766-3804) Submitted On: 23-Jul-12				
1-1	Backcheck Recommendation Close Comment Closed without comment.			
Submitted By: Robert Finch (808-835-4144) Submitted On: 23-Jul-12				
Current Comment Status: Comment Closed				

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**WALLA WALLA COST ENGINEERING TECHNICAL
CENTER OF EXPERTISE**

COST AGENCY TECHNICAL REVIEW

RE-CERTIFICATION STATEMENT

For

**SWG – Corpus Christi Ship Channel 52’
incl LaQuinta Channel**

The Corpus Christi Ship Channel 52’ project as presented by Galveston District has undergone a successful Cost Agency Technical Review (Cost ATR) Re-Certification, performed by the Walla Walla District Cost Engineering Technical Center of Expertise (Cost TCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

As of August 31, 2012, the Cost TCX certifies the estimated total project cost of:

FY 2012 Price Level:

Corpus Christi and Barge Shelves	\$280,345.000
LaQuinta Channel and Ecosystem Restoration	\$ 56,446.000

Fully Funded Amount incl spent costs:

Corpus Christi and Barge Shelves	\$316,273,000
LaQuinta Channel and Ecosystem Restoration	\$ 58,091,000

It remains the responsibility of the District to correctly reflect these cost values within the Final Report and to implement effective project management controls and implementation procedures including risk management throughout the life of the project.



**US Army Corps
of Engineers®**

Glenn R. Matlock
Glenn R. Matlock, PE, CCE
Chief, Cost Engineering
Walla Walla District

**** TOTAL PROJECT COST SUMMARY ****

PROJECT LOCATION:		DISTRICT:		PREPARED:															
Corpus Christi Ship Channel, Texas - Corpus Christi Ship Channel Improvement Project		Corpus Christi, TX		Corpus Christi, TX															
This Estimate reflects the scope and schedule in report.		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quirola Channel, Draft Engineering Appendix published in 2002		Corpus Christi Ship Channel Improvement Project, Corpus Christi Ship Channel and La Quirola Channel, Draft Engineering Appendix published in 2002															
WBS NUMBERS	WBS Structure	ESTIMATED COST						PROJECT FIRST COST (Constant Dollar Basis)						TOTAL PROJECT COST (FULLY FUNDED)					
		COST	CNTG	CNTG	TOTAL	ESG	COST	CNTG	TOTAL	Spent Thru:	COST	CNTG	TOTAL	COST	CNTG	TOTAL			
A	Channel Works																		
B	Facilities & Structures																		
C	CCSC Improvement Project - All Components (Combined)																		
D																			
E																			
F																			
G																			
H																			
I																			
J																			
K																			
L																			
M																			
N																			
O																			
02	RELOCATIONS - NON-FEDERAL	\$21,560	\$5,390	25%	\$26,950					\$21,560	\$5,390	\$26,950							
12	NAVIGATION PORTS & HARBORS - FEDERAL	\$100,383	\$21,285	21%	\$121,668					\$100,383	\$21,285	\$121,668	\$959						
12	NAVIGATION PORTS & HARBORS - NON-FEDERAL	\$62,982	\$19,605	24%	\$102,587					\$62,982	\$19,605	\$102,587	\$214						
16	BANK STABILIZATION - FEDERAL	\$19,443	\$3,480	18%	\$22,923					\$19,443	\$3,480	\$22,923							
16	BANK STABILIZATION - NON-FEDERAL	\$18,549	\$3,393	21%	\$19,942					\$18,549	\$3,393	\$19,942							
18	CULTURAL RESOURCE PRESERVATION	\$115	\$29	25%	\$144					\$115	\$29	\$144							
18	CULTURAL RESOURCE PRES. - NON-FEDERAL	\$115	\$29	25%	\$144					\$115	\$29	\$144							
CONSTRUCTION ESTIMATE TOTALS:		\$244,147	\$53,210		\$297,356					\$244,147	\$53,210	\$297,356	\$1,143						
01	LANDS AND DAMAGES - NON-FEDERAL	\$8,752	\$319	4%	\$9,071					\$8,752	\$319	\$9,071							
30	PLANNING, ENGINEERING & DESIGN	\$9,831	\$1,573	16%	\$11,404					\$9,831	\$1,573	\$11,404	\$3						
30	PLANNING, ENG & DESIGN - NON-FEDERAL	\$5,775	\$1,260	22%	\$7,035					\$5,775	\$1,260	\$7,035							
31	CONSTRUCTION MANAGEMENT - FEDERAL	\$9,468	\$1,147	12%	\$10,615					\$9,468	\$1,147	\$10,615	\$15						
31	CONSTRUCTION MANAGEMENT - NON-FEDERAL	\$4,584	\$1,007	22%	\$5,591					\$4,584	\$1,007	\$5,591							
PROJECT COST TOTALS:		\$268,275	\$58,516	21%	\$326,791					\$268,275	\$58,516	\$326,791	\$1,161						
ESTIMATED FEDERAL COST:																\$183,596			
ESTIMATED NON-FEDERAL COST:																\$150,771			
ESTIMATED TOTAL PROJECT COST:																\$374,367			

The costs for Lands and Damages and Planning, Professional and Retainers are to be borne entirely by the Non-Federal Sponsor


 PROJECT MANAGER, James Worthington
 CHIEF, REAL ESTATE, Orlando Basas
 CHIEF, PLANNING, Deian Dum
 CHIEF, ENGINEERING, Robert Howell
 CHIEF, OPERATIONS, Joseph Hramaz
 CHIEF, CONSTRUCTION, Donald Craleok
 CHIEF, CONTRACTING, John Euglio
 CHIEF, PM-I, Valerie Miller
 CHIEF, DPM, Pete Perez



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
441 G STREET, NW
WASHINGTON, DC 20314-1000

APR 16 2012

CEMP-SWD

MEMORANDUM FOR COMMANDER, SOUTHWESTERN DIVISION

SUBJECT: Corpus Christi Ship Channel (CCSC) Limited Reevaluation Report (LRR), Corpus Christi, Texas - Request for Exclusion from Type I Independent External Peer Review (IEPR)

1. The Headquarters, U.S. Army Corps of Engineers, has reviewed the IEPR exclusion request for the Corpus Christi Ship Channel, Corpus Christi, Texas Navigation Project. While the project does not represent a threat to health and safety; is not controversial; and has not had a request for IEPR from the Governor of an affected State or the head of a Federal or State agency, its cost is estimated to be greater than \$45 million. Projects costing over \$45 million may be excluded from Type I IEPR when no other mandatory conditions are met, the project does not include an Environmental Impact Statement (EIS), the various aspects of the problems or opportunities being addressed are not complex, and there is no controversy surrounding the study. Based on applicable laws and policy, the request for exclusion is approved.

2. Approval of the exclusion request was based on the following information. There are a total of four separable elements to the \$411 million CCSC project which was authorized by Section 1001(40) of the Water Resources Development Act of 2007. Two of the four separable elements were previously reevaluated in 2010. The current LRR is being prepared for the purpose of getting a new authorized project cost pursuant to Section 902 of the Water Resources Development Act of 1986. The LRR is updating the economics and environmental information for the remaining two separable elements - deepening and widening the CCSC and the construction of barge shelves on a portion of the channel. Specifically, these elements include deepening the CCSC to 52 feet and construction of barge shelves at 12 feet deep on both sides of the CCSC for approximately 10 miles. Project formulation has not been affected. Precedent-setting methods or models were not used in the evaluation and the LRR does not include an EIS.

3. Questions or concerns should be directed to Ms. Sandy Gore, Deputy Chief, Southwestern Division Regional Integration Team, at 202-761-5237.

MERDITH W.B. TEMPLE
Major General, USA
Acting Commander

CERTIFICATION OF LEGAL REVIEW

The Limited Reevaluation Report for Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, Texas dated November 2012 has been reviewed by the Office of Counsel, USAED Galveston. The report is approved as legally sufficient.

P. Alex Petty

P. ALEX PETTY
District Counsel

17 DECEMBER 2012

DATE

John P. LaRue
EXECUTIVE DIRECTOR



PORTCORPUSCHRISTI

August 28, 2012

Col. Christopher W. Sallese, Commander
USACE, Galveston District
P. O. Box 1229
Galveston, TX 77550-1229

**Subject: Corpus Christi Ship Channel
Deepening and Barge Shelves
Limited Re-Evaluation Report**

Dear Col. Sallese,

The Port of Corpus Christi Authority (PCCA) extends its full support for the deepening and barge shelves components of the Corpus Christi Ship Channel – Channel Improvement Project (Project). The PCCA understands that approval of the Limited Re-Evaluation Report (LRR) by the U.S. Army Corps of Engineers will allow the Project to be reauthorized at current cost levels. The LRR confirmed that the 52-foot deep channel deepening and 200-foot-wide barge shelves are still in the federal interest and remain the best alternative to address the PCCA's requirements for navigational improvements for the Corpus Christi Ship Channel. The improvements will assure the PCCA's goal of providing the safe and efficient transport of vessels into and out of the area while enhancing economic development for our region.

The Port of Corpus Christi Authority anxiously awaits the opportunity to amend its existing Project Partnership Agreement for the Project to include these critical additional general navigational features. Our Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents is attached. Thank you for your assistance for this much needed project. Please contact me if you need any additional information.

Sincerely,

John P. LaRue
Executive Director

JPL/DLK/pem
Enclosure



**NON-FEDERAL SPONSOR'S
SELF-CERTIFICATION OF FINANCIAL CAPABILITY
FOR DECISION DOCUMENTS**

I, Frank C. Brogan, do hereby certify that I am the Deputy Port Director of Engineering, Finance and Administration of the Port of Corpus Christi Authority of Nueces County, Texas (the "Non-Federal Sponsor"); that I am aware of the financial obligations of the Non-Federal Sponsor for the Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, Texas; and that the Non-Federal Sponsor will have the financial capability to satisfy the Non-Federal Sponsor's obligations for that project. I understand that the Government's acceptance of this self-certification shall not be construed as obligating either the Government or the Non-Federal Sponsor to implement a project.

IN WITNESS WHEREOF, I have made and executed this certification this 28th day of August 2012.

BY: Frank C. Brogan
Frank C. Brogan, P.E., R.P.L.S.
Deputy Port Director
Engineering, Finance and Administration

DATE: August 28, 2012



DEPARTMENT OF THE ARMY
 U.S. ARMY CORPS OF ENGINEERS
 WASHINGTON, D.C. 20314-1000

Reply to
 Attention of:

CEMP-SWD

OCT 23 2012

MEMORANDUM FOR Commander, Southwestern Division (CESWD-PDP), 1100 Commerce Street, Dallas, Texas 75242

SUBJECT: Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, TX -- Final Limited Re-evaluation Report (LRR) Policy Compliance Review, Final Assessment

1. The CESWG-PE memorandum, 17 September 2012, subject: Request for Approval of Final Limited Reevaluation Report, Corpus Christi Ship Channel Deepening and Barge Shelves, Corpus Christi, Texas, PWI #010383, forwarded the report for review and approval.
2. This memorandum submits the attached concerns resulting from the HQUSACE final assessment of the subject report. One previous concern regarding removals and relocations is still unresolved, and nine new comments were generated. See the enclosure for more details.
3. Several actions are necessary prior to approval of the LRR. These actions include responding, discussing and resolving concerns, and receiving MSC endorsement of the final LRR.
4. Any questions should be directed to Ms. Yvonne L. Haberer, SWD RIT Planning Program Manager, at 202-761-0315.

FOR THE COMMANDER:

Encl
 as

A handwritten signature in cursive script, appearing to read "for Sandra Altendorf".

CHRISTINE T. ALTENDORF, PH.D., P.E.
 Chief, Southwestern Division
 Regional Integration Team
 Directorate of Military Programs

**Corpus Christi Ship Channel, Corpus Christi, TX
Deepening and Barge Shelves
Limited Re-evaluation Report**

**HQSACE POLICY COMPLIANCE REVIEW
FINAL ASSESSMENT**

I. Background.

1. Project Area. The Corpus Christi Ship Channel (CCSC) provides deep-water access from the Gulf of Mexico to the Port of Corpus Christi, via Aransas Pass, through Redfish Bay and Corpus Christi Bay. Access points include the La Quinta Channel, the Gulf Intracoastal Waterway (GIWW), and Rincon Channel. The waterway extends from deep water in the Gulf through the Aransas Pass jettied entrance, then westerly 20.75 miles through Industrial Canal to and including a turning basin at Avery Point, then westerly 0.9 miles to and including the Chemical Turning Basin, then 3.3 miles to and including a turning basin near Tule Lake, then northwesterly 1.8 miles to the Viola Turning Basin. The landlocked portion of the CCSC is referred to as Inner Harbor. The La Quinta Channel extends off the CCSC near Ingleside, Texas, and runs parallel to the eastern shoreline of Corpus Christi Bay for 5.5 miles to the La Quinta Channel Turning Basin.

2. Project Authorization. Section 1001(40) of Water Resource Development Act (WRDA) 2007 authorized modifications to the Corpus Christi Ship Channel with the following language:

CORPUS CHRISTI SHIP CHANNEL, CORPUS CHRISTI, TEXAS.—

(A) IN GENERAL.—The project for navigation and ecosystem restoration, Corpus Christi Ship Channel, Texas: Report of the Chief of Engineers dated June 2, 2003, at a total cost of \$188,110,000, with an estimated Federal cost of \$87,810,000 and an estimated non-Federal cost of \$100,300,000.

(B) NAVIGATIONAL SERVITUDE.—In carrying out the project under subparagraph (A), the Secretary shall enforce the navigational servitude in the Corpus Christi Ship Channel (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of section 101 of the Water Resources Development Act of 1986 (33 U.S.C. 2211).

This Limited Reevaluation Report updates project costs to support additional authorization beyond the 902 limit for the project. Construction of the project is to be completed as authorized.

3. Status of ATR and IEPR. The Deep-Draft Navigation Planning Center of Expertise (DDNPCX) completed Agency Technical Review (ATR) for the CCSC LRR and that review was certified in May 2011. A second ATR review of the LRR subsequent to its revision was certified on 27 July 2012. The Cost Engineering Center of Expertise

reviewed and certified the total project cost (updated to October 2011 price levels) for the CCSC LRR dated 25 July 2012 and 31 August 2012. The economic model was approved for one-time use by HQUSACE on 11 September 2012. The IEPR exclusion request was approved by HQUSACE on 16 April 2012.

4. Policy Compliance Reviews. The HQUSACE Policy Review team conducted a policy and legal review of the draft LRR submittal package dated 31 August 2011. The final LRR was received in HQ on 18 September 2012 for review and approval. Section II below summarizes the comments and responses, and provides the HQ Final Assessment based on review of the final LRR dated September 2012. One comment from the previous review remains unresolved.

Review of the final September 2012 LRR generated nine new comments, which are listed in **Section III** of this documentation.

II. HQUSACE Policy Compliance Review. The following section of this document captures the HQUSACE Policy Review comments on the draft LRR submittal package dated 31 August 2011. All comments are resolved except one. Comment (II.1.f. Removals and Relocations) remains unresolved. A response to the HQUSACE Assessment is needed to enable final resolution.

1. Main Report Comments

- a. Price Level and Discount Rate. The current LRR utilizes FY12 (October 2011) price levels. Reports being submitted for approval (and subsequent authorization) should utilize the most current price level and discount rate per ER 1110-2-1302.

District Response: Concur. The team will update costs for the submittal of AFB documentation currently scheduled for February 2012. The LRR and subsequent documents will be modified to include prices and discount rates at 2012 price levels that are consistent with new cost guidance dated 25 August 2011.

Discussion: Report will include FY 2012 (October 2011) price levels consistent with revised cost guidance.

Required Action: Implement the district response.

District Action: Costs have been updated to 2012 price levels (1 October 2011) and were re-certified (31 August 2012) by the Walla Walla Cost Engineering Technical Center of Expertise. The current cost estimate can be located in Appendix A of the LRR.

The LRR and pertinent appendices have been updated to reflect these re-certified costs. For example, Section 4.0 Recommended Plan shows costs for separable elements updated to FY 12 (October 2011) price levels. The economic analysis was updated using the current discount rate of 4.000 percent, per EGM 12-01. The spreadsheet incorporates the current discount rate and those changes have been incorporated in the economic appendix and main report. For example, the references in the reports to the interest rate in the current benefits have been updated to 4.000 percent.

HQ Final Assessment: The report uses the FY12 Discount Rate of 4%. There is indication that the FY13 Discount Rate is going to go down, although it has not been officially announced. If the FY13 discount rate does change, then the economics will need to be updated to reflect the appropriate FY13 discount rate. As the LRR moves forward for Administration approval, please be aware of this requirement. Otherwise, this comment is resolved.

- b. Model Certification. Section 2.2 of the LRR mentions Economic Models used for the deepening analysis and benefit calculations, however the model is not certified. Since this LRR will form the basis for further project authorization and cost-sharing, it must comply with Engineering Circular (EC) 105-2-412 Planning: Assuring Quality of Planning Models.

District Response: Concur. Model Certification is currently being performed in accordance with EC 105-2-412. The District has been in coordination with the DDNPCX on certification for this model. Economic spreadsheets and report is currently being finalized and will be submitted to the DDNPCX in mid-January 2012.

Discussion: Spreadsheet will be submitted to the DDNPCX in January 2012. Division stated that the HarborSym model has received corporate certification; however, the district needs to ensure the current version is being used as there have been some changes made. Upload the input if the current version is not being used.

Required Action: Implement the district response and verify current version of HarborSym model is being used.

District Action: The economic spreadsheet and model documentation was submitted to the DDNPCX on January 24, 2012 for approval of the model. In addition, on page 13 of the report, the following was stated: "An Excel spreadsheet model was utilized for the deepening analysis. The model was developed by the District and will be considered for approval for one-time use. Model review is being conducted in accordance with Engineer Circular (EC) 1105-2-412, Assuring Quality of Planning Models dated 31 March 2011, and EC 1105-2-407, Planning Models Improvement Program: Model Certification dated 31 May 2005."

Also, due to the certification of the HarborSym model, the inputs were uploaded to the current version and the scenarios were re-run. The updated outputs were incorporated into the spreadsheet and the results are provided in the economic appendix and main report. For example, the updated average vessel wait times are provided in Tables 27 and 28 under Section 2.7 HarborSym Widening Analysis in the LRR. The DDNPCX model reviewer completed his certification review of the economic spreadsheet model in July 2012 and the DDNPCX requested an IPR with Tom Hughes via email dated 12 July 2012. An IPR between OWRP and the DDNPCX is necessary prior to approval of one-time use. Additionally, the economic model was approved for one-time use on 11 September 2012.

HQ Final Assessment: The concern is resolved by the response and economic model approval for one-time use.

- c. Project First Costs. Project first costs have substantially increased since authorization in WRDA 2007, from ~\$188M to ~\$337M. The LRR does not provide the reasons for the significant cost increases in such a short amount of time, particularly the real cost growth. A cost increase of this magnitude leads to questions regarding whether or not the recommended plan has changed enough in scope to warrant further plan formulation. The report should be revised to include specific details on why the construction costs have exponentially increased since authorization and clearly articulate the case that the recommended plan is still the National Economic Development (NED) Plan even with the cost increases. The report should follow the procedures in paragraph G-16.a.(9), Appendix G, Engineer Regulation (ER) 1105-2-100, which requires itemizing the reasons for cost changes.

District Response: Concur. There has been no change to scope of the project. Increases are solely related to inflation for materials and work. For example, fuel costs have increased from \$0.95/gallon in 2002 to approximately \$3.29/gallon in 2011. There was also a large upswing in costs for materials during the 2004 through 2006 time period that impacted overall construction costs. A table showing a four column comparison will be added to the report. Those columns will address: 1) the estimated cost for the project being recommended; 2) the project as authorized by Congress; 3) the authorized project updated to current price levels; and 4) the project last presented to Congress. In subparagraphs, the District will itemize the reasons for the cost changes so that 100 percent of the cost increase since authorization is explained.

Discussion: Clearly need to state in the report that the project scope has not changed so that it is understood there is no need to go back through formulation. It is critical to show the major components (i.e., Account 01, 12, etc.), from the Chief's report to present to show that there is only a cost change; the scope remains the same. The report should include a table that clearly communicates the cost from the Chief's report and the cost now. Start with the information from the Total Project Cost Summary (TPCS) sheet at account level (not subaccount level). Comparison of major

features/components or contracts from the previous report showing how the costs have changed is acceptable.

Required Action: Implement the district response with interim coordination with the Major Subordinate Command (MSC).

- a) District Action: In the LRR under Section 5.2 Changes in Scope of Authorized Project it states “There is no change in scope of the authorized project.” Under Section 5.6 Changes in Total Project First Costs, Table 60 shows a four column comparison of the costs as requested. Those columns provide: 1) the project first cost for the project (October 2002 price level); 2) the project as authorized by Congress (same as the project last presented to Congress) at October 2005 price levels; 3) the authorized project updated to current price levels (October 2011); and 4) the current estimated project first cost for the project being recommended (October 2011 price level).

In subparagraphs under Section 5.6, the reasons for the cost changes have been itemized so that the cost increase since authorization is explained. For example, the most significant increase in cost for the project is under the 12 Code Account. The price of fuel assumed in the original estimate (October 2002 price level) was \$1.00 per gallon. When the project cost was updated for the WRDA 2007 authorization the original project cost was inflated from October 2005 price level for the 2003 report by applying inflation and consumer price index adjustment factors. The updated costs did not reflect increases in fuel prices which fluctuated from a recorded low of \$1.67 a gallon to a high of \$2.86 a gallon in 2005. This approximate doubling of the fuel price typically results in an approximately 50 to 55 percent increase in the unit price of dredging. Additionally, the higher fuel price also translates to higher mobilization and demobilization costs for the dredge plant. The Total Project First Cost updated to FY 12 (October 2011) price level is now estimated at 337,952,000 (inclusive of \$1,161,000 expended costs).

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- d. Project Benefits. Table 48 of the LRR lists the total annual benefits as \$31,539,700. The sum of the annual benefits by category (grain exports, petroleum imports, petroleum product imports, petroleum product exports, and incidental benefits) does not add up to the total benefits claimed. Please clarify the reason for this discrepancy and, if necessary, revise the LRR.

District Response: Concur. The annual benefits for each commodity category do not currently equal the equivalent annual savings in Table 48. The sum of the equivalent annual savings from Tables 41, 44, 45, 46, and 47 should add up to the equivalent annual savings provided in Table 48. Upon completion of Model Certification the benefit numbers will be updated and the tables modified.

Discussion: Need to discuss whether the AEO 2010 forecast is being used, if not the report must include detailed discussion of why not, and the ATR and economic model approval process should review that rationale. Need to update benefits from the authorizing report without building a new economic model. The forecast should be consistent with Freeport. Economic analysis should demonstrate that the project is economically justified at the current price level.

Required Action: Implement the district response and discussion.

District Action: (Note: The previous Table 48 is now Table 49 (pg 61)). Upon completion of the economic update, to include updating the interest rate, etc., the benefit numbers were updated and the tables were modified. The equivalent annual savings in Table 49 are shown as \$50,204 (in thousands), and the individual equivalent annual savings provided in Tables now numbered as Table 48 (pg 60), Table 41 (pg 55), Table 42, (pg 56) and Table 43 (pg 56), add up to the total equivalent annual savings provided in Table 49 (pg 61).

In addition, the 2010 AEO forecast is being used for petroleum products, imports, and exports. However, Global Insight's forecast is being used for crude oil imports. As stated on page 18 "Corpus Christi's updated 2014-2064 Crude Oil Imports Tonnage Forecast was prepared using Global Insight's Projections and is presented in Table 9." There is also a discussion regarding AEO and Global Insight's Forecasts and why Global Insight's Forecast was used for crude oil imports. The respective AEO and Global Insight's Forecast used for petroleum products and crude oil imports is consistent with the forecast used in Freeport.

The economic model was approved for one-time use on 11 September 2012.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- e. IEPR. In accordance with EC 1165-2-209, IEPR will be conducted unless it is determined that none of the mandatory or discretionary triggers are met. If there is a determination that the triggers are not met, the district must prepare an IEPR exclusion request that will be transmitted to HQUSACE for approval.

District Response: Concur. The District has coordinated the IEPR exclusion through the DDNPCX and has received concurrence. This exclusion request has been submitted to SWD for review, approval and subsequent submittal to HQ for review. SWD has stated that the IEPR package will be submitted to HQ the week of 12 December 2012.

Discussion: The IEPR package is in SWD waiting for Commander's signature. It should be transmitted to HQ within the next couple days. The IEPR team meets every couple weeks; however, there will not likely be any additional meetings for

December 2011. RIT will process through for review probably in January 2012. HQ can't say whether an IEPR exclusion will be granted.

Required Action: Implement the district response.

District Action: Per Memorandum dated 16 April 2012, Headquarters, USACE, reviewed the IEPR exclusion request for the Corpus Christi Ship Channel, Corpus Christi Navigation Project and based on applicable laws and policy, the request for exclusion was approved and signed by Merdith W.B. Temple, Major General, USA, Acting Commander. The IEPR Exclusion Request Approval is included with the supporting documentation.

HQ Final Assessment: The concern is resolved by the response and IEPR exclusion request approval.

- f. Removals and Relocations, P. 85, second paragraph of the Recommended Plan. This paragraph, which indicates that pipelines will be removed using the navigation servitude at full cost to the owner, requires modification to bring it into line with the Corps' legal/policy position on this matter best stated in the Real Estate (RE) Plan for the Sabine-Neches Waterway, March 2011, pages 12-13. The first sentence of the paragraph correctly quotes the authority contained in Section 1001(40) of WRDA 2007, but that does not necessarily mean that removals will be at full cost to the owner. It will depend on the situation. For example, a utility relocation in the deep draft channel may have been classed as a removal in the 2003 Feasibility Report because it did not meet the definition of "public utility". Since we now include the relocation of any pipeline, cable, or related facility in the definition of utility for purposes of cost sharing deep draft utility relocations between the Sponsor and the owner under Section 101(a)(4) of WRDA 1986 at 50-50%, such cost sharing would apply in this situation. This is consistent with Section 1001(40), as that section explicitly requires the application of Section 101 cost sharing. Another situation would be a pipeline that is abandoned in place. Although this is not a relocation for purposes of cost sharing under Section 101(a)(4), it would still fall within the procedures for Sponsor-owner negotiations on any compensable interests prior to Corps exercise of the navigation servitude and removal of the pipeline as part of cost shared construction. See page 13 of the Sabine-Neches RE Plan, fourth paragraph.

District Response: Concur. The previously completed feasibility report for this project clearly indicates which pipelines were classified as relocations and removals with the cost of relocations being shared 50/50 between owners and sponsor and removals at 100% owner cost. This LRR will verify that these classifications are consistent with policy identified for the Sabine Neches Waterway study.

Discussion: Guidance for the pipeline removals and relocations for the Corpus Christi Project should be in accordance with the recent Sabine Neches Waterway CIP Final Feasibility Report of March 2011. Need to look at all of the “utilities” and have sponsor and owners determine whether there is a “compensable interest” and make appropriate arrangements. Ensure all utilities are in the correct category. Definition of utility is now in accordance with guidance provided within the Sabine Neches Waterway CIP Final Feasibility Report.

Required Action: Implement the district response.

District Action: The district has addressed the CCSC Pipeline Crossing list by ensuring all utilities have been updated to the correct category in regards to being listed as a Removal or Deep Draft Relocation, as described in Appendix 5. The updated CCSC Pipeline Crossing was developed in coordination with the local Sponsor.

The district implemented the Corpus Christi Ship Channel Chief’s Report (02 Jun 2003), WRDA 2007 Implementation Guidance on Project Authorizations in Section 1001 Memorandum (24 Mar 2008) and PL 110-114 (HR 1495) 08 Nov 2007 WRDA 2007 (40)(b) during the drafting of the LLR. Also used as general guidance for this LLR was the SNWW Feasibility Report Study 2011.

The District addressed comment (f) by adding the statement below to the first paragraph of the “FACILITY/UTILITY RELOCATIONS” section within the REP:

FACILITY/UTILITY RELOCATIONS AND REMOVALS: There are 48 pipelines and conduit facilities below the channel that are within the entire CCSC Project boundaries. Of the 48 pipelines and conduit facilities, 43 are below the channel and will be affected by the deepening and widening of the CCSC and the barge shelves element. A determination of which of the facilities will probably be impacted was made during the feasibility study. (See Table 2 below for complete list of all pipelines affecting the Project.) Twenty six (26) deep draft utility relocations and seventeen (17) removals were identified. Pipelines located within the La Quinta Channel Extension are included in Table 2 below, but were not calculated in the total project costs because ownership was identified and pipelines were removed at the owners’ expense for previous construction of that separable element.

Pursuant to Section 1001(40) of WRDA 2007, subparagraph (B), in carrying out the authorized project, the Secretary shall enforce the navigational servitude in the CCSC (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of Section 101 of WRDA 86 (33 U.S.C. 2211). Therefore, the Sponsor is responsible for performing, or assuring the performance, of all relocations, including utility relocations, necessary for construction of the project. All relocations, including utility relocations, are to be accomplished at no cost to the Federal Government.

Since the recommended plan consists of a 52-foot deep navigation channel, the CIP is a deep draft project. Therefore, in accordance with Section 101(a)(4) of WRDA 86, for all relocations of pipelines that are classified as "deep draft utility relocations," one-half of the cost of each such relocation shall be borne by the owner of the facility being relocated and one-half of the cost of each such relocation shall be borne by the Sponsor. This includes any pipelines that were not defined as a "public utility" prior to the 2003 Corps Christi Ship Channel Feasibility Report.

The cost of the pipeline removals will be borne 100 percent by the facility owner if the subject owner has been located and is in agreement to the terms of the removal pursuant to the Section 10 permit.

In the event that the facility owner cannot be located or the facility owner has been located but not in agreement to the terms of the pipeline removal, then the Corps will revoke any existing Section 10 permit and remove the line as part of construction of the CIP, with the costs of the removal shared by the Corps and Sponsor as part of the costs of the general navigation features.

A line-by-line categorization of these facilities is attached as Appendix 5. All removals and deep draft utility relocations are located in the open water. There are no bank removal areas affecting removals or relocations.

Based on current law and Administration policy, cost-sharing for the recommended plan will be based on Section 101(a)(4) of the Water Resources Development Act of 1986 and U.S. Army Corps of Engineers policy regarding the categorization and assignment of costs for actions involving facilities interfering with Federal navigation improvements. Cost sharing has been determined as to whether the affected facilities have been categorized as "removals" or "deep draft utility relocations," and presented in Appendix 5 for each of the pipelines and conduits affected by the Project.

Any conclusion or categorization contained in this report that an item is a deep draft utility relocation or a removal, to be performed by the Non-Federal Sponsor as part of its LERRD responsibilities is preliminary only. The Government will make a final determination of the relocations necessary for the construction, operation, or maintenance of the Project after further analysis and completion and approval of final attorney's opinions of compensability for each of the impacted utilities and facilities. In the event the future status of a pipeline or facility is converted from relocation to a removal, such as a pipeline that becomes abandoned, the Non-Federal Sponsor will work with the owner to ensure the removal and none of the costs of removal will be creditable against the Sponsor's cost share.

HQ Final Assessment: The concern is not yet resolved. There are a couple of refinements that need to be considered, and more importantly, the overall context of the relocation costs within the Total Project Cost calculations needs to be detailed.

1. Taking the second matter first, it is not clear from the report that the correct Total Project Cost has been identified as a basis for increasing the authorized cost and future cost calculations under Section 902 due to the treatment of the deep draft utility relocations (DDUR). Table 68 identifies the current project cost as \$337,952,000, which includes \$26,950,000 for the relocations- pipelines item. First, the total cost appears to be slightly different than the \$336,791,000 value shown in the Total Project Cost Spreadsheet on C-2. The value of \$26,950,000 is included in the Appendix C estimate as a non-Federal project cost for relocations. Table 4 in contrast shows the deep draft utility relocations as part of the associated costs based on the 2003 feasibility report. Tables 54 and 55 indicate in the footnotes that the total cost shown does not include the associated non-Federal costs of \$60,434,000. The pipeline costs of \$26,950,000 are shown as \$13,475,000 non-Federal and \$13,475,000 LSF. This results in some confusion as to how the cost for DDUR is being treated, whether the LSF value is intended to be the owner's 50% share of DDUR (which is an associated project cost), and if the total project cost is correct or includes some associated project costs.

The total project cost for authorization should be calculated as follows.

For the purpose of calculating the Section 902 limit, the total estimated first cost of the project is \$ (a) including an estimated Federal share of \$ (b) and an estimated non-Federal share of \$ (c).

- (a) Includes only GNF costs plus LERR value, (and for deep draft harbors) plus the 50% of deep draft utility relocation (DDUR) costs borne by the NFS (ie. (a) = (b) + (c) below).
- (b) Includes only the Government's percentage share of GNF costs.
- (c) Includes only the NFSs initial percentage share of GNF costs (ie. not the extra 10% payment amount) plus LERR value, (and for deep draft harbors) plus the 50% of DDUR costs borne by the NFS

All of the project costs and associated costs should be clearly identified and included in the benefit to cost ratio calculation. In addition, the appropriate values for the LERR and DDUR should be reflected in the Real Estate Appendix after resolution of the cost concerns to assure consistency.

2. With regard to the details of the proposed new Section 18 of the Real Estate Plan, "Facility/Utility Relocations and Removals", it should be noted that the language quoted above does not precisely mirror the language that was actually inserted into Section 18. For example, the above language correctly refrained from referencing Policy Guidance Letter (PGL) 44, which has now been overtaken by the policy originally identified in the Sabine-Neches RE Plan, but the CCSC REP itself still references PGL 44. Also the Table of relocations in the CCSC REP, in the rows indicating removals, lists "Abandoned" in the "Type" columns. That term has a specific meaning in admiralty law and should not be used here. I assume that what is meant is that the owner cannot be located, and if so this should be stated.

Lastly, the two paragraphs above regarding removals and commencing with the words: “The cost of pipeline removals will be borne 100 percent by the facility owner. . . .” and “In the event the facility owner cannot be located. . . .” are not quite as precise as the equivalent paragraph in the Sabine-Neches REP, in that the cost may not be 100 percent attributable to the facility owner if compensation is owed to the facility owner by the Sponsor under local law. If the Sponsor does have to pay in such a case, then its payment may be credited as part of LERS against the 10 percent additional amount. Therefore the following paragraph should be substituted, modeled on the one in the Sabine-Neches REP:

“The following procedure applies to pipelines that are no longer necessary and therefore do not require replacement, or whose owners cannot be located, but that require removal to construct the CCSC. If an owner of such a line can be located, the Sponsor will contact the owner to reach a determination as to whether the owner has an interest in the existing line for which compensation is owed by the Sponsor. If the owner has a compensable interest, the Sponsor, as part of its requirement to provide lands, easements, and rights-of-way required for the CCSC, will be responsible for acquiring this interest, at no cost to the Federal Government. The Sponsor will receive credit toward its additional 10 percent cash payment required by Section 101(a)(2) of WRDA 86 for the value of the interest acquired, and the Corps will revoke any existing Section 10 permit and remove the line as part of construction of the CCSC, with the costs of the removal shared by the Corps and Sponsor as part of the costs of the general navigation features. If no compensation is owed to the owner of the line, or if the owner cannot be located, then the Corps will revoke any existing Section 10 permit and remove the line as part of construction of the CCSC, with the costs of the removal shared by the Corps and Sponsor as part of the costs of the general navigation features.”

2. Section 3.0-Environmental Update

- a. Threatened and Endangered (T&E) Species considerations. Because it has been over five years since Section 7 consultations were completed, as part of this effort, an updated T&E list was obtained to ensure current /proposed project compliance with the Endangered Species Act (ESA). US Fish & Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) provided new Federal lists of T&E species, under their respective stewardships, that may occur in the project area. Reference Page 76, second paragraph, which states that Table 50 shows the T&E species and further states that the USFWS and NMFS letters can be found in Appendix A.
 - i. Table 50 is Current Construction Cost (page 73). Table 51 is the correct reference, found on page 76. This reference should be corrected.

District Response: Concur. Reference will be corrected to “Table 51...” in LRR.

Discussion: Include environmental documentation.

Required Action: Implement the district response.

District Action: The aforementioned table reference for endangered species under the jurisdiction of USFWS has been corrected to cite the appropriate Table number which is now Table 52 and is located on page 66 of the LRR. The second table for endangered species (under NMFS jurisdiction) is labeled as Table 53 on page 69 of the LRR. In addition, the letters referred to for the USFWS can be found in Appendix B and the letters referred to for the NMFS can be found in Appendix C of the report.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- ii. Referenced Appendix A is “Project Cost & Risk Analysis. There are NO T&E/ESA references in this appendix. More critical to the LRR there are no copies of the documents found anywhere throughout the LRR. This needs to be corrected.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals. References to appendices will be corrected in the LRR and all required appendices will be included in subsequent submittals. Previous letters from USFWS and NFMS, as well as current Corps letters to these agencies to update coordination, are attached.

Discussion: The information missing from the appendices was received by HQ prior to the IPR. Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: The Appendices have been corrected. USFWS Coordination can be found in Appendix B and NMFS Coordination can be found in Appendix C. The current letters to the agencies have been attached to the aforementioned appendices.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- iii. Page 76 notes “In a letter dated December 5, 2008, (Appendix B)” the USFWS provided information on the delisting of 3 species (northern aplomado falcon, mountain plover, and Eskimo curlew) and are no longer on the T&E list for San Patricio and Nueces County. However, the whooping crane is now listed in Nueces County as well as San Patricio County (that was already on the 2003 listing).

District Response: Documentation was left out of submittal but will be included in future submittals. Additional coordination is also underway with National Oceanic Atmospheric Administration (NOAA) and USFWS as existing coordination has become dated. Lists will be coordinated and updated as necessary. Corps letters to the USFWS and NMFS to update coordination are attached.

Discussion: The information missing from the appendices was received by HQ prior to the In-Progress Review (IPR). Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: District response has been implemented. Lists have been coordinated and updated. Corps letters to the USFWS and NMFS to update the coordination are attached to the appendices.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- iv. The last paragraph on page 77, discusses the fact that the brown pelican is no longer listed, but that the “...USACE will continue to honor agreements coordinated with the USFWS during Section 7 consultation in 2002 to ensure project impacts do not have a cumulative effect that could contribute to a USFWS determination that the species should be relisted.” As part of the 2002 agreements, USACE agreed to extend bayward from the east end of the island a 2,200 linear foot hydraulically filled embankment, protected by geotube and/or riprap. Since then it has been determined that the embankment was designed to prevent dredged material from flowing east into the channel is not needed. Accordingly at a meeting in November 2005, USACE requested that USFWS remove this measure from the list. USFWS concurred, and agreed to remove the measure in a letter dated April 5, 2006. Again, references Appendix B to provide the reviewer/approving official documentation of this action. ...and once again: no such letter appears in Appendix B. Subject matter of Appendix B is: Section 902 Analysis. All these omissions of documentation of concurrence need to be provided and included in LRR in a properly identified appendix.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals. References to appendices will be corrected in the LRR and all required appendices will be included in subsequent submittals. The "Appendix B" USFWS Letter is attached.

Discussion: The information missing from the appendices was received by HQ prior to the IPR. Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: District response has been implemented. Appendices have been corrected and the referenced letters are now included.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- v. Beginning on page 79 the T&E/ESA dialogues with NMFS is provided. As part of this effort the reader is directed to "Appendix C" for a series of e-mails the NMFS has provided for an explanation of USACE's responsibilities and an updated list of T&E species that could be found in the project area. The list included one new endangered species for consideration: the Smalltooth Sawfish. The e-mail also stated that the USACE likely does not need to re-initiate consultation with NMFS, but USACE will have to make that determination. Once again, the cited Appendix C is in error. In fact, the LRR does not even contain an Appendix C. Accordingly none of the referenced NMFS e-mails are available to support the statements of "unlikelihood of need to re-initiate consultation" as related to the new listing of the smalltooth sawfish. These omissions/miss identifications must be corrected.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals. References to appendices will be corrected in the LRR and all required appendices will be included in subsequent submittals. The "Appendix C" NFMS letter is attached.

Discussion: The information missing from the appendices was received by HQ prior to the IPR. Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: District response has been implemented. NMFS Coordination can be found in Appendix C. Appendices have been corrected and referenced letters are now included.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- b. Section 404 Water Quality Exclusion. LRR, page 82 notes, rather abruptly, that "...the State of Texas water quality certification will not be required", and that no new or additional water quality certification is required for the LRR. Believe it would provide a better explanation by citing appropriate guidance found in ER 1105-2-100, Appendix C, page C-42, C-6g. Section 404(r) Exemption. This describes how Section 404(r) waives the requirement to obtain either the State water quality certificate or the 404 permit if complete information on the effects of the discharge of dredged or fill material into the waters of the United States, including the application of the Section 404(b)(1) Guidelines are included in the Environmental Impact Statement (EIS), and the EIS is submitted to Congress. Evaluation will be discussed in the body of the EIS and included in full in the Appendix to the Main Report. When such compliance is noted in the Record of Decision (ROD), this will satisfy the Section 404(r) criteria, hence no State Certification would be required. This is indeed the case with the Corpus Christi Ship Channel Deepening and Barge Shelves Report and EIS.

District Response: Concur. The LRR will be modified to better explain the use of 404(r) exemption. Specific wording that details the specific process for 404(r) exemption will be lifted from the guidance and placed in the LRR.

Discussion: Comment intended to clean up document to accurately reflect the 404(r) waiver for the project signed by Woodley.

Required Action: Implement the district response and attach the signed ROD to the National Environmental Policy Act (NEPA) document.

District Action: District response has been implemented. Requirements for 404(r) exemption found in ER 1105-2-100, Appendix C, Section C-6, page C-42, C-6g, as well as how the requirements were met, were included in the LRR. The signed ROD was attached to the NEPA document.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

3. Project Study Issue Checklist Comments

- a. Project Datum (Issue #2). The study currently uses mean low tide (MLT) datum instead of the required datum of mean lower low water (MLLW). The WRDA 92 congressional action amended the Rivers and Harbors Appropriation Act of 1915. This amendment specifically required that navigation projects developed since the 1915 Act be referenced to a vertical MLLW defined by the Department of Commerce. The intent of WRDA 92 was to supersede older MLW datums on the Atlantic and Gulf Coasts or locally defined navigation datums. Subsequent HQUSACE guidance was issued in 1993 to implement the provisions of WRDA 92. Furthermore, ER 1110-2-8160, 1 March 2009, directs that all coastal USACE navigation projects be directly referenced to MLLW as determined by the most recent NOAA National Tidal Datum Epoch. Tidal Datum conversion could have a direct implication on cost-sharing based on foot-depth of the channel. While the district's Issue Paper #2 makes mention that all elevations used in the report are in MLT, there is no mention of how the Galveston District is in the process of collecting data in an effort to convert MLT datum to MLLW datum along the Texas coast. Relaying this information in the Issue Paper would have been beneficial to the reviewers of the report. Please explain what actions the district is taking to be policy compliant with the MLLW conversion.

District Response: A modified issue paper detailing the Districts efforts for conversion to MLLW was supplied to HQ on 1 November 2011. That document details the background of why the conversion is necessary and the steps that the District is taking to make the change. All of these steps are detailed in the modified issue paper which will be supplied as an attachment to this document.

Discussion: HQ and the ASA (CW) were recently briefed on the Galveston District's on-going process of collecting data in an effort to convert MLT datum to MLLW datum along the Texas Coast. The ASA CW has expressed concern on the Sabine Neches Waterway CIP where the district did not use the proper vertical datum. The tidal change between MLT to MLLW varies on the CCSC from about 1.0 – 1.5 feet.

Required Action: Include a discussion in the LRR on the district's ongoing conversion efforts.

District Action: The following text was added to the initial discussion at the end of Section 1.4 in the LRR:

A synopsis of the four phases the District will perform to comply with the above reference guidance with estimated cost and estimated duration is as follows:

- Phase 1: Use active and inactive Texas Coastal Ocean Observation Network (TCOON) gages to determine calibration/conversion values between MLLW (approximately \$300,000 and one year).
- Phase 2: Establish new gages if needed to better define the MLT and MLLW relationships in the coastal region (approximately \$1,311,000 and 18 month).
- Phase 3: Install new or reconfigure existing staff gages to reflect MLLW datum (approximately \$300,000-500,000 labor and 18 months scheduled parallel with Phases 1 and 2 to minimize delay in overall conversion).
- Phase 4: Update technical materials and communicate conversion impacts to internal/external stakeholders (no cost/duration cited).

Activities associated with Phases 1 and 2 have been initiated via contract. Because of the data collection requirements, these tasks are scheduled to be completed by 3rd Quarter FY13.

Additional References for consultation during PED may include the following post-2003 guidance pertaining to tidal datum:

1. ER 1110-2-8160, "Policies for Referencing Project Elevation Grades to Nationwide Vertical Datums", dated March 1, 2009;
2. Engineer Circular (EC) 1110-2-6070, "Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects", dated July 1, 2009;
3. EM 1110-1-1005, "Engineering and Design – Control and Topographic Surveying", Appendix B-6. Implementation Actions, dated January 1, 2007; and
4. EM 1110-2-6056, "Standards and Procedures for Referencing Project Evaluation Grades to Nationwide Vertical Datums", dated December 31, 2010.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

4. Non-Critical/Miscellaneous

- a. Table of Contents lists four Appendices incorrectly:
 A-Project Cost Estimate: CORRECT
 B- USFWS ES Coordination-
 WRONG: Section 902 Analysis
 C- NMFS ES Coordination-
 WRONG: LRR does NOT have an Appendix C
 D- Section 902 Analysis- WRONG: 902 Analysis, as already noted: is Appendix B, in addition there is NO Appendix D in this report.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals.

Discussion: None

Required Action: Implement the district response.

District Action: The physical documents have been noted correctly and attached in the proper order for subsequent submittals.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- b. Table 54, page 86 has several simple mathematical (adding). For example:
 Beneficial Use Sites Total is \$30,445,000 and should be \$30,446,000;
 Construction Management: Total-\$14,281,000, should be: \$15,607,000; Total
 Cost: \$299,355,000 should be: \$301,682,000.

District Response: Concur. The document will be modified to correct the totals as detailed in the comment.

Discussion: None

Required Action: Implement the district response.

District Action: The aforementioned Table is now Table 55. All computations have been corrected in the table.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- c. Editorial corrections are needed on the following pages of the LRR: 16, 26, and 85.

District Response: Concur. The tables on pages 16 and 26 will be scrubbed to correct the formatting of the footnote identifiers. Pipeline costs in paragraph 2 will be modified to show correct cost sharing; and price levels in paragraph 3 on page 85 will be modified and updated to 2012 levels.

Discussion: Footnotes and fonts need to be fixed.

Required Action: Implement the district response.

District Action: All tables have been scrubbed to correct the formatting of the footnote identifiers. Pipeline costs which are addressed beginning in paragraph two under Section 4.0 Recommended Plan have been modified to show correct cost sharing. All price levels including paragraph 5 (previously identified as paragraph 3 before revision of the report) under Section 4.0 Recommended Plan have been modified and updated to FY 12 levels (1 October 2011).

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

III. Comments on the September 2012 Final LRR. The following section of this document captures the new policy review comments on the Final LRR dated September 2012. A response to each comment listed below is needed to enable final resolution.

1. Calculation of BCRs. It appears that the BCRs identified on page 61 and 62 of the report are actually Remaining Benefit Remaining Cost Ratios (RBRCRs), even though they are labeled BCR. For the 'reauthorization' decision, the total RBRCR at the current discount rate is used. However, it should be noted that this document will also serve as the Updated BCR for budgetary purposes. Therefore the report should include four calculated Benefit and Cost Ratios - the RBRCR at both the current discount rate and at 7% and also the Total BCR at both the current rate and at 7% (ref. DCW Memorandum SUBJECT: Methodology for Updating Benefit-to-Cost Ratios (BCR) for Budget Development Dated 8 March 2012). The report needs to be revised to include all appropriate Benefit to Cost Ratios to support both the authorization and budget decisions.

2. Environmental (General). It is understood that the focus of the environmental update is on changes since the 2003 report. In particular, the report needs to show that no significant changes to the natural or man-made environment have occurred in order to justify providing only an update and not a supplement. However, the 2003 report has some good text in the executive summary that summarizes the environmental analyses that were done. It is suggested to include the below text copied from the 2003 report (or something similar) as well as a web link to the 2003 report. Without this text, it is not apparent the work that went into the original analysis.

“The following is a brief summary of the effects of the recommended plan on the significant environmental resources of Corpus Christi Bay.

Water Quality

A Hydrodynamic and Salinity Model for Corpus Christi Bay, developed by the Texas Water Development Board, evaluated water exchange and salinity impacts. The model results concluded that changes in tidal amplitude of 0.06 feet or less are expected in the project area, and that changes in salinity may seasonally and

locally decrease by up to 4 ppt or increase up to 0.38 ppt. Testing of maintenance material elutriates with chemical analyses and water column bioassays has indicated no cause for concern. No significant increase or decrease in ballast water introductions is expected. As a result, no net adverse direct or indirect impacts from water quality are expected as a result of the recommended plan.

Sediment Quality

The results of sediment analyses demonstrated that new work and maintenance dredged material are acceptable for beneficial uses with two exceptions. Sediments from the Inner Harbor will be placed in several upland confined placement areas, and the fine material from the Upper Bay will continue to go into open-bay, unconfined placement areas.

Community Types

Five acres of submerged aquatic vegetation will be directly impacted by the recommended plan. This loss will be mitigated by planting 15 acres of seagrass within a 200-acre shallow water beneficial use site. The beneficial use plan will protect and create submerged aquatic vegetation habitat areas, wetlands, and coastal shore areas.

Fish and Wildlife Resources

No significant adverse impacts to finfish, shellfish, recreational and commercial species, aquatic communities, essential fish habitat, and wildlife resources are expected to occur from the recommended plan. Temporary impacts to fish and wildlife resources may be experienced from dredging and resulting suspended solids (turbidity). However, the beneficial use plan will create new habitat to be used by these species.”

3. Environmental (DMMP/BU). It is also suggested that information regarding which portions of the Dredged Material Management/Beneficial Uses Plan will be accomplished for this portion of the project also be briefly outlined. (It is confusing to read on page 87 that the ecosystem restoration component has been completed, and yet it appears this was supposed to be one of the beneficial uses of dredge material.)

4. Cumulative Impacts. Were cumulative impacts re-evaluated? (Are there any new projects in the area, which were unknown in 2003?) Please include if there are any additional projects that would change the cumulative impacts analysis.

5. Mitigation. Why does it say there is no mitigation on page 73 of the LRR, but the 2003 FEIS, in the executive summary (see text above) states that there will be mitigation for 5 acres of seagrasses? Please indicate if there is or is not mitigation and be consistent in the document.

6. Socio-Economic and Environmental Justice. It does not appear that the original analysis in the EIS indicated whether the demographics near the ports and/or shipping channel were different than away from the ports/channel nor does it indicate if populations near these areas would receive higher exposures or impacts than others. The latest analysis does not indicate if there were any changes in demographics in the area or if there would be changes to exposure levels. Are there any populations in the area that would receive a higher exposure than others from emissions at/near the port? If so, are those minority or low income populations? Please indicate such in the report.

7. General Navigation Features (Entrance Channel). Reference Page 6, Main Report. Since the proposal is to deepen the entrance channel to 54 feet, the channel should only be extended to the 54-foot contour in the Gulf rather than the 56-foot contour. The purpose of advanced maintenance dredging is not to provide a deeper channel, but to enable the channel to stay open at the authorized depth for a longer period of time. This would reduce the cost of the project.

8. General Navigation Features (Lower Bay Portion). Reference Page 8, Main Report. Please explain why we aren't narrowing the eastern portion of the channel to 530 feet if ERDC's ship simulation studies show that's all that's needed for safety navigation. This would also reduce the cost of the project.

9. Funding Since Authorization. Reference Page 10, Tables 1 and 2. Would the costs/values in these tables change if updated closer to the final report submittal date? The expenditures only show a portion of FY12 - October 1, 2011 to January 30, 2012.

EDITORIAL COMMENTS:

NED Benefits. Reference Page 12, Table 3. The first year "2046" in the "Year" column should be "2036".

Present Market Conditions. Reference Page 16, Tables 5, 6, and 7. Add the title to Table 6 and correct the "Total Product" amount under column "2004". The Petroleum exports in Table 5 and 7 do not match.

Petroleum Product Exports. Reference Page 25, Table 14. Correct the 2012 Update Base Case value for 2000.

**Corpus Christi Ship Channel, Corpus Christi, TX
Deepening and Barge Shelves
Limited Re-evaluation Report**

**DISTRICT RESPONSE TO
HQUSACE POLICY COMPLIANCE REVIEW
FINAL ASSESSMENT**

I. Background.

1. Project Area. The Corpus Christi Ship Channel (CCSC) provides deep-water access from the Gulf of Mexico to the Port of Corpus Christi, via Aransas Pass, through Redfish Bay and Corpus Christi Bay. Access points include the La Quinta Channel, the Gulf Intracoastal Waterway (GIWW), and Rincon Channel. The waterway extends from deep water in the Gulf through the Aransas Pass jettied entrance, then westerly 20.75 miles through Industrial Canal to and including a turning basin at Avery Point, then westerly 0.9 miles to and including the Chemical Turning Basin, then 3.3 miles to and including a turning basin near Tule Lake, then northwesterly 1.8 miles to the Viola Turning Basin. The landlocked portion of the CCSC is referred to as Inner Harbor. The La Quinta Channel extends off the CCSC near Ingleside, Texas, and runs parallel to the eastern shoreline of Corpus Christi Bay for 5.5 miles to the La Quinta Channel Turning Basin.

2. Project Authorization. Section 1001(40) of Water Resource Development Act (WRDA) 2007 authorized modifications to the Corpus Christi Ship Channel with the following language:

CORPUS CHRISTI SHIP CHANNEL, CORPUS CHRISTI, TEXAS.—

(A) IN GENERAL.—The project for navigation and ecosystem restoration,

Corpus Christi Ship Channel, Texas: Report of the Chief of Engineers dated June 2, 2003, at a total cost of \$188,110,000, with an estimated Federal cost of \$87,810,000 and an estimated non-Federal cost of \$100,300,000.

(B) NAVIGATIONAL SERVITUDE.—In carrying out the project under subparagraph (A), the Secretary shall enforce the navigational servitude in the Corpus Christi Ship Channel (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of section 101 of the Water Resources Development Act of 1986 (33 U.S.C. 2211).

This Limited Reevaluation Report updates project costs to support additional authorization beyond the 902 limit for the project. Construction of the project is to be completed as authorized.

3. Status of ATR and IEPR. The Deep-Draft Navigation Planning Center of Expertise (DDNPCX) completed Agency Technical Review (ATR) for the CCSC LRR and that review was certified in May 2011. A second ATR review of the LRR subsequent

to its revision was certified on 27 July 2012. The Cost Engineering Center of Expertise reviewed and certified the total project cost (updated to October 2011 price levels) for the CCSC LRR dated 25 July 2012 and 31 August 2012. The economic model was approved for one-time use by HQUSACE on 11 September 2012. The IEPR exclusion request was approved by HQUSACE on 16 April 2012.

4. Policy Compliance Reviews. The HQUSACE Policy Review team conducted a policy and legal review of the draft LRR submittal package dated 31 August 2011. The final LRR was received in HQ on 18 September 2012 for review and approval. Section II below summarizes the comments and responses, and provides the HQ Final Assessment based on review of the final LRR dated September 2012. One comment from the previous review remains unresolved.

Review of the final September 2012 LRR generated nine new comments, which are listed in **Section III** of this documentation.

II. HQUSACE Policy Compliance Review. The following section of this document captures the HQUSACE Policy Review comments on the draft LRR submittal package dated 31 August 2011. All comments are resolved except one. Comment (II.I.f. Removals and Relocations) remains unresolved. A response to the HQUSACE Assessment is needed to enable final resolution.

1. Main Report Comments

- a. Price Level and Discount Rate. The current LRR utilizes FY12 (October 2011) price levels. Reports being submitted for approval (and subsequent authorization) should utilize the most current price level and discount rate per ER 1110-2-1302.

District Response: Concur. The team will update costs for the submittal of AFB documentation currently scheduled for February 2012. The LRR and subsequent documents will be modified to include prices and discount rates at 2012 price levels that are consistent with new cost guidance dated 25 August 2011.

Discussion: Report will include FY 2012 (October 2011) price levels consistent with revised cost guidance.

Required Action: Implement the district response.

District Action: Costs have been updated to 2012 price levels (1 October 2011) and were re-certified (31 August 2012) by the Walla Walla Cost Engineering Technical Center of Expertise. The current cost estimate can be located in Appendix A of the LRR.

The LRR and pertinent appendices have been updated to reflect these re-certified costs. For example, Section 4.0 Recommended Plan shows costs for separable elements updated to FY 12 (October 2011) price levels. The economic analysis was updated using the current discount rate of 4.000 percent, per EGM 12-01. The spreadsheet incorporates the current discount rate and those changes have been incorporated in the economic appendix and main report. For example, the references in the reports to the interest rate in the current benefits have been updated to 4.000 percent.

HQ Final Assessment: The report uses the FY12 Discount Rate of 4%. There is indication that the FY13 Discount Rate is going to go down, although it has not been officially announced. If the FY13 discount rate does change, then the economics will need to be updated to reflect the appropriate FY13 discount rate. As the LRR moves forward for Administration approval, please be aware of this requirement. Otherwise, this comment is resolved.

District Response: Per EGM 13-01, released on 26 October 2012, the current interest rate is now 3.750 percent. Revisions have been made to the LRR to incorporate this change in the current interest rate.

- b. Model Certification. Section 2.2 of the LRR mentions Economic Models used for the deepening analysis and benefit calculations, however the model is not certified. Since this LRR will form the basis for further project authorization and cost-sharing, it must comply with Engineering Circular (EC) 105-2-412 Planning: Assuring Quality of Planning Models.

District Response: Concur. Model Certification is currently being performed in accordance with EC 105-2-412. The District has been in coordination with the DDNPCX on certification for this model. Economic spreadsheets and report is currently being finalized and will be submitted to the DDNPCX in mid-January 2012.

Discussion: Spreadsheet will be submitted to the DDNPCX in January 2012. Division stated that the HarborSym model has received corporate certification; however, the district needs to ensure the current version is being used as there have been some changes made. Upload the input if the current version is not being used.

Required Action: Implement the district response and verify current version of HarborSym model is being used.

District Action: The economic spreadsheet and model documentation was submitted to the DDNPCX on January 24, 2012 for approval of the model. In addition, on page 13 of the report, the following was stated: "An Excel spreadsheet model was utilized for the deepening analysis. The model was developed by the District and will be considered for approval for one-time use. Model review is being conducted in accordance with Engineer Circular (EC) 1105-2-412, Assuring Quality of Planning

Models dated 31 March 2011, and EC 1105-2-407, Planning Models Improvement Program: Model Certification dated 31 May 2005.”

Also, due to the certification of the HarborSym model, the inputs were uploaded to the current version and the scenarios were re-run. The updated outputs were incorporated into the spreadsheet and the results are provided in the economic appendix and main report. For example, the updated average vessel wait times are provided in Tables 27 and 28 under Section 2.7 HarborSym Widening Analysis in the LRR. The DDNPCX model reviewer completed his certification review of the economic spreadsheet model in July 2012 and the DDNPCX requested an IPR with Tom Hughes via email dated 12 July 2012. An IPR between OWPR and the DDNPCX is necessary prior to approval of one-time use. Additionally, the economic model was approved for one-time use on 11 September 2012.

HQ Final Assessment: The concern is resolved by the response and economic model approval for one-time use.

- c. Project First Costs. Project first costs have substantially increased since authorization in WRDA 2007, from ~\$188M to ~\$337M. The LRR does not provide the reasons for the significant cost increases in such a short amount of time, particularly the real cost growth. A cost increase of this magnitude leads to questions regarding whether or not the recommended plan has changed enough in scope to warrant further plan formulation. The report should be revised to include specific details on why the construction costs have exponentially increased since authorization and clearly articulate the case that the recommended plan is still the National Economic Development (NED) Plan even with the cost increases. The report should follow the procedures in paragraph G-16.a.(9), Appendix G, Engineer Regulation (ER) 1105-2-100, which requires itemizing the reasons for cost changes.

District Response: Concur. There has been no change to scope of the project. Increases are solely related to inflation for materials and work. For example, fuel costs have increased from \$0.95/gallon in 2002 to approximately \$3.29/gallon in 2011. There was also a large upswing in costs for materials during the 2004 through 2006 time period that impacted overall construction costs. A table showing a four column comparison will be added to the report. Those columns will address: 1) the estimated cost for the project being recommended; 2) the project as authorized by Congress; 3) the authorized project updated to current price levels; and 4) the project last presented to Congress. In subparagraphs, the District will itemize the reasons for the cost changes so that 100 percent of the cost increase since authorization is explained.

Discussion: Clearly need to state in the report that the project scope has not changed so that it is understood there is no need to go back through formulation. It is critical to show the major components (i.e., Account 01, 12, etc.), from the Chief's report to present to show that there is only a cost change; the scope remains the same. The report should include a table that clearly communicates the cost from the Chief's report and the cost now. Start with the information from the Total Project Cost

Summary (TPCS) sheet at account level (not subaccount level). Comparison of major features/components or contracts from the previous report showing how the costs have changed is acceptable.

Required Action: Implement the district response with interim coordination with the Major Subordinate Command (MSC).

- a) District Action: In the LRR under Section 5.2 Changes in Scope of Authorized Project it states “There is no change in scope of the authorized project.” Under Section 5.6 Changes in Total Project First Costs, Table 60 shows a four column comparison of the costs as requested. Those columns provide: 1) the project first cost for the project (October 2002 price level); 2) the project as authorized by Congress (same as the project last presented to Congress) at October 2005 price levels; 3) the authorized project updated to current price levels (October 2011); and 4) the current estimated project first cost for the project being recommended (October 2011 price level).

In subparagraphs under Section 5.6, the reasons for the cost changes have been itemized so that the cost increase since authorization is explained. For example, the most significant increase in cost for the project is under the 12 Code Account. The price of fuel assumed in the original estimate (October 2002 price level) was \$1.00 per gallon. When the project cost was updated for the WRDA 2007 authorization the original project cost was inflated from October 2005 price level for the 2003 report by applying inflation and consumer price index adjustment factors. The updated costs did not reflect increases in fuel prices which fluctuated from a recorded low of \$1.67 a gallon to a high of \$2.86 a gallon in 2005. This approximate doubling of the fuel price typically results in an approximately 50 to 55 percent increase in the unit price of dredging. Additionally, the higher fuel price also translates to higher mobilization and demobilization costs for the dredge plant. The Total Project First Cost updated to FY 12 (October 2011) price level is now estimated at 337,952,000 (inclusive of \$1,161,000 expended costs).

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- d. Project Benefits. Table 48 of the LRR lists the total annual benefits as \$31,539,700. The sum of the annual benefits by category (grain exports, petroleum imports, petroleum product imports, petroleum product exports, and incidental benefits) does not add up to the total benefits claimed. Please clarify the reason for this discrepancy and, if necessary, revise the LRR.

District Response: Concur. The annual benefits for each commodity category do not currently equal the equivalent annual savings in Table 48. The sum of the equivalent annual savings from Tables 41, 44, 45, 46, and 47 should add up to the equivalent annual savings provided in Table 48. Upon completion of Model Certification the benefit numbers will be updated and the tables modified.

Discussion: Need to discuss whether the AEO 2010 forecast is being used, if not the report must include detailed discussion of why not, and the ATR and economic model approval process should review that rationale. Need to update benefits from the authorizing report without building a new economic model. The forecast should be consistent with Freeport. Economic analysis should demonstrate that the project is economically justified at the current price level.

Required Action: Implement the district response and discussion.

District Action: (Note: The previous Table 48 is now Table 49 (pg 61)). Upon completion of the economic update, to include updating the interest rate, etc., the benefit numbers were updated and the tables were modified. The equivalent annual savings in Table 49 are shown as \$50,204 (in thousands), and the individual equivalent annual savings provided in Tables now numbered as Table 48(pg 60), Table 41 (pg 55), Table 42, (pg 56) and Table 43 (pg 56), add up to the total equivalent annual savings provided in Table 49 (pg 61).

In addition, the 2010 AEO forecast is being used for petroleum products, imports, and exports. However, Global Insight's forecast is being used for crude oil imports. As stated on page 18 "Corpus Christi's updated 2014-2064 Crude Oil Imports Tonnage Forecast was prepared using Global Insight's Projections and is presented in Table 9." There is also a discussion regarding AEO and Global Insight's Forecasts and why Global Insight's Forecast was used for crude oil imports. The respective AEO and Global Insight's Forecast used for petroleum products and crude oil imports is consistent with the forecast used in Freeport.

The economic model was approved for one-time use on 11 September 2012.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- e. IEPR. In accordance with EC 1165-2-209, IEPR will be conducted unless it is determined that none of the mandatory or discretionary triggers are met. If there is a determination that the triggers are not met, the district must prepare an IEPR exclusion request that will be transmitted to HQUSACE for approval.

District Response: Concur. The District has coordinated the IEPR exclusion through the DDNPCX and has received concurrence. This exclusion request has been submitted to SWD for review, approval and subsequent submittal to HQ for review. SWD has stated that the IEPR package will be submitted to HQ the week of 12 December 2012.

Discussion: The IEPR package is in SWD waiting for Commander's signature. It should be transmitted to HQ within the next couple days. The IEPR team meets every couple weeks; however, there will not likely be any additional meetings for December 2011. RIT will process through for review probably in January 2012. HQ can't say whether an IEPR exclusion will be granted.

Required Action: Implement the district response.

District Action: Per Memorandum dated 16 April 2012, Headquarters, USACE, reviewed the IEPR exclusion request for the Corpus Christi Ship Channel, Corpus Christi Navigation Project and based on applicable laws and policy, the request for exclusion was approved and signed by Merdith W.B. Temple, Major General, USA, Acting Commander. The IEPR Exclusion Request Approval is included with the supporting documentation.

HQ Final Assessment: The concern is resolved by the response and IEPR exclusion request approval.

- f. Removals and Relocations, P. 85, second paragraph of the Recommended Plan. This paragraph, which indicates that pipelines will be removed using the navigation servitude at full cost to the owner, requires modification to bring it into line with the Corps' legal/policy position on this matter best stated in the Real Estate (RE) Plan for the Sabine-Neches Waterway, March 2011, pages 12-13. The first sentence of the paragraph correctly quotes the authority contained in Section 1001(40) of WRDA 2007, but that does not necessarily mean that removals will be at full cost to the owner. It will depend on the situation. For example, a utility relocation in the deep draft channel may have been classed as a removal in the 2003 Feasibility Report because it did not meet the definition of "public utility". Since we now include the relocation of any pipeline, cable, or related facility in the definition of utility for purposes of cost sharing deep draft utility relocations between the Sponsor and the owner under Section 101(a)(4) of WRDA 1986 at 50-50%, such cost sharing would apply in this situation. This is consistent with Section 1001(40), as that section explicitly requires the application of Section 101 cost sharing. Another situation would be a pipeline that is abandoned in place. Although this is not a relocation for purposes of cost sharing under Section 101(a)(4), it would still fall within the procedures for Sponsor-owner negotiations on any compensable interests prior to Corps exercise of the navigation servitude and removal of the pipeline as part of cost shared construction. See page 13 of the Sabine-Neches RE Plan, fourth paragraph.

District Response: Concur. The previously completed feasibility report for this project clearly indicates which pipelines were classified as relocations and removals with the cost of relocations being shared 50/50 between owners and sponsor and removals at 100% owner cost. This LRR will verify that these classifications are consistent with policy identified for the Sabine Neches Waterway study.

Discussion: Guidance for the pipeline removals and relocations for the Corpus Christi Project should be in accordance with the recent Sabine Neches Waterway CIP Final Feasibility Report of March 2011. Need to look at all of the "utilities" and have sponsor and owners determine whether there is a "compensable interest" and make

appropriate arrangements. Ensure all utilities are in the correct category. Definition of utility is now in accordance with guidance provided within the Sabine Neches Waterway CIP Final Feasibility Report.

Required Action: Implement the district response.

District Action: The district has addressed the CCSC Pipeline Crossing list by ensuring all utilities have been updated to the correct category in regards to being listed as a Removal or Deep Draft Relocation, as described in Appendix 5. The updated CCSC Pipeline Crossing was developed in coordination with the local Sponsor.

The district implemented the Corpus Christi Ship Channel Chief's Report (02 Jun 2003), WRDA 2007 Implementation Guidance on Project Authorizations in Section 1001 Memorandum (24 Mar 2008) and PL 110-114 (HR 1495) 08 Nov 2007 WRDA 2007 (40)(b) during the drafting of the LLR. Also used as general guidance for this LLR was the SNWW Feasibility Report Study 2011.

The District addressed comment (f) by adding the statement below to the first paragraph of the "FACILITY/UTILITY RELOCATIONS" section within the REP:

FACILITY/UTILITY RELOCATIONS AND REMOVALS: There are 48 pipelines and conduit facilities below the channel that are within the entire CCSC Project boundaries. Of the 48 pipelines and conduit facilities, 43 are below the channel and will be affected by the deepening and widening of the CCSC and the barge shelves element. A determination of which of the facilities will probably be impacted was made during the feasibility study. (See Table 2 below for complete list of all pipelines affecting the Project.) Twenty six (26) deep draft utility relocations and seventeen (17) removals were identified. Pipelines located within the La Quinta Channel Extension are included in Table 2 below, but were not calculated in the total project costs because ownership was identified and pipelines were removed at the owners' expense for previous construction of that separable element.

Pursuant to Section 1001(40) of WRDA 2007, subparagraph (B), in carrying out the authorized project, the Secretary shall enforce the navigational servitude in the CCSC (including the removal or relocation of any facility obstructing the project) consistent with the cost sharing requirements of Section 101 of WRDA 86 (33 U.S.C. 2211). Therefore, the Sponsor is responsible for performing, or assuring the performance, of all relocations, including utility relocations, necessary for construction of the project. All relocations, including utility relocations, are to be accomplished at no cost to the Federal Government.

Since the recommended plan consists of a 52-foot deep navigation channel, the CIP is a deep draft project. Therefore, in accordance with Section 101(a)(4) of WRDA 86, for all relocations of pipelines that are classified as "deep draft utility relocations," one-half of the cost of each such relocation shall be borne by the owner of the facility

being relocated and one-half of the cost of each such relocation shall be borne by the Sponsor. This includes any pipelines that were not defined as a "public utility" prior to the 2003 Corpus Christi Ship Channel Feasibility Report.

The cost of the pipeline removals will be borne 100 percent by the facility owner if the subject owner has been located and is in agreement to the terms of the removal pursuant to the Section 10 permit.

In the event that the facility owner cannot be located or the facility owner has been located but not in agreement to the terms of the pipeline removal, then the Corps will revoke any existing Section 10 permit and remove the line as part of construction of the CIP, with the costs of the removal shared by the Corps and Sponsor as part of the costs of the general navigation features.

A line-by-line categorization of these facilities is attached as Appendix 5. All removals and deep draft utility relocations are located in the open water. There are no bank removal areas affecting removals or relocations.

Based on current law and Administration policy, cost-sharing for the recommended plan will be based on Section 101(a)(4) of the Water Resources Development Act of 1986 and U.S. Army Corps of Engineers policy regarding the categorization and assignment of costs for actions involving facilities interfering with Federal navigation improvements. Cost sharing has been determined as to whether the affected facilities have been categorized as "removals" or "deep draft utility relocations," and presented in Appendix 5 for each of the pipelines and conduits affected by the Project.

Any conclusion or categorization contained in this report that an item is a deep draft utility relocation or a removal, to be performed by the Non-Federal Sponsor as part of its LERRD responsibilities is preliminary only. The Government will make a final determination of the relocations necessary for the construction, operation, or maintenance of the Project after further analysis and completion and approval of final attorney's opinions of compensability for each of the impacted utilities and facilities. In the event the future status of a pipeline or facility is converted from relocation to a removal, such as a pipeline that becomes abandoned, the Non-Federal Sponsor will work with the owner to ensure the removal and none of the costs of removal will be creditable against the Sponsor's cost share.

HQ Final Assessment: The concern is not yet resolved. There are a couple of refinements that need to be considered, and more importantly, the overall context of the relocation costs within the Total Project Cost calculations needs to be detailed.

1. Taking the second matter first, it is not clear from the report that the correct Total Project Cost has been identified as a basis for increasing the authorized cost and future cost calculations under Section 902 due to the treatment of the deep draft utility relocations (DDUR). Table 68 identifies the current project cost as \$337,952,000, which includes \$26,950,000 for the relocations- pipelines item.

First, the total cost appears to be slightly different than the \$336,791,000 value shown in the Total Project Cost Spreadsheet on C-2. The value of \$26,950,000 is included in the Appendix C estimate as a non-Federal project cost for relocations. Table 4 in contrast shows the deep draft utility relocations as part of the associated costs based on the 2003 feasibility report. Tables 54 and 55 indicate in the footnotes that the total cost shown does not include the associated non-Federal costs of \$60,434,000. The pipeline costs of \$26,950,000 are shown as \$13,475,000 non-Federal and \$13,475,000 LSF. This results in some confusion as to how the cost for DDUR is being treated, whether the LSF value is intended to be the owner's 50% share of DDUR (which is an associated project cost), and if the total project cost is correct or includes some associated project costs.

The total project cost for authorization should be calculated as follows.

For the purpose of calculating the Section 902 limit, the total estimated first cost of the project is \$ (a) including an estimated Federal share of \$ (b) and an estimated non-Federal share of \$ (c).

- (a) Includes only GNF costs plus LERR value, (and for deep draft harbors) plus the 50% of deep draft utility relocation (DDUR) costs borne by the NFS (ie. (a) = (b) + (c) below).
- (b) Includes only the Government's percentage share of GNF costs.
- (c) Includes only the NFS's initial percentage share of GNF costs (ie. not the extra 10% payment amount) plus LERR value, (and for deep draft harbors) plus the 50% of DDUR costs borne by the NFS

All of the project costs and associated costs should be clearly identified and included in the benefit to cost ratio calculation. In addition, the appropriate values for the LERR and DDUR should be reflected in the Real Estate Appendix after resolution of the cost concerns to assure consistency.

District Response: Concur that the total cost in the LRR (\$337,952,000) appears to be slightly different than the \$336,791,000 value shown in the Total Project Cost Spreadsheet on C-2. This is because the spreadsheet doesn't include the \$1,161,000 in expended costs in the project first cost. Also concur that the \$26,950,000 for pipeline relocations is included in the total first cost. The LRR incorrectly represented the pipeline relocation cost. The \$26,950,000 is actually the 50 percent non-Federal sponsor cost for the pipeline removals with contingency as is represented in the TPCS (\$21,559,676 cost with \$5,390,000 in contingency). The other 50 percent is represented in the TPCS for the Associated Costs for the 52-foot project (Appendix G of the Cost Estimate). It shows the 50 percent owner cost as \$21,559,676 with \$4,312,000 contingency. The LRR has been corrected to properly reflect the pipeline information. In addition, the footnote has been modified to identify that the associated costs are in addition to the total identified in the TPCS. As example, Table 55 footnote states *"Associated non-Federal costs are comprised of 100 percent pipeline removals (owner), 50 percent of pipeline relocation costs (owner), Berthing Area Modifications, Berthing Area Dredging, and Buoy Modifications".*

In regards to the template shown above “for the purpose of calculating the Section 902 limit” we have added that text under Section 5.6 Changes in Total Project First Costs. Because one of the components of the entire project is Ecosystem Restoration, those numbers have been included in the text.

2. With regard to the details of the proposed new Section 18 of the Real Estate Plan, “Facility/Utility Relocations and Removals”, it should be noted that the language quoted above does not precisely mirror the language that was actually inserted into Section 18. For example, the above language correctly refrained from referencing Policy Guidance Letter (PGL) 44, which has now been overtaken by the policy originally identified in the Sabine-Neches RE Plan, but the CCSC REP itself still references PGL 44. Also the Table of relocations in the CCSC REP, in the rows indicating removals, lists “Abandoned” in the “Type” columns. That term has a specific meaning in admiralty law and should not be used here. I assume that what is meant is that the owner cannot be located, and if so this should be stated.

Lastly, the two paragraphs above regarding removals and commencing with the words: “The cost of pipeline removals will be borne 100 percent by the facility owner. . . .” and “In the event the facility owner cannot be located. . . .” are not quite as precise as the equivalent paragraph in the Sabine-Neches REP, in that the cost may not be 100 percent attributable to the facility owner if compensation is owed to the facility owner by the Sponsor under local law. If the Sponsor does have to pay in such a case, then its payment may be credited as part of LERs against the 10 percent additional amount. Therefore the following paragraph should be substituted, modeled on the one in the Sabine-Neches REP:

“The following procedure applies to pipelines that are no longer necessary and therefore do not require replacement, or whose owners cannot be located, but that require removal to construct the CCSC. If an owner of such a line can be located, the Sponsor will contact the owner to reach a determination as to whether the owner has an interest in the existing line for which compensation is owed by the Sponsor. If the owner has a compensable interest, the Sponsor, as part of its requirement to provide lands, easements, and rights-of-way required for the CCSC, will be responsible for acquiring this interest, at no cost to the Federal Government. The Sponsor will receive credit toward its additional 10 percent cash payment required by Section 101(a)(2) of WRDA 86 for the value of the interest acquired, and the Corps will revoke any existing Section 10 permit and remove the line as part of construction of the CCSC, with the costs of the removal shared by the Corps and Sponsor as part of the costs of the general navigation features. If no compensation is owed to the owner of the line, or if the owner cannot be located, then the Corps will revoke any existing Section 10 permit and remove the line as part of construction of the CCSC, with the costs of the removal shared by the Corps and Sponsor as part of the costs of the general navigation features.”

District Response: After coordination with the vertical team it was determined that the REP will not be used or included in the CCSC LRR final submittal. Pipeline relocation and removal costs are reflected in the LRR and TPCS as set forth in paragraph 1, immediately preceding.

These costs are:

Relocations:

\$21,559,676 + \$5,390,000 contingency = \$26.950M Non-federal Cost

Removals:

\$9.3M + \$1.9M contingency = \$11.2M Owner Cost

Allocation of these costs is based on statements by the Non-Federal Sponsor, who has been working to identify pipeline owners and facilitate necessary relocations and removals. SWG is funding an update of the REP prior to PED to assure it meets applicable regulations and policies.

District Action: The main report has been modified as detailed in the response to Comment #1 above to accurately describe the costs that are included in the new 902 limit. Also, as detailed in the response to Comment #2, the Real Estate Plan has been removed from the submittal and will be reevaluated during PED.

2. Section 3.0-Environmental Update

- a. Threatened and Endangered (T&E) Species considerations. Because it has been over five years since Section 7 consultations were completed, as part of this effort, an updated T&E list was obtained to ensure current /proposed project compliance with the Endangered Species Act (ESA). US Fish & Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) provided new Federal lists of T&E species, under their respective stewardships, that may occur in the project area. Reference Page 76, second paragraph, which states that Table 50 shows the T&E species and further states that the USFWS and NMFS letters can be found in Appendix A.
 - i. Table 50 is Current Construction Cost (page 73). Table 51 is the correct reference, found on page 76. This reference should be corrected.

District Response: Concur. Reference will be corrected to "Table 51..." in LRR.

Discussion: Include environmental documentation.

Required Action: Implement the district response.

District Action: The aforementioned table reference for endangered species under the jurisdiction of USFWS has been corrected to cite the appropriate Table number which is now Table 52 and is located on page 66 of the LRR. The second table for endangered species (under NMFS jurisdiction) is labeled as Table 53 on page 69 of the LRR. In addition,

the letters referred to for the USFWS can be found in Appendix B and the letters referred to for the NMFS can be found in Appendix C of the report.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- ii. Referenced Appendix A is "Project Cost & Risk Analysis. There are NO T&E/ESA references in this appendix. More critical to the LRR there are no copies of the documents found anywhere throughout the LRR. This needs to be corrected.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals. References to appendices will be corrected in the LRR and all required appendices will be included in subsequent submittals. Previous letters from USFWS and NMFS, as well as current Corps letters to these agencies to update coordination, are attached.

Discussion: The information missing from the appendices was received by HQ prior to the IPR. Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: The Appendices have been corrected. USFWS Coordination can be found in Appendix B and NMFS Coordination can be found in Appendix C. The current letters to the agencies have been attached to the aforementioned appendices.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- iii. Page 76 notes "In a letter dated December 5, 2008, (Appendix B)" the USFWS provided information on the delisting of 3 species (northern aplomado falcon, mountain plover, and Eskimo curlew) and are no longer on the T&E list for San Patricio and Nueces County. However, the whooping crane is now listed in Nueces County as well as San Patricio County (that was already on the 2003 listing).

District Response: Documentation was left out of submittal but will be included in future submittals. Additional coordination is also underway with National Oceanic Atmospheric Administration (NOAA) and USFWS as existing coordination has become dated. Lists will be coordinated and updated as necessary. Corps letters to the USFWS and NMFS to update coordination are attached.

Discussion: The information missing from the appendices was received by HQ prior to the In-Progress Review (IPR). Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: District response has been implemented. Lists have been coordinated and updated. Corps letters to the USFWS and NMFS to update the coordination are attached to the appendices.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- iv. The last paragraph on page 77, discusses the fact that the brown pelican is no longer listed, but that the "...USACE will continue to honor agreements coordinated with the USFWS during Section 7 consultation in 2002 to ensure project impacts do not have a cumulative effect that could contribute to a USFWS determination that the species should be relisted." As part of the 2002 agreements, USACE agreed to extend bayward from the east end of the island a 2,200 linear foot hydraulically filled embankment, protected by geotube and/or riprap. Since then it has been determined that the embankment was designed to prevent dredged material from flowing east into the channel is not needed. Accordingly at a meeting in November 2005, USACE requested that USFWS remove this measure from the list. USFWS concurred, and agreed to remove the measure in a letter dated April 5, 2006. Again, references Appendix B to provide the reviewer/approving official documentation of this action. ...and once again: no such letter appears in Appendix B. Subject matter of Appendix B is: Section 902 Analysis. All these omissions of documentation of concurrence need to be provided and included in LRR in a properly identified appendix.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals. References to appendices will be corrected in the LRR and all required appendices will be included in subsequent submittals. The "Appendix B" USFWS Letter is attached.

Discussion: The information missing from the appendices was received by HQ prior to the IPR. Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: District response has been implemented. Appendices have been corrected and the referenced letters are now included.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- v. Beginning on page 79 the T&E/ESA dialogues with NMFS is provided. As part of this effort the reader is directed to "Appendix C" for a series of e-mails the NMFS has provided for an explanation of USACE's responsibilities and an updated list of T&E species that could be found in the project area. The list included one new endangered species for consideration: the Smalltooth Sawfish. The e-mail also stated that the USACE likely does not need to re-initiate consultation with NMFS, but USACE will have to make that determination. Once again, the cited Appendix C is in error. In fact, the LRR does not even contain an Appendix C. Accordingly none of the referenced NMFS e-mails are available to support the statements of "unlikelihood of need to re-initiate consultation" as related to the new listing of the smalltooth sawfish. These omissions/miss identifications must be corrected.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals. References to appendices will be corrected in the LRR and all required appendices will be included in subsequent submittals. The "Appendix C" NFMS letter is attached.

Discussion: The information missing from the appendices was received by HQ prior to the IPR. Information appears sufficient at this time.

Required Action: Implement the district response.

District Action: District response has been implemented. NMFS Coordination can be found in Appendix C. Appendices have been corrected and referenced letters are now included.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- b. Section 404 Water Quality Exclusion. LRR, page 82 notes, rather abruptly, that "...the State of Texas water quality certification will not be required", and that no new or additional water quality certification is required for the LRR. Believe it would provide a better explanation by citing appropriate guidance found in ER 1105-2-100, Appendix C, page C-42, C-6g. Section 404(r) Exemption. This describes how Section 404(r) waives the requirement to obtain either the State water quality certificate or the 404 permit if complete

information on the effects of the discharge of dredged or fill material into the waters of the United States, including the application of the Section 404(b)(1) Guidelines are included in the Environmental Impact Statement (EIS), and the EIS is submitted to Congress. Evaluation will be discussed in the body of the EIS and included in full in the Appendix to the Main Report. When such compliance is noted in the Record of Decision (ROD), this will satisfy the Section 404(r) criteria, hence no State Certification would be required. This is indeed the case with the Corpus Christi Ship Channel Deepening and Barge Shelves Report and EIS.

District Response: Concur. The LRR will be modified to better explain the use of 404(r) exemption. Specific wording that details the specific process for 404(r) exemption will be lifted from the guidance and placed in the LRR.

Discussion: Comment intended to clean up document to accurately reflect the 404(r) waiver for the project signed by Woodley.

Required Action: Implement the district response and attach the signed ROD to the National Environmental Policy Act (NEPA) document.

District Action: District response has been implemented. Requirements for 404(r) exemption found in ER 1105-2-100, Appendix C, Section C-6, page C-42, C-6g, as well as how the requirements were met, were included in the LRR. The signed ROD was attached to the NEPA document.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

3. Project Study Issue Checklist Comments

- a. Project Datum (Issue #2). The study currently uses mean low tide (MLT) datum instead of the required datum of mean lower low water (MLLW). The WRDA 92 congressional action amended the Rivers and Harbors Appropriation Act of 1915. This amendment specifically required that navigation projects developed since the 1915 Act be referenced to a vertical MLLW defined by the Department of Commerce. The intent of WRDA 92 was to supersede older MLW datums on the Atlantic and Gulf Coasts or locally defined navigation datums. Subsequent HQUSACE guidance was issued in 1993 to implement the provisions of WRDA 92. Furthermore, ER 1110-2-8160, 1 March 2009, directs that all coastal USACE navigation projects be directly referenced to MLLW as determined by the most recent NOAA National Tidal Datum Epoch. Tidal Datum conversion could have a direct implication on cost-sharing based on foot-depth of the channel. While the district's Issue Paper #2 makes mention that all elevations used in the report are in MLT, there is no mention of how the Galveston District is in the

process of collecting data in an effort to convert MLT datum to MLLW datum along the Texas coast. Relaying this information in the Issue Paper would have been beneficial to the reviewers of the report. Please explain what actions the district is taking to be policy compliant with the MLLW conversion.

District Response: A modified issue paper detailing the Districts efforts for conversion to MLLW was supplied to HQ on 1 November 2011. That document details the background of why the conversion is necessary and the steps that the District is taking to make the change. All of these steps are detailed in the modified issue paper which will be supplied as an attachment to this document.

Discussion: HQ and the ASA (CW) were recently briefed on the Galveston District's on-going process of collecting data in an effort to convert MLT datum to MLLW datum along the Texas Coast. The ASA CW has expressed concern on the Sabine Neches Waterway CIP where the district did not use the proper vertical datum. The tidal change between MLT to MLLW varies on the CCSC from about 1.0 – 1.5 feet.

Required Action: Include a discussion in the LRR on the district's ongoing conversion efforts.

District Action: The following text was added to the initial discussion at the end of Section 1.4 in the LRR:

A synopsis of the four phases the District will perform to comply with the above reference guidance with estimated cost and estimated duration is as follows:

- Phase 1: Use active and inactive Texas Coastal Ocean Observation Network (TCOON) gages to determine calibration/conversion values between MLLW (approximately \$300,000 and one year).
- Phase 2: Establish new gages if needed to better define the MLT and MLLW relationships in the coastal region (approximately \$1,311,000 and 18 month).
- Phase 3: Install new or reconfigure existing staff gages to reflect MLLW datum (approximately \$300,000-500,000 labor and 18 months scheduled parallel with Phases 1 and 2 to minimize delay in overall conversion).
- Phase 4: Update technical materials and communicate conversion impacts to internal/external stakeholders (no cost/duration cited).

Activities associated with Phases 1 and 2 have been initiated via contract. Because of the data collection requirements, these tasks are scheduled to be completed by 3rd Quarter FY13.

Additional References for consultation during PED may include the following post-2003 guidance pertaining to tidal datum:

1. ER 1110-2-8160, "Policies for Referencing Project Elevation Grades to Nationwide Vertical Datums", dated March 1, 2009;
2. Engineer Circular (EC) 1110-2-6070, "Guidance for a Comprehensive Evaluation of Vertical Datums on Flood Control, Shore Protection, Hurricane Protection, and Navigation Projects", dated July 1, 2009;
3. EM 1110-1-1005, "Engineering and Design – Control and Topographic Surveying", Appendix B-6. Implementation Actions, dated January 1, 2007; and
4. EM 1110-2-6056, "Standards and Procedures for Referencing Project Evaluation Grades to Nationwide Vertical Datums", dated December 31, 2010.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

4. Non-Critical/Miscellaneous

- a. Table of Contents lists four Appendices incorrectly:
 A-Project Cost Estimate: CORRECT
 B- USFWS ES Coordination-
 WRONG: Section 902 Analysis
 C- NMFS ES Coordination-
 WRONG: LRR does NOT have an Appendix C
 D- Section 902 Analysis- WRONG: 902 Analysis, as already noted: is Appendix B, in addition there is NO Appendix D in this report.

District Response: Concur. The appendices are listed correctly in the table of contents and that will likely not change. The physical documents will be noted correctly and attached in the proper order for subsequent submittals.

Discussion: None

Required Action: Implement the district response.

District Action: The physical documents have been noted correctly and attached in the proper order for subsequent submittals.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- b. Table 54, page 86 has several simple mathematical (adding). For example:
 Beneficial Use Sites Total is \$30,445,000 and should be \$30,446,000;
 Construction Management: Total-\$14,281,000, should be: \$15,607,000; Total Cost: \$299,355,000 should be: \$301,682,000.

District Response: Concur. The document will be modified to correct the totals as detailed in the comment.

Discussion: None

Required Action: Implement the district response.

District Action: The aforementioned Table is now Table 55. All computations have been corrected in the table.

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

- c. Editorial corrections are needed on the following pages of the LRR: 16, 26, and 85.

District Response: Concur. The tables on pages 16 and 26 will be scrubbed to correct the formatting of the footnote identifiers. Pipeline costs in paragraph 2 will be modified to show correct cost sharing; and price levels in paragraph 3 on page 85 will be modified and updated to 2012 levels.

Discussion: Footnotes and fonts need to be fixed.

Required Action: Implement the district response.

District Action: All tables have been scrubbed to correct the formatting of the footnote identifiers. Pipeline costs which are addressed beginning in paragraph two under Section 4.0 Recommended Plan have been modified to show correct cost sharing. All price levels including paragraph 5 (previously identified as paragraph 3 before revision of the report) under Section 4.0 Recommended Plan have been modified and updated to FY 12 levels (1 October 2011).

HQ Final Assessment: The concern is resolved by the response and changes incorporated in the report.

III. Comments on the September 2012 Final LRR. The following section of this document captures the new policy review comments on the Final LRR dated September 2012. A response to each comment listed below is needed to enable final resolution.

1. Calculation of BCRs. It appears that the BCRs identified on page 61 and 62 of the report are actually Remaining Benefit Remaining Cost Ratios (RBRCRs), even though they are labeled BCR. For the 'reauthorization' decision, the total RBRCR at the current discount rate is used. However, it should be noted that this document will also serve as the Updated BCR for budgetary purposes. Therefore

the report should include four calculated Benefit and Cost Ratios - the RBRCR at both the current discount rate and at 7% and also the Total BCR at both the current rate and at 7% (ref. DCW Memorandum SUBJECT: Methodology for Updating Benefit-to-Cost Ratios (BCR) for Budget Development Dated 8 March 2012). The report needs to be revised to include all appropriate Benefit to Cost Ratios to support both the authorization and budget decisions.

District Response: Concur. The text in Section 2.9 has been clarified to state that “the Remaining Benefit Remaining Cost Ratios (RBRCRs) represent the current benefits and costs for the project that has yet to be constructed, which includes the widening and deepening of the main channel and the barge shelves. In addition, the references to the BCR in Tables 50 and 51 have been changed to RBRCR. Table 62, Table 63, and Table 64 have all been updated to include the information for the 7% discount rate at October 2011 prices. Finally, Table 66 includes the four required BCRs and RBRCRs.

2. Environmental (General). It is understood that the focus of the environmental update is on changes since the 2003 report. In particular, the report needs to show that no significant changes to the natural or man-made environment have occurred in order to justify providing only an update and not a supplement. However, the 2003 report has some good text in the executive summary that summarizes the environmental analyses that were done. It is suggested to include the below text copied from the 2003 report (or something similar) as well as a web link to the 2003 report. Without this text, it is not apparent the work that went into the original analysis.

“The following is a brief summary of the effects of the recommended plan on the significant environmental resources of Corpus Christi Bay.

Water Quality

A Hydrodynamic and Salinity Model for Corpus Christi Bay, developed by the Texas Water Development Board, evaluated water exchange and salinity impacts. The model results concluded that changes in tidal amplitude of 0.06 feet or less are expected in the project area, and that changes in salinity may seasonally and locally decrease by up to 4 ppt or increase up to 0.38 ppt. Testing of maintenance material elutriates with chemical analyses and water column bioassays has indicated no cause for concern. No significant increase or decrease in ballast water introductions is expected. As a result, no net adverse direct or indirect impacts from water quality are expected as a result of the recommended plan.

Sediment Quality

The results of sediment analyses demonstrated that new work and maintenance dredged material are acceptable for beneficial uses with two exceptions. Sediments from the Inner Harbor will be placed in several upland confined placement areas, and the fine material from the Upper Bay will continue to go into open-bay, unconfined placement areas.

Community Types

Five acres of submerged aquatic vegetation will be directly impacted by the recommended plan. This loss will be mitigated by planting 15 acres of seagrass within a 200-acre shallow water beneficial use site. The beneficial use plan will protect and create submerged aquatic vegetation habitat areas, wetlands, and coastal shore areas.

Fish and Wildlife Resources

No significant adverse impacts to finfish, shellfish, recreational and commercial species, aquatic communities, essential fish habitat, and wildlife resources are expected to occur from the recommended plan. Temporary impacts to fish and wildlife resources may be experienced from dredging and resulting suspended solids (turbidity). However, the beneficial use plan will create new habitat to be used by these species."

District Response: This text was added to the document beginning on the first paragraph of Section 3.0 (Environmental Update), under the "NEPA Documentation for Navigation Improvements and Ecosystem Restoration" subsection. Also, a web link to the 2003 report was added to the last paragraph of this subsection.

3. Environmental (DMMP/BU). It is also suggested that information regarding which portions of the Dredged Material Management/Beneficial Uses Plan will be accomplished for this portion of the project also be briefly outlined. (It is confusing to read on page 87 that the ecosystem restoration component has been completed, and yet it appears this was supposed to be one of the beneficial uses of dredge material.)

District Response: A subsection titled "*Beneficial Use of Dredged Material*" was added to the end of Section 3.0 (Environmental Update) which clarifies ecosystem restoration and beneficial use components.

4. Cumulative Impacts. Were cumulative impacts re-evaluated? (Are there any new projects in the area, which were unknown in 2003?) Please include if there are any additional projects that would change the cumulative impacts analysis.

District Response: A section describing cumulative impacts was added to Section 3.0 (Environmental Update). This section describes new projects in the area and describes that there are no changes to the cumulative impacts analysis found in the 2003 FEIS.

5. Mitigation. Why does it say there is no mitigation on page 73 of the LRR, but the 2003 FEIS, in the executive summary (see text above) states that there will be

mitigation for 5 acres of seagrasses? Please indicate if there is or is not mitigation and be consistent in the document.

District Response: Text has been added to the Mitigation subsection found within Section 3.0 (Environmental Update) to clarify that ecosystem mitigation for 5 acres of seagrasses is not associated with elements addressed for this LRR. Seagrass mitigation is associated with a separate element and was addressed in the 2010 La Quinta Channel Extension LRR.

6. Socio-Economic and Environmental Justice. It does not appear that the original analysis in the EIS indicated whether the demographics near the ports and/or shipping channel were different than away from the ports/channel nor does it indicate if populations near these areas would receive higher exposures or impacts than others. The latest analysis does not indicate if there were any changes in demographics in the area or if there would be changes to exposure levels. Are there any populations in the area that would receive a higher exposure than others from emissions at/near the port? If so, are those minority or low income populations? Please indicate such in the report.

District Response: Text has been added to the “Socioeconomic and Environmental Justice Impacts” subsection found within Section 3.0 (Environmental Update) to update demographic information and describe that exposure to emissions would not disproportionately impact populations at/near the port.

7. General Navigation Features (Entrance Channel). Reference Page 6, Main Report. Since the proposal is to deepen the entrance channel to 54 feet, the channel should only be extended to the 54-foot contour in the Gulf rather than the 56-foot contour. The purpose of advanced maintenance dredging is not to provide a deeper channel, but to enable the channel to stay open at the authorized depth for a longer period of time. This would reduce the cost of the project.

District Response: The 56-foot contour is correct. Please refer to the attached sketch (Attachment 1 located at the end of this document) for clarification. The trapezoid channel template includes within the dredging template, the proposed depth (52 feet), the 2-foot for wave action (54 feet), and the 2-foot for advanced maintenance (56 feet). Dredging only to the 54-foot contour will prematurely stop the channel template as portrayed in the Profile. District engineering recommendation is to continue the dredging to the 56-foot contour.

8. General Navigation Features (Lower Bay Portion). Reference Page 8, Main Report. Please explain why we aren’t narrowing the eastern portion of the channel to 530 feet if ERDC’s ship simulation studies show that’s all that’s needed for safety navigation. This would also reduce the cost of the project.

District Response: The proposed channel footprint matches the existing channel footprint throughout this reach, except where ERDC’s recommendation justified

needing 520-feet (the part where the existing width is 500-feet-wide). The initial sentence was incorrectly worded, and is revised to read "Based on the ERDC's Ship Simulation Report recommendation, the part of the existing channel with 500-foot width will be widened to 530 feet, beginning at Station 35+00 and proceeding westward or upstream. Downward of this Station, the channel will keep its existing footprint.

9. Funding Since Authorization. Reference Page 10, Tables 1 and 2. Would the costs/values in these tables change if updated closer to the final report submittal date? The expenditures only show a portion of FY12 - October 1, 2011 to January 30, 2012.

District Response: Concur. The costs/values in Table 1 and Table 2 have been updated to reflect funding and expenditures as of 30 September 2012.

EDITORIAL COMMENTS:

NED Benefits. Reference Page 12, Table 3. The first year "2046" in the "Year" column should be "2036".

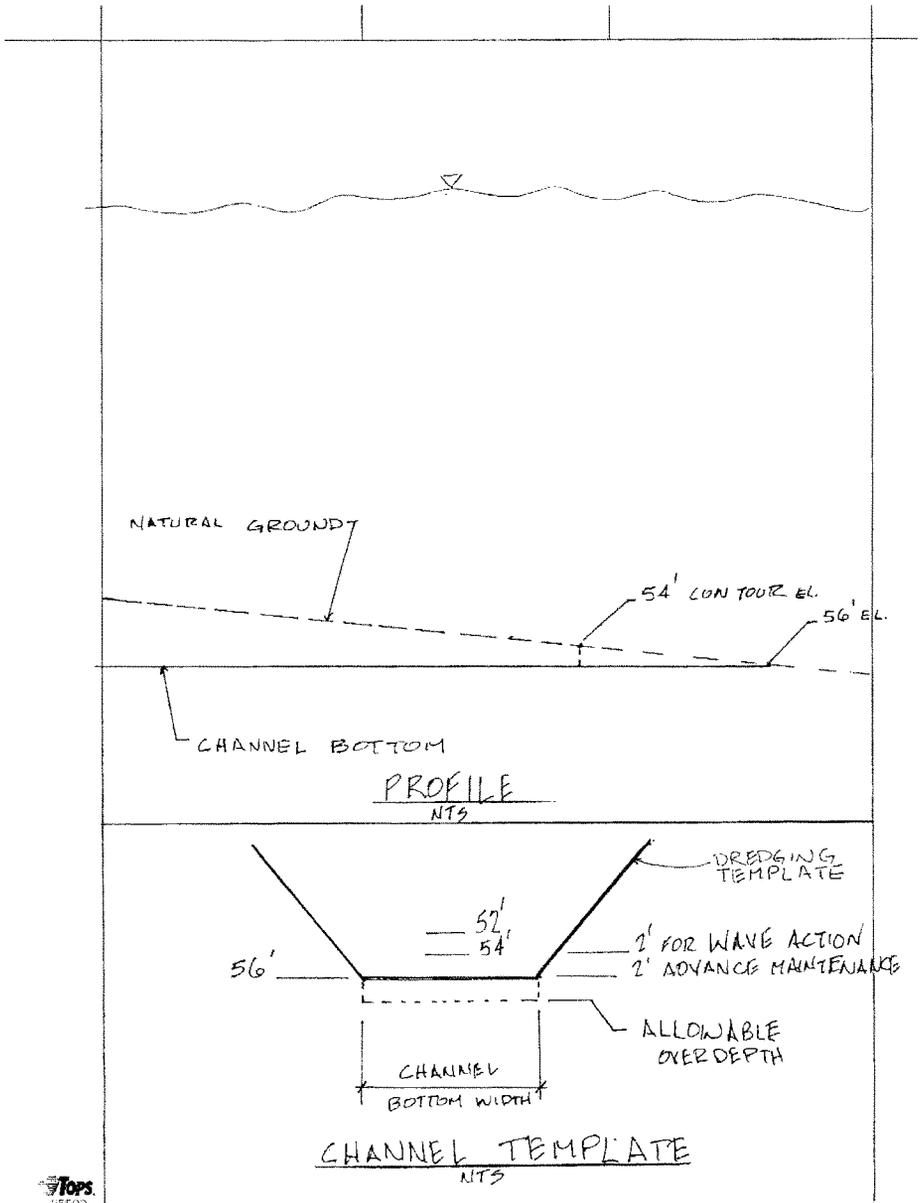
District Response: Concur. Table 3 has been corrected to list the year "2036".

Present Market Conditions. Reference Page 16, Tables 5, 6, and 7. Add the title to Table 6 and correct the "Total Product" amount under column "2004". The Petroleum exports in Table 5 and 7 do not match.

District Response: Concur. Table 6 already has a title, "Corpus Christi Petroleum Product Imports by Commodity Classification and as a % of U.S. Imports (1,000s of Short Tons). The Total Product under column 2004 has been corrected to state "10,488".

Petroleum Product Exports. Reference Page 25, Table 14. Correct the 2012 Update Base Case value for 2000.

District Response: Concur. The Base Value for 2000 has been corrected to state "3,162".



ATTACHMENT I

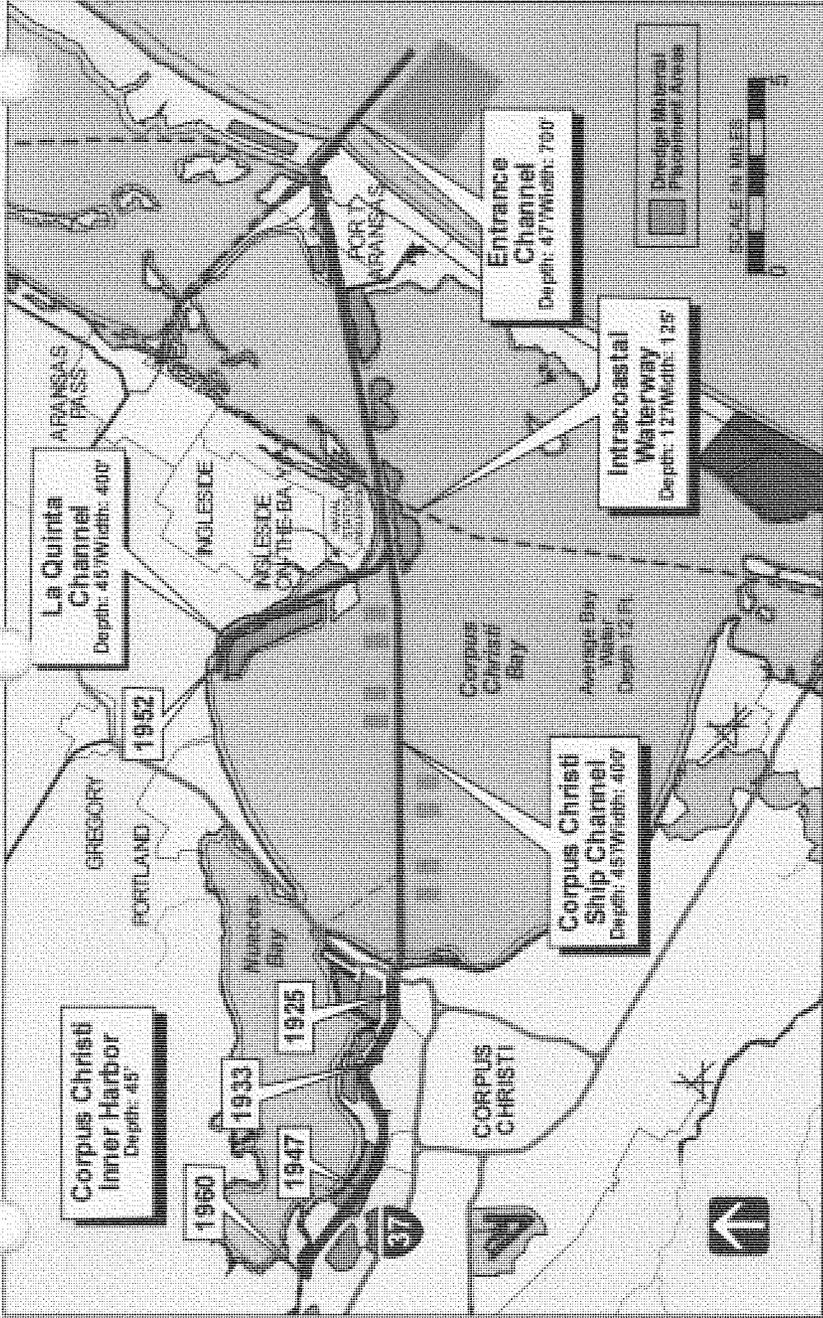


Figure - Corpus Christi Ship Channel & La Quinta Channel – Years Denote Date of Completion