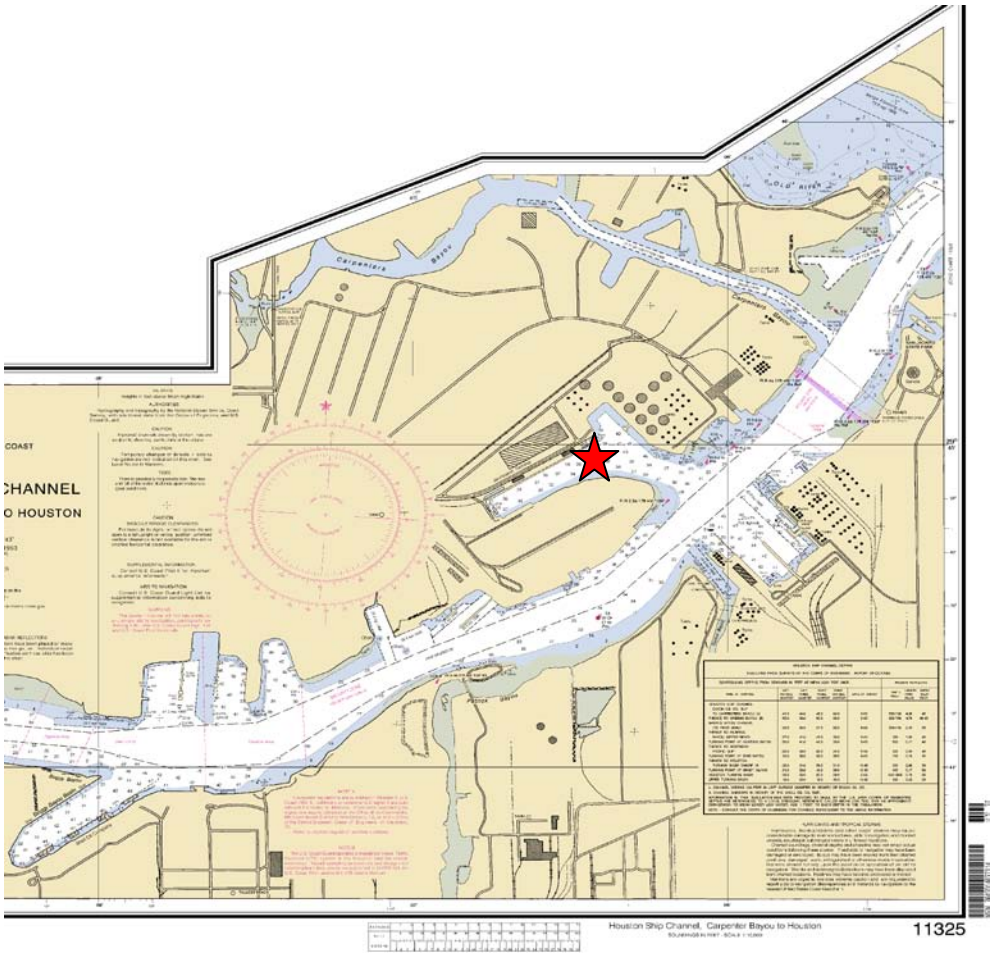
US Army Corps of Engineers
Galveston District

JACINTOPORT CHANNEL

Houston, Texas

Assumption of Maintenance Decision Document



Jacintoport Channel Assumption of Maintenance
US Army Corps of Engineers
Southwestern Division
August 2012

Executive Summary

Section 5001 of the Water Resources Development Act of 2007 authorizes the Federal assumption of maintenance (AOM) for the Jacintoport Navigation Channel (including a channel flare separately known as the Jacintoport Plateau) provided that the Assistant Secretary of the Army for Civil Works (ASA/CW) makes a determination that such maintenance is economically justified and environmentally acceptable and that the Jacintoport Navigation Channel (hereafter Jacintoport Channel or Channel) was constructed in accordance with applicable permits and appropriate engineering and design standards. This report is provided in response to that legislation.

The less than one-mile-long Jacintoport Channel and Plateau are located as a branch channel off the Houston Ship Channel (HSC). The Jacintoport Channel is currently maintained by the Port of Houston Authority (PHA) under U.S. Army Corps of Engineers (USACE) and State permitting to a depth of 40 feet (ft) mean low tide (MLT) and the Plateau to 39 ft MLT. The Channel serves three terminal facilities, two of which are private. The analysis conducted for the AOM assessment is limited to the existing channel dimensions and no widening or deepening beyond the currently-constructed limits is included in the evaluation.

Current maintenance plan for dredging and placing dredged material is permitted and is placed in the nearby PHA facility known as Lost Lake Placement Area (Lost Lake). This facility serves Federal and non-Federal disposal from several reaches of the HSC and has sufficient capacity for the next 20 years. The average annual contribution from the potential federalization of Jacintoport Channel and Plateau is approximately six percent (6%) of the average annual disposal into Lost Lake.

An Environmental Analysis (EA) has been performed and the existing permit documents have been reviewed. The PHA has obtained and complied with the necessary Federal, State, and local permits and requirements. Evidence of appropriate documentation supporting the National Environmental Policy Act (NEPA) requirements has been identified and provided for review in the EA. NEPA compliance includes coordination and consultation with the National Marine Fisheries Service, the U.S. Fish and Wildlife Service, and the Texas Council on Environmental Quality and insures the protection of sensitive species and habitat in the Jacintoport Channel project area. Upon completion of the NEPA compliance, a Decision of Record document will be issued by the District Commander.

The economic analysis has determined that continued maintenance of the existing channel to an operating depth of 40 ft MLT produces a benefit-to-cost ratio of 1.8:1 with average annual benefits of approximately $637,418; costs of $352,053; and net benefits of $285,365. These are based on a conservative approach of constant traffic, a fixed fleet, and a range of sedimentation rates over the period of analysis.

Channel dimensions fall short of meeting USACE typical design dimensions, but the Channel generally functions safely through traffic management enforced by the Houston Pilots' Association. The USACE recently approved the assumption of Federal maintenance at Port Lavaca, Texas where USACE dimensions were not achieved, but performance demonstrated a safely functioning channel.

TABLE OF CONTENTS

TABLES

ATTACHMENTS

JACINTOPORT CHANNEL
ASSUMPTION OF MAINTENANCE
DECISION DOCUMENT

I. INTRODUCTION

The Water Resources Development Act (WRDA) of 2007 states:

> Sec. 5001 Maintenance of Navigation Channels.
> (a) IN GENERAL. Upon request of a non-Federal interest, the Secretary shall be responsible for maintenance of the following navigation channels and breakwaters constructed or improved by the non-Federal interest if the Secretary determines that such maintenance is economically justified and environmentally acceptable and that the channel or breakwater was constructed in accordance with applicable permits and appropriate engineering and design standards.
> ...(9) Jacintoport Channel at Houston Ship Channel, Texas.

This report is intended to support the U.S. Army Corps of Engineers, (hereinafter USACE) Galveston District to make a determination whether such maintenance at the Jacintoport Navigation Channel (hereafter Jacintoport Channel or Channel) is economically justified and environmentally acceptable. This report seeks to identify the available data, provide an initial estimate of the maintenance volumes, dredged material placement requirements, associated costs, potential National Economic Development (NED) benefits and potential environmental issues.

Section 101(a) (30) of the Water Resources and Development Act of 1996 authorized deepening of the Houston Ship Channel (HSC) to 45 feet (ft) below mean low tide (MLT). The Jacintoport Channel is one of several non-Federal channels that branch off of the Federal HSC, and are maintained by the Port of Houston or other private interests. The Jacintoport Channel, located in Channelview, Harris County, Texas, is approximately 4,000 ft in length and currently maintained to a depth of 40 ft MLT. (Figure 1 provides a general location map, Figure 2 provides an aerial view of the surrounding vicinity, Figure 3 provides a detailed aerial of the Jacintoport Channel and terminals, and Figure 4 shows the dimensions of the current Channel and berthing areas). The Channel provides access to the Jacintoport Terminal, owned by the Port of Houston Authority (PHA), and the privately-owned Inbesa American, Inc. Terminal and Houston Fuel Oil (HFO) Terminal. The Channel includes the Jacintoport Plateau, which is maintained at 39 ft MLT and located along the southwestern mouth of the Channel and serves as an entrance flare and pressure wave attenuator. Material dredged from the Jacintoport Channel is placed in Lost Lake Placement Area (Lost Lake) (USACE Section 10/404 Permit, 1986).

Lost Lake is the closest authorized placement area to the Jacintoport Channel; the distance is approximately three miles. Dredge material from designated reaches of the HSC is also placed in Lost Lake. The placement area is maintained by the PHA, which charges fees to Federal and non-Federal parties based on volumes of material placed.

Figure 1: General Location Map

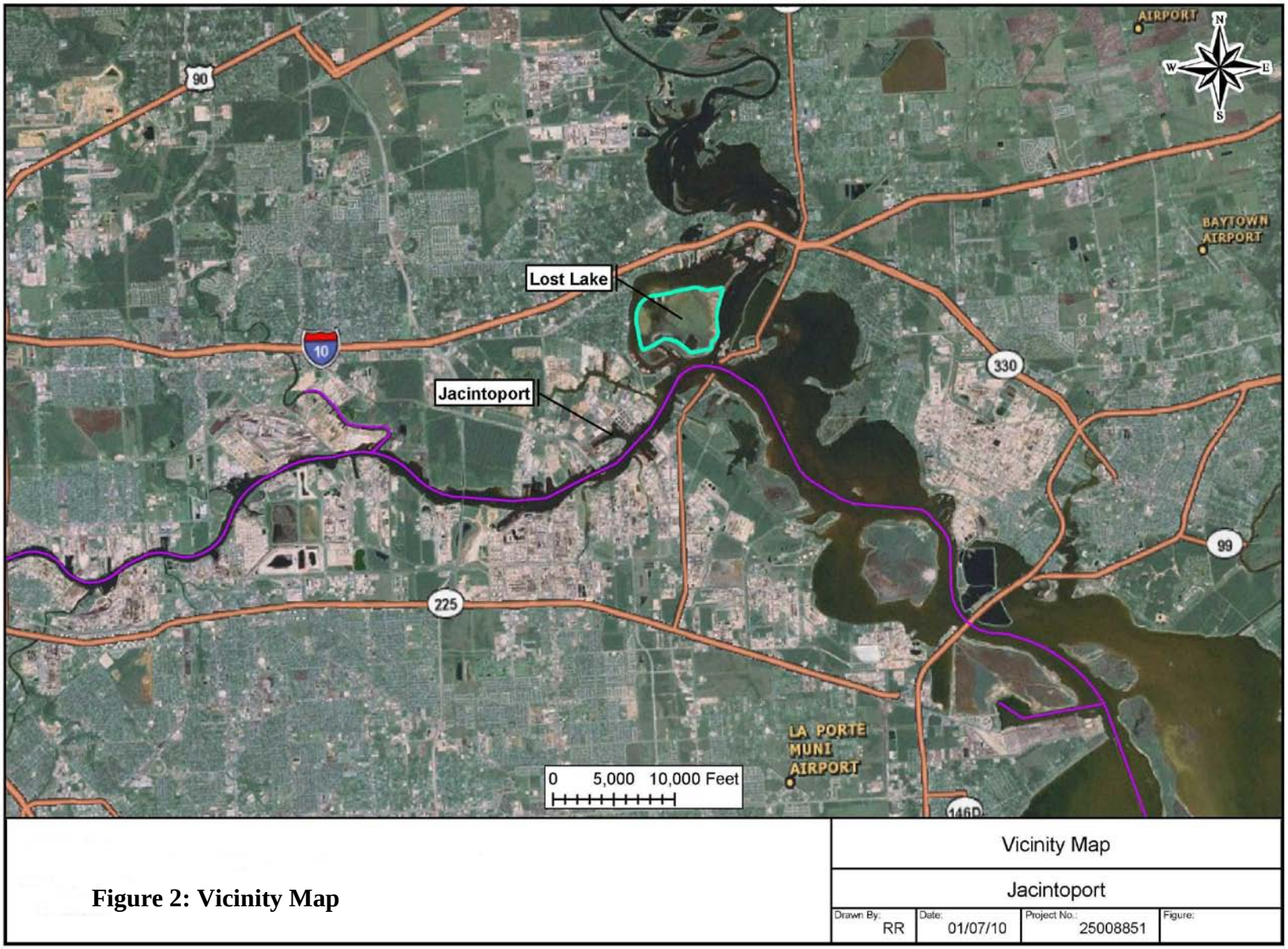


Figure 2: Vicinity Map

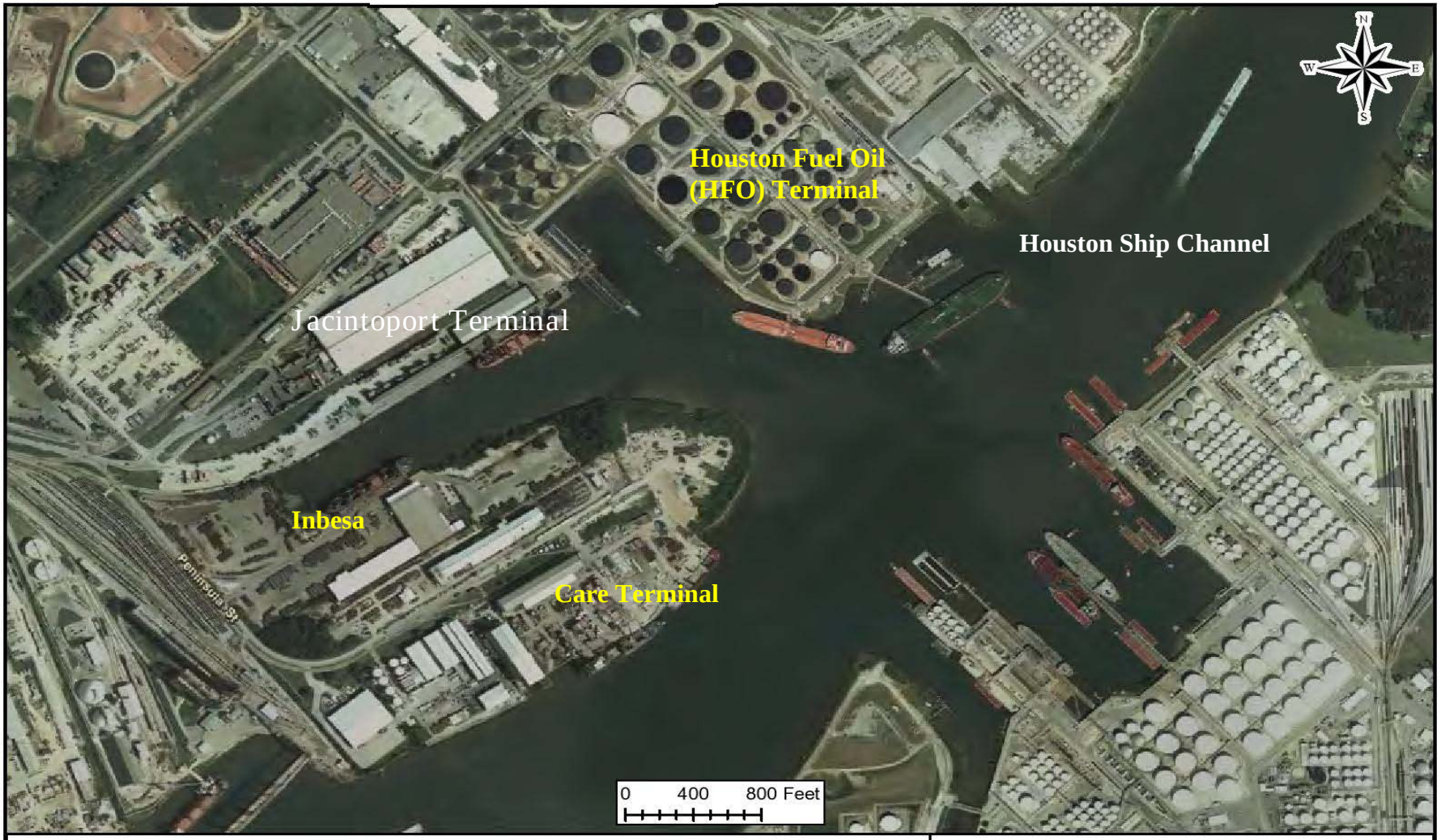


Figure 3: Aerial View of Jacintoport Channel and Terminal Facilities

Aerial Overview			
Jacintoport			
Drawn By: RR	Date: 01/07/10	Project No.: 25008851	Figure:

Figure 4:
Jacintoport Channel and Terminal Dimensions

II. SPONSOR REQUEST

Section 5001 of the WRDA of 2007 authorizes the Federal assumption of maintenance (AOM) of specified projects following receipt and review of a request from a non-Federal interest. Further, it requires that the ASA/CW make a determination that such maintenance is economically justified and environmentally acceptable and that the channel was constructed in accordance with applicable permits and appropriate engineering and design standards. The ASA/CW must notify the non-Federal interest of the determination not later than six months after receipt of the request.

By letter dated December 3, 2007, the PHA requested the AOM for the Jacintoport Channel and the Bayport Cruise Channel and Turning Basin, in accordance with WRDA 2007, Section 5001(a)(7) and Section 5001(a)(9). The evaluation of the AOM request for the Bayport facility is addressed in a separate report.

This Decision Document will determine if such maintenance is economically justified and environmentally acceptable as defined in ER 1105-2-100, Planning Guidance Notebook. To do so, the Decision Document will address the following requirements:

Environmental Acceptability: The non-Federal interest was responsible for obtaining all necessary Federal, State, and local permits for project construction and ongoing operation. Discussion of these permits is provided in this report. Thus, environmental concerns should have been addressed adequately through the permitting process. Additional documentation must be completed to meet National Environmental Policy Act (NEPA) requirements because of the Federal nature of the requested AOM. The analysis, which will be provided in the Environmental Assessment (EA), will also document that the Channel was constructed in accordance with applicable permits and appropriate engineering and design standards.

Economic Justification: In order to find the proposed work economically justified, it must be demonstrated that project benefits, as defined by the Water Resources Council's Principles and Guidelines, exceed project Operation and Maintenance costs. Further, it must be demonstrated that the last increment of maintenance is justified by evaluating lesser depth alternatives to the existing project.

Consistency with Federal Policy: Maintenance of the project must be consistent with other Federal policies including being limited to General Navigation Features (GNF) and consistent with the policy that the benefits from the project not accrue to a single private ownership.

Dredged Material Management Plan (DMMP): The project must include a DMMP to demonstrate that there is adequate disposal capacity for 20 years of Operation and Maintenance of the Channel to be assumed for Federal maintenance considering other Federal maintenance requirements.

To document all of these requirements, the AOM Decision Document for the Jacintoport Navigation Channel includes the following components:

(a) An economic assessment to determine whether Federal AOM of the overall project appears to be warranted;

(b) An evaluation of existing environmental permits for dredging the Channel and an assessment of the need for additional coordination efforts with environmental resource agencies;

(c) An engineering assessment of the Channel construction relative to appropriate design standards, dredging template and volumes, and development of a DMMP;

(d) An assessment of the consistency of assumption with current Federal policy.

The analysis conducted in this Decision Document will comply with the USACE Planning Guidance Notebook, ER 1105-2-100. The analysis will also be conducted within the constraints of relevant laws and regulations pertaining to the State of Texas.

III. PROJECT DESCRIPTION

This AOM Decision Document reviews the economic feasibility and environmental suitability of the Federal AOM costs at the Jacintoport Channel. The analysis conducted for the AOM assessment is limited to the existing Channel dimensions and no widening or deepening beyond the currently-constructed limits is included in the evaluation. The Jacintoport Channel was constructed by the Department of the Army and later turned over to non-Federal interests. However, original engineering and design documents for the Channel are not available for review. The PHA is believed to have assumed maintenance of the Channel after title was transferred to the PHA from private interests in 1987 (Special Warranty Deed, October 9, 1987) where the PHA subsequently took over maintenance and ownership of the Channel. The PHA currently maintains the Channel to a depth of 40 ft MLT.

Background:

In 1984, the maintenance dredging of the Channel was permitted to a depth of 36 ft MLT, with dredged material placement in Lost Lake. In 1988, the Channel was permitted to be deepened from 36 ft MLT to 38 ft MLT. In 1994, the Channel was permitted to be deepened from 38 ft MLT to 40 ft MLT, with maintenance dredging through 2004. In 1995, the permit was amended to include the Jacintoport Plateau (entrance flare) to a depth of 39 ft MLT as a pressure wave attenuator. Maintenance dredging volumes for the Plateau are included in the overall volumes for the Jacintoport Channel.

IV. CURRENT AND PAST PROJECT PERMIT ACTIONS AND REPORTS

The Jacintoport Channel was constructed by the Department of the Army and later turned over to non-Federal interests. No previous USACE reports have been identified. USACE has reviewed and approved similar permit applications under Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) to deepen the Channel and perform maintenance dredging of the Channel. Department of the Army (DA) Permit 13623, issued in 1984, authorized Shippers Stevedoring Company to perform maintenance dredging of the Channel to 36 ft MLT and placement of the dredge material in Lost Lake. On October 26, 1987, DA Permit 13623 was transferred from Shippers Stevedoring Company to the Port of Houston Authority. DA Permit 17741, dated January 8 1987, authorized construction of a dock facility in the Jacintoport Channel. Also in 1987, the USACE completed the Final Feasibility Report and Environmental Impact Statement, Galveston Bay Area Navigation Study, Volume 3, which included Appendix C – Navigation Economics. DA Permit 18576, dated November 9 1988, authorized deepening of the Channel from 36 ft MLT to 38 ft MLT and hydraulic dredging of the Jacintoport Channel to provide sufficient depth to accommodate deep draft vessels. On August 22, 1994, a revision to the Permit (No. 18576(01)) was approved. Permit 18576(01) increased the authorized depth from 38 ft MLT to 40 ft MLT and extended the expiration date to December 31, 2004. On November 3 1995, a second revision (Permit No. 18576(02)) was approved by the USACE to include dredging of the Jacintoport Plateau to a depth of 39 ft MLT. On July 13, 2006, a third revision to the Permit (No. 18576(03)) was approved. Permit 18576(03) allowed mechanical, water injection, and siltblade dredging as approved maintenance dredging methods; allowed placement of dredged material in Peggy Lake and Alexander Island Placement Areas (Peggy Lake and Alexander Island) in addition to Lost Lake; and extended the expiration date to December 31, 2016. The USACE has also been the approval agency for Section 404-Clean Water Act permitting, and the Texas Commission on Environmental Quality (TCEQ) has been the approval agency for Section 401 water quality certification.

The TCEQ has reviewed the third application for Amendment of Permit 18576 (i.e. 18576(03)), the Public Notice, Statement of Findings (SOF) (June, 7 2006), and the Addendum to SOF (June 26, 2006), and has subsequently issued a certification that "there is reasonable assurance that the project will be conducted in a way that will not violate water quality standards". The TCEQ has additionally reviewed the proposed permit action for consistency with the goals and policies of the Texas Coastal Management Program (CMP); as set forth in regulation 31 TAC §505.30 of the Coastal Coordination Council; and attests consistency with the CMP.

V. EXISTING CONDITIONS

Physical Conditions

Datum

All elevations referred to in this report, unless specifically noted otherwise, are based on MLT datum. This vertical datum, as defined by the Galveston District, accounts for wind and tide. MLT is defined as 1.14 ft below National Geodetic Vertical Datum of 1929 (NGVD29) for the reach of the HSC adjacent to the Jacintoport Channel. A measurement station at Morgan's Point in the HSC is used by the HSC Pilots in determining the water level when bringing vessels into the HSC and Jacintoport Channel. Mean Lower Low Water (MLLW) is 1 ft above MLT.

Location and Berthing Areas

The Jacintoport Channel in Channelview, Texas meets with the larger HSC approximately 4,000 ft west of San Jacinto State Park, and approximately 17 miles east of downtown Houston. The Channel is approximately 4,100 ft long, with an average width of 200 ft, and has three berthing areas. A portion of the channel is maintained at two different depths. The main Channel is maintained to a depth of 40 ft MLT. From the Channel entrance at the HSC to approximately Station 29+00, the northern 100' portion of the Channel is maintained at a depth of 45 ft MLT to provide deep draft access to oil tankers berthing at the (Houston Fuel Oil) HFO Terminal (See Figure 4 for view of Channel dimensions and associated facilities).

The section of the Channel closest to the HSC is oriented to the northwest (when entering from the HSC), and then turns to the southwest. An area known as the Jacintoport Plateau is dredged to a depth of 39 ft MLT on the western side of the Channel where it meets with the HSC. The Jacintoport Plateau was constructed to increase navigation safety by reducing the pressure waves on ships entering and exiting the Channel.

The PHA-owned Jacintoport Terminal and Harbor (Jacintoport Terminal) is located on the northern side of the Channel, the Inbesa American, Inc. Terminal (Inbesa Terminal) is on the southern shore of the Channel. The HFO Terminal is located on the northeastern portion of the Channel. Ships enter the Jacintoport Channel and the HFO terminal from the HSC to the east. Ships either turn into the HFO Terminal to the right or continue up the Channel to the Jacintoport and Inbesa Terminals. Because the Channel is narrow, vessels turn around within the HSC and enter the Jacintoport Channel frontward or backward, as predicated by the required direction for berthing (see detailed description of vessel maneuverability in section VII of this report).

The HFO terminal area is maintained to 45 ft MLT at Docks 1 and 3, and 42 ft MLT at Dock 2. The Jacintoport Terminal berthing area is maintained at 40 ft MLT and the Inbesa Terminal berthing area at 34 ft MLT. The Jacintoport Terminal on the north side has three docks with a 2,000 ft long berthing area, and the Inbesa Terminal on the south side has a 1,480 ft long berthing area. Deep draft vessels berthing at HFO Terminal Docks 2 and 3 routinely use a small portion of the Jacintoport Channel to access their 45 ft depth terminal. The third berth is accessible directly from the HSC.

Channel Dimensions

In 1994, the Channel was permitted to be deepened from 38 ft MLT to 40 ft MLT. In 1995, the Jacintoport Plateau was permitted to be added to a depth of 39 ft MLT. The current depth to which each area of the Channel is maintained is listed in **Table 1** below:

Table 1: Current Maintenance Depths in Jacintoport Channel and Associated Terminals

Area of Channel	Maintenance Depth (MLT)	Advanced Maintenance
Channel (*)	40 ft	2 ft
HFO Terminal	45 ft	NA
Jacintoport Terminal	40 ft	2 ft
Inbesa Terminal	34 ft	1 ft
Jacintoport Plateau (*)	39 ft	2 ft

(*) The AOM is being made for these features only, to the indicated depths.

From Channel station 29+00 to the intersection with the HSC, HFO maintains the north side (100') of the Jacintoport Channel at a depth of 45 ft MLT to provide access for large oil tankers to their docks. (In this section, half of the width of the Jacintoport Channel is maintained to 40 ft MLT and half to 45 ft MLT.) HFO arranges and pays for the additional dredging beyond 40 ft MLT to its required depth of 45 ft MLT.

The beam restrictions at the Jacintoport Terminal for berthed vessels are: Dock 1 at 90 ft, Dock 2 at 100 ft, and Dock 3 at 106 ft. These dimensions take into account the possibility of a 106-ft beam vessel berthed at the Inbesa dock, which is its beam limitation. According to USACE Engineering Manual 1110-2-1613 "Hydraulic Design of Deep Draft Navigation Channels", 31 May 2006, sufficient width is not available for vessels to be docked at both the Jacintoport and Inbesa Terminals. However, the Houston Pilots' Association has stated that it is able to operate vessels safely in this section of the Channel using tug assistance. In general practice, the clearance required between docked vessels is double its beam dimension plus the 100 ft beam of the largest tug that would work in the Channel.

However, if there is a 138 ft beam vessel at HFO Dock 1, then it is necessary for vessels accessing the HFO Dock 3 to use the main Jacintoport Channel to get to HFO Dock 3. A portion of the Jacintoport Channel is also used to get to HFO Dock 2. HFO Dock 1 is accessed directly from the HSC.

The Care Terminal, also operated by PHA, is located on the peninsula between the Jacintoport Channel and the HSC. The facilities at the Care Terminal are accessed directly from the HSC, and vessels calling there do not enter the Jacintoport Channel. The docks at the Care Terminal are sometimes referred to as "Jacinto Docks 4 and 5", but are not part of the main Jacintoport Terminal.

Commodities

The Jacintoport Terminal had a combined total of 198 vessel calls in 2009. The arrival and departure drafts are shown in **Table 2**. It should be noted that not all vessel calls had both an arrival and departure draft recorded.

Table 2: 2009 Arrival and Departure Drafts
Jacintoport Terminal

Draft	Arrivals	Departures	Total
<=34	155	142	297
35	1	0	1
36	0	3	3
37	0	0	0
38	0	3	3
39	0	3	2
40	0	0	0
Total	**156**	**150**	**306**

Source: USACE Navigation Data Center

Table 2 indicates that most vessels calling on this terminal arrives and departs with drafts less than 35 ft MLT.

Design drafts and deadweight tonnages of the vessels were obtained from the Lloyd's Register Fairplay Sea-Web database. **Table 3** shows that 92% of vessels that called on the Jacintoport Terminal had design drafts of 34 ft or less.

Table 3: 2009 Vessel Call Design Drafts
Jacintoport Terminal

Design Draft	Number of Calls	Percent
<=34	149	92.0%
35-39	9	5.6%
40-44	3	1.90%
>=45	**1**	**0.6%**
Total Calls	**198**	**100.0%**

Sources: USACE Navigation Data Center; Sea-Web database

Agricultural products and textiles were the largest commodity handled by the Jacintoport Terminal in terms of total tonnage. Agricultural products and textiles accounted for 42.9% of all commodity handled in 2009. Totals for all commodity categories are listed in **Table 4**.

Table 4: 2009 Commodities Handled
Jacintoport Terminal
(Tons)

Commodity	Tonnage	Percent
Agricultural Products/Textiles	424,956	42.9%
Bulk Metals & Ores	27,498	2.8%
Chemical Products	49,249	5.0%
Construction Materials/Wood & Stone Products	20,510	2.1%
Machinery/Manufactured Products	409,069	41.3%
Other	31,205	3.2%
Petroleum Products	27,266	2.8%
Total	**989,7531**	**100.0%**

Source: USACE Navigation Data Center

Tides and Currents

In the project area, winds can significantly alter the mean diurnal tide, which is approximately 0.7 ft during winter, and strong north winds from cold fronts can lower water surfaces by up to 2 ft below MLT. Conversely, water levels can rise up to 15 ft during tropical storms and hurricanes.

The average Gulf of Mexico (Gulf) tide is 1.45 ft (closest Gulf station – Galveston Pleasure Pier; Texas Coastal Ocean Observation Network (TCOON), 2009), but this tide range can vary substantially with astronomical factors as well as winds. The nearest TCOON observation station to the project area was the Battleship Texas State Park Station, approximately one mile northeast of the project area. This station collected water-level data from May 2002 to September 2008. The average daily water-level range between May 2002 and September 2008 at the Battleship Texas State Park Station was approximately 1.7 ft (with a standard deviation of approximately 0.5 ft); the average monthly water-level range was approximately 4.2 ft.

There is limited flow and current information available for the Jacintoport Channel. No flow data is obtained from locations near Jacintoport, with the nearest gauge located upstream on Buffalo Bayou and thus not relevant to this location. The TCOON stations are designed to measure tide elevations and provide meteorological information, but do not measure currents. The TCOON station at Morgan's Point is used by the HSC Pilots in determining the water level when bringing vessels into the HSC and Jacintoport Channel.

Geology

The coastal plain near the Gulf is located within the Gulf Coast geosyncline, a major center of sediment deposition since the middle to late Jurassic Period. More than 30,000 ft of sedimentary deposits dip toward the Gulf in this area. The geology of the project area is characterized as Quaternary-aged (Recent and Holocene) Alluvium containing thick deposits of clay, silts, sand, and gravel overlying the Pleistocene-aged Beaumont Formation. These formations consist mainly of stream channel, point bar, natural levee, marsh, and backswamp deposits associated with former and current river channels and

bayous. The Alluvium outcrops in a zone that is approximately 70 to 90 miles wide, which parallels the Texas coastline. The underlying Beaumont Formation is estimated to be less than 1,000 ft thick and consists primarily of clay, silt, sand, and gravel.

Subsidence occurs as sudden sinking or gradual downward settling of land with little or no horizontal motion, caused by surface faults and intensified and/or accelerated by subsurface mining or the pumping of oil and/or groundwater. Rapid subsidence has also been seen in the area due to groundwater withdrawal. Estimated subsidence in the project area was approximately 10 ft between 1906 and 1978 (Harris Galveston Subsidence District, 2009). Conversely, localized subsidence has been observed to lessen and diminish altogether as groundwater, oil, and gas pumping has decreased or ceased; there has been less than one ft of subsidence in the project area between 1978 and 2000.

The network of dredged navigation channels, principally Houston and Galveston Navigation Channels (HGNC), the Gulf Intracoastal Waterway (GIWW), and the industrial and urban land uses surrounding the project area have replaced the natural coastal features. The bathymetry of the project area has been modified by human activity, due to channel dredging. The project area is adjacent to Buffalo Bayou, which is dredged as part of the Bayou Reach of the HSC, and water depths are currently maintained by the USACE to 45 ft MLT.

Relative Sea Level Rise

Changes in local or relative sea level reflect the integrated changes in global or eustatic sea level plus changes due to vertical land movement, or subsidence. The recent historic rate of relative mean sea level rise in the project area is estimated at 0.021 ± 0.001 ft/yr from over 100 years of tide gauge data recorded locally at Galveston Pier 21 (National Oceanic and Atmospheric Administration (NOAA), 2010). In accordance with USACE guidance (ER-1165-2-211), the local subsidence rate may be estimated from tidal analysis by subtracting the rate of global mean sea level (GMSL) change from the historic rate of relative mean sea level (RMSL) change. Assuming the historic rate of GMSL change is equal to the globally averaged rate of 0.0056 ft/yr, the resulting estimated observed subsidence rate for the project area would be 0.021–0.0056 = 0.0154 ft/yr. Using this estimated local subsidence rate for the project area, changes in RMSL in the project area over the 50-year period of analysis would be 1.05 ft under the low or historic rate of GMSL change, 1.43 ft under the medium rate of accelerated GMSL change (modified NRC Curve I), and 2.66 ft under high or accelerated rate of GMSL change (modified NRC Curve III).

The sedimentation rates calculated for the historic period and the estimates of future vertical sedimentation rates in the HGNC Preliminary Assessment are generally on the order of 0.5 to two ft/yr. On this basis, the direct effect of RSLR will be on the order of one percent (1%) to ten percent (10%) of the vertical sedimentation rate. This is likely much less than the overall uncertainties in the calculated vertical sedimentation rates.

The effects of RSLR on both the historic sedimentation rates and estimates of future sedimentation rates should be studied in more detail in subsequent planning stages for dredged material management on the HGNC and Jacintoport Channel. The overall effect of RSLR would be a decrease in required dredging; RSLR is not expected to significantly affect placement area capacity. Since the levee crest at the Lost Lake is currently being raised to an elevation of 36 ft, the projected increases in sea level are unlikely to require any levee modifications.

Environmental Permitting

"Environmental Acceptability" presumes that the non-Federal interest who submitted the request for AOM has or will obtain all the necessary Federal, State, and local permits for maintenance construction activities. All of the inherent environmental concerns would therefore have been addressed via the USACE Section 10/404 permit action; where the USACE is responsible for providing the permit and associated statement of findings. This permitting process, including appropriate documentation that satisfies NEPA compliance, includes the collective administration of the following Acts:

- RIVERS AND HARBORS ACT OF 1899 (SECTION 10)
  33 U.S.C. §§ 401-413: Rivers and Harbors Act of 1899; 33 CFR 323: Structures or Work Affecting Navigable Waters of the United States.

- CLEAN WATER ACT (SECTION 404)
  33 U.S.C. §1251 et seq.: Federal Water Pollution Control Act; 33 FCR 322: Discharges of Dredged or Fill Material into the Waters of the United States.

Specific environmental evaluations of the USACE Section 10/404 permit action may additionally include, but are not limited to, the following elements:

- Wetland Determinations
- Coastal Zone Consistency Determination
- Threatened and Endangered Species Report
- U.S. Fish and Wildlife Service (USFWS) Concurrence Letter
- Cultural Resource Investigation
- Soil or Core Bore Analyses
- DMMP
- Mitigation Requirements

Environmental Setting

General Area

The Jacintoport Channel is part of the greater Galveston Bay region, which lies within the Western Gulf Coastal Plain of the U.S. The Jacintoport Channel and the HSC, however, reside within and can be locally characterized by two important ecological designations: terrestrially by the "Gulf Coast Prairies and Marshes" Natural Region of Texas (Texas

Park, and Wildlife, 2009), and 2) aquatically by the San Jacinto River Basin (watershed), specifically by the water body segment described as Houston Ship Channel Tidal (TCEQ, 2009).

The Jacinto Channel and the greater HSC are heavily industrialized where the waterways have been created over years of extensive dredging and widening, and therefore resemble few characteristics of their natural indigenous state. A description of environmental resources in the project area is provided below, with more detailed descriptions provided in Attachment 2, Environmental Considerations.

Wetlands & Vegetation

Aerial photography indicates that there is little remaining wetland vegetation associated within the immediate vicinity of the Jacintoport Channel due to predominantly hardened shorelines. A variety of vegetation species appear to exist on the shores of nearby intercoastal regions. Common and likely species identified for this region may include big cordgrass (*Spartina cynosuroides),* widgeongrass (*Ruppia maritima*), bulrush (Scirpus app.), seashore paspalum (*Paspalum vaginatum*), and common reed (*Phragmites australis*), etc (Texas Parks, and Wildlife, 2009). Lost Lake does retain a sizeable potential area to support both emergent and submergent wetland vegetation and associated habitat. Aerial photographs indicate that there may be episodic growing phases for vegetation based on dredging placement activity and frequency, and/or island elevation.

Wildlife Resources

A variety of water birds and other waterfowl inhabit and utilize surrounding area resources of the San Jacinto River Basin, and constitute the predominant wildlife of the region. A wide variety of other bird species over winter or use southern Texas as a flyover and resting area on return trips from more southern wintering grounds. Although there are few natural areas at Jacintoport Channel, Lost Lake provides potential habitat and roosting areas for many of the bird species, although no substantiating bird use data for Lost Lake could be obtained.

Aquatic Resources

Fisheries

Fisheries resources potentially found in the waters of the Jacintoport Channel, the greater HSC, and northern reaches of the Galveston Bay area include popular sport fishes including: Red drum (*Sciaenops ocellatus*), spotted seatrout (*Cynoscion nebulosus*), black drum (*Pogonias cromis*), southern flounder (*Paralichthys lethostigma*), Star drum (*Stellifer lanceolatus*), and Spot (*Leiostomus xanthurus*). Other common fishes of the region include the Gafftopsail catfish (*Bagre marinus*), Striped mullet (*Mugil cephalus*), Sheepshead (*Archosargus probatocephalus*), Atlantic croaker (*Micropogonia undulates*), Hardhead catfish (*Arius felis*), and the Bay anchovy (*Anchoa mitchilli*).

Shellfish resources include the blue crab (*Callinectes sapidus*) and a variety of shrimp species (*Penaeus spp.),* as well as the American oyster (*Crassostrea virginica*). It is not

uncommon to have fishery and shellfish "seafood consumption advisories" for many species of the HSC due to the bioaccumulation of toxins. Dioxin is one such compound found in area fishery specimens that have been analyzed. Dioxin is a generic term commonly used for a suite of toxic and environmentally persistent compounds.

Benthos

Benthic macroinvertebrate and microbial communities are well established in the HSC, and scientists have developed biological indicators utilized to track future environmental changes. Monitoring results have demonstrated that these communities exhibit abundances, diversity, and composition which are consistent with chemically and/or physically disturbed environments (e.g., dredging maintenance) (Galveston Bay Information Center; 1996).

Essential Fish Habitat

The Magnuson-Stevens Fishery Conservation and Management Act Reauthorization (16 U.S.C. 1801-1882) provided added measures to describe, identify, and minimize adverse effects to Essential Fish Habitat (EFH) (50 CFR Part 600). The Gulf of Mexico Regional Management Council (GMRMC) retains responsibility for management of EFH species in Texas, Louisiana, Mississippi, and Florida. By definition, EFH includes those waters and substrate necessary for fish and shellfish spawning, breeding, feeding, and growth through maturity. "Waters" include aquatic areas and associated physical, chemical, and biological properties currently or historically utilized by the fisheries; "Substrate" includes any sediment, hard bottom, structures underlying the waters, and associated biological communities. Those activities potentially impacting EFH may either be direct (e.g. physical disruption) or indirect (e.g. loss of prey species) and can have site-specific, habitat-wide, cumulative, and/or synergistic effects.

According to the Biogeography Branch of the GMRMC, EFH have been designated for species within the region included in the Jacintoport Channel vicinity, and may include the red drum (*Sciaenops ocellatus*), blue crab (*Callinectes sapidus*), brown shrimp (*Penaeus aztecus*), and white shrimp (*Penaeus setiferus*). Lost Lake may additionally provide waters and substrate (vegetation, mud, sand, shell substrate) utilized as nursery or forage areas for these species, their prey species, and/or other commercially managed species by the GMRMC.

Threatened and Endangered Species

The U.S. Fish and Wildlife Service (USFWS) (Department of the Interior) and the National Marine Fisheries Service (NMFS) (Department of Commerce) co-share the responsibility for the administration of the Endangered Species Act (ESA). Within the ESA, a species may be listed as either threatened or endangered (T&E species). "Threatened" indicates that a species is likely to become endangered within the foreseeable future. "Endangered" indicates that a species is in danger of extinction throughout all or a significant portion of its range. All species of plants and animals, except pest insects, are eligible for listing as T&E species.

State wildlife organizations have and exercise the ability to provide additional jurisdiction and protection to species within their statewide boundaries. The Texas Parks and Wildlife Department (TPWD) has established a list of threatened (likely to become endangered) and endangered (threatened with statewide extinction) species.

The potential occurrence of several State- and Federally-listed T&E species has been identified for Harris County, Texas. Scientific evaluation and discretion was applied to further subset potential species of occurrence within the Jacintoport Channel project area. These species have been compiled from both Federally-listed (USFWS and NMFS) and State-listed (TPWD) sources as shown in **Table 5** (Note: table citations of species do not indicate confirmed existence).

Table 5: State- and Federally-Listed Threatened and Endangered Species Potentially Occurring in the Jacintoport Channel Project Area, Harris County, Texas.

Common Name	Scientific Name	Listing Status
AMPHIBIANS		
Houston Toad	*Bufo houstonensis*	FE, SE
BIRDS		
American Peregrine Falcon	*Falco peregrinus anatum*	ST
Bald Eagle	*Haliaeetus leucocephalus*	ST
Brown Pelican	*Pelecanus occidentalis*	SE
Peregrine Falcon	*Falco peregrinus*	ST
White-faced Ibis	Plegadis chihi	ST
White-tailed hawk	Buteo albicandatus	ST
Whooping crane	Grus americanus	SE, FE
Wood stork	Mycteria Americana	FT
FISH		
Creek chubsucker	*Erimyzon oblongus*	FT
Smalltooth Sawfish	*Pristis pectinata*	SE, FE
MOLLUSKS		
Sandbank pocketbook	*Lampsilis satura*	ST
Texas pigtoe	*Fusconaia askewi*	ST
REPTILES		
Alligator snapping turtle	*Macrochelys temminckii*	ST
Green sea turtle	*Chelonia mydas*	ST, FT
Kemp's Ridley sea turtle	*Lepidochelys kempii*	SE, FE
Leatherback sea turtle	*Dermochelys coriacea*	SE, FE
Loggerhead sea turtle	*Caretta caretta*	ST, FT
PLANTS		
Texas Prairie dawn	*Hymenoxys texana*	FE, SE

Source: USFWS, 2010; NMFS, 2010; TPWD, 2010 websites
Note: FE = Federally Endangered, SE = State Endangered, FT = Federally Threatened, ST = State Threatened

Water and Sediment Quality

The TCEQ has classified major surface waters of Texas as "segments" for the management of water quality and for the designation of site-specific uses and criteria. This management encompasses 1) the assessment of in-stream water quality, 2) the issuance of permits to discharge into State waters, and 3) the potential allocation of

funding. Furthermore, this classification system assists with assuring compliance to State and Federal requirements. Accordingly, the Jacintoport Channel, as well as the surrounding waters of Lost Lake are contained within the State designated San Jacinto River Basin; and more specifically, within the surface water segment described as "SegID 1006: Houston Ship Channel Tidal". The Houston Ship Channel Tidal segment initiates "from the confluence with the San Jacinto River in Harris County, to a point immediately upstream of Greens Bayou in Harris County, including tidal portions of tributaries". The Houston Ship Channel Tidal segment is classified as a tidal stream of approximately 25.6 miles in length.

Water and sediment quality within the Jacintoport Channel project area have been impacted by the long history and existence of the petrochemical industry. In spite of this history, specific information and data describing water and sediment quality of the area have been sparse.

Water Quality

The 2008 Texas Water Quality Inventory provides site specific water and fish tissue sampling for various subsections of the Houston Ship Channel Tidal segment. In general, the 2008 water quality report identifies the number of samples which have "exceeded" the screening levels of various chemical and biological measures. The following constituents were found to have numerous samples exceeding (high, unless otherwise indicated) the screening levels for the Houston Ship Channel Tidal segment: dissolved oxygen (low), pH (low), lead, mercury, Enterococcus spp., ammonia, Chlorophyll-a (low), nitrate, orthophosphorus, and total phosphorus. Other chemicals of concern which were monitored in fish tissue and/or water samples and suspect for bioaccumulation in fish tissue and found to have numerous screening level exceedances include: PCBs, chlordane, dieldrin, dioxin, and heptachlor epoxide. Total suspended solids are typically monitored during dredging activities, but not necessarily monitored as a routine or standard practice by TCEQ apart from such activities.

Sediment Quality

The 2008 Texas Water Quality Inventory also provided site specific sediment sampling for various subsections of the Houston Ship Channel Tidal segment and identified samples which have "exceeded" the screening levels of various chemical and biological measures. The following constituents were found to have numerous samples exceeding (high, unless otherwise indicated) the screening levels for sediments within the Houston Ship Channel Tidal segment: 1,3-Dichlorobenzene, acenaphthene, acenaphthylene, anthracene, benz(a)-anthracene, benzo(a)pyrene, bis(2-ethyl-hexyl)phthalate, chromium, chrysene, copper, dibenz (a,h)-anthracene, fluranthene, flourene, hexachlorobutadiene (HCBD), mercury, naphthalene, nickel, phenanthrene, pyrene, and zinc.

Sediment samples were also collected and analyzed as part of the Jacintoport Channel maintenance dredging permit requirement in 2006. Preliminary sampling did find elevated copper levels from two of nine sampling locations; however, follow-up testing proved to be within acceptable limits, deeming the original measurement a statistical outlier. The Environmental Affairs Department of the PHA concluded that independent sampling and analyses of the sediment locations by Benchmark Ecological Services, Inc.

and e-Lab confirm that the PHA had no reservations for dredge material placement from the sampling locations into a PHA owned/operated dredge placement area.

The TCEQ has reviewed the application for Amendment of Permit 18576 (03) and has subsequently issued a certification that "there is reasonable assurance that the project will be conducted in a way that will not violate water quality standards". The TCEQ has additionally reviewed the proposed action for consistency with the goals and policies of the Texas CMP, as set forth in regulation 31 TAC §505.30 of the Coastal Coordination Council, and attests consistency with the CMP.

Hazardous, Toxic, and Radioactive Waste (HTRW)

No HTRW assessment has been conducted for the proposed project. Such an assessment would determine any known and potentially unknown HTRW sites within the Jacintoport Channel, terminals, and Lost Lake which would have the potential for release to the environment endanger human health, and/or impact project costs/schedules. Such an assessment would include, but not be limited to, database, maps, and photo searches, including databases from the National Pollutant Discharge Elimination System (NPDES), the Resource Conservation and Recovery Act (RCRA) hazardous waste reports, Toxic Release Inventory (TRI) reports, and/or potential Superfund data reports.

Air Quality and Noise

Air Quality

The Clean Air Act (CAA; 1990 amendment) requires the Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for those pollutants considered harmful to the environment and public health. The CAA established two types of NAAQS: 1) primary standards to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly, and secondary standards to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.

EPA's office of Air Quality Planning and Standards (OAQPS) has established NAAQS for six principal pollutants, referred to as "criteria" pollutants: carbon dioxide (CO), lead (PB), nitrogen dioxide (NO), particulate matter (PM), ozone (O_3), and sulfur dioxide (SO). The units of measure for the NAAQS are in parts per million (ppm) by volume, milligrams per cubic meter of air (mg/m3), and micrograms per cubic meter of air (µg/m3). The TCEQ has additionally adopted EPA's NAAQS as Texas' criteria pollutants. Areas that failed to meet Federal standards for ambient air quality are considered non-attainment. The EPA's 2008 report for Harris County, Texas indicates that the air quality index (AQI) for some of the criteria pollutants was exceeded for greater than 100 days (ozone and particulate matter). The TCEQ has classified Harris County as non-attainment for ozone and issued a severe rating with requirements for attainment by 2019.

Noise

EPA has transferred noise monitoring and regulation to State and local governments. EPA, however, retains authority to investigate and study noise and its effect. Regulations are placed on noise sources, such as rail and motor carriers, low noise emission products, construction equipment, transport equipment, trucks, and motorcycles. Ambient noise levels were not available for the Jacintoport Channel area.

Cultural Resources

A cultural/historical resource assessment has not been conducted for the proposed project. Such an assessment would determine any known and potentially unknown historic properties, artifacts, or sites considered eligible for the National Register of Historic Sites within the Jacintoport Channel, terminals, and Lost Lake. Since routine dredge maintenance has occurred in support of navigation in the Jacintoport Channel area since 1988, it is highly unlikely that any such cultural resources continue to remain within the Jacintoport Channel.

Economic and Social Conditions

Navigation Use

As shown in Table 3 under the Physical Conditions section of this report, the Jacintoport Terminal had a total of 198 vessel calls in 2009. **Table 2** shows that most vessels that called on this terminal had arrival and departure drafts less than 35 ft. According to **Table 4**, the largest commodity handled at Jacintoport Terminal in terms of total tonnage was agricultural products and textiles. These products accounted for 42.9% of all commodities handled in 2009.

The HFO Terminal has three docks, two of which are located on the Jacintoport Channel. These docks had 214 vessel calls in 2009. Design drafts and deadweight tonnages of the vessels calling on the HFO Terminal were obtained from the Lloyd's Register Fairplay Sea-Web database.

Socioeconomics and Land Use

The Jacintoport Channel is adjacent and connected to the Federally-maintained HSC. Jacintoport Terminal has operated commercial cargo activities since the 1990s and is surrounded by many other commercial and industrial activities. The Channel and Terminal are not located within a specific municipality or Census Designated Place (CDP), but are within Harris County, Texas. There do not appear to be any residential or civic buildings located on the Jacintoport peninsula; the landscape is devoted to industrial, commercial, and navigation uses. The nearest CDP is Channelview, Texas, which is located to the north across Carpenters Bayou.

Channelview is bounded on the west by Beltway 8, to the north by Wallisville Road, to the east by Bear Lake, and to the south by Carpenters Bayou. The community is bisected by Interstate I-10, which runs from east to west. Residential uses appear to be limited to

the areas north of De Zavalla Road, which is approximately 4,000 ft north of Jacintoport Boulevard, which is located north of the Jacintoport Terminal. The areas south of De Zavalla Road (which is the section of the community closest to the Jacintoport peninsula) appear to be entirely industrial and commercial.

Dredged Material Management

Channel Maintenance/Dredging History

Historical dredging contract documents were reviewed. Maintenance dredging in the Jacintoport Channel occurs approximately every three to five years; this includes the Channel, Jacintoport and Inbesa Terminals and the Plateau. The last dredging event took place in August 2006. The HFO Terminal is dredged directly by HFO more frequently than the rest of the Jacintoport Channel. HFO also dredges portions of the Jacintoport Channel to 45 ft MLT, as needed. Detailed HFO dredging records were not available for review. As detailed in Attachment 1, Physical Analysis, historic dredging records other than the 2006 event did not separate the amounts dredged from the Channel, berthing areas, and Care Facility Docks. A breakdown of the 2006 dredging event by area is provided in **Table 6**:

Table 6: Summary of 2006 Dredge Contract Provided

Area/Reaches Dredged	Dredge Quantity (CY)	Prescribed Dredge Depth (ft)	Prescribed Overdepth (ft)
Jacintoport Channel	72,829	40	2
Jacintoport Plateau	14,373	39	2
Jacintoport Dock	23,515	40	2
Inbesa Dock	3,921	34	1
TOTAL	241,916		

Additional information on the dredging history is provided in Attachment 1, Physical Analysis.

Dredged Material Management

One of the requirements for the Federal AOM is that the project must include a DMMP to demonstrate that there is adequate disposal capacity for 20 years of Operation and Maintenance of the Channel to be assumed for Federal maintenance considering other Federal maintenance requirements. Material dredged from the Jacintoport Channel is currently placed in Lost Lake (USACE Section 10/404 Permit, 1986). Lost Lake is the closest authorized placement area to the Jacintoport Channel; the distance is approximately three miles. Based on the PHA dredge placement plan data, Lost Lake covers an area of 570 acres and, as of 2009, had an interior elevation of 21.8 ft. The levee is currently being raised to an elevation of 36 ft. Long term plans call for raising the levee height to 42 ft in 2040.

A Preliminary Dredge Material Management Assessment was recently completed for the HGNC due to concerns about the availability of capacity for these channels. The

Preliminary Assessment identified a lack of capacity in some reaches of the HSC and that a new DMMP for the HSC will be necessary. Lost Lake, however, was identified as having sufficient capacity for well over 20 years.

The assessment of future capacity and the predicted maintenance material volume to be placed in Lost Lake is based on predicted sedimentation rates (see Attachment 1, Physical Analysis) from the Preliminary Assessment of the Dredged Material Management Plan for the Houston-Galveston Navigation Channels, Texas, 2010 (HGNC Preliminary Assessment) and a list of channel segments that use Lost Lake from the Port of Houston Authority's 50-Year Plan – Useful Life of DAMP Sites and Costs, 2009 (PHA Plan), and the Houston-Galveston Navigation Channels, Texas, Engineering Supplement to Limited Reevaluation Report – Volume I, 1995 (LRR). Sedimentation rates from the HGNC Preliminary Assessment are broken up into 2,500-ft channel segments. The LRR states that material from HSC Bayou Station 500+00 to 700+00 will be placed in Lost Lake. The PHA Plan indicates that material from up to Station 810+00 is also placed in Lost Lake, so for this assessment of material placed in Lost Lake, the predicted volume of material from the segments from 500+00 to 825+00 are included. Lost Lake is the closest placement area to the segments from Station 425+00 to 500+00, so these are also included in this assessment. In summary, material from channel segments from Station 425+00 to 825+00 of the HSC will be placed in Lost Lake in this assessment. In addition, the PHA Plan shows that 350,000 cubic yards of material from non-Federal sources will be placed in Lost Lake every three years. Based on previous dredging records, the HSC from Station 425+00 to 700+00 is dredged every three years, and from Station 700+00 to 825+00 is dredged every four years, though not every one of these dredge events is expected to use Lost Lake.

The HGNC Preliminary Assessment predicts that Lost Lake is expected to have a remaining capacity of approximately 8.2 million cubic yards in the year 2029. These remaining capacities from the HGNC Preliminary Assessment are based on placement of material from the HSC and 350,000 cubic yards of material from non-Federal sources every three years. Attachment 1, Physical Analysis, Appendix A contains the relevant Lost Lake capacity data and calculations from the HGNC Preliminary Assessment.

VI. FUTURE WITHOUT PROJECT CONDITIONS

Physical Conditions

The existing maintained dredging depth of the Jacintoport Channel is 40 ft MLT, employing 2ft of advanced maintenance dredging. No planned changes in the overall dimensions (width or depth) of the HSC are known at this time.

In the absence of the Federal AOM, there is no indication that the current maintenance practices would be altered. However, the without project future condition is defined as maintaining the Channel to the lesser depth of 34 ft MLT. This depth was chosen because it is the minimum depth that would allow the majority of the vessels currently calling on Jacintoport and Inbesa Terminals to continue to do so. Any lesser depth would cause a major reduction in the capacity of Jacintoport Channel, changes in the composition of the vessels calling on the port, and would result in unreasonable transportation costs.

The last non-Federal dredge event occurred in 2012, and the Channel was dredged to 40 ft MLT, plus 2 ft of advanced maintenance dredging. For this analysis, the Channel is assumed to shoal evenly at a sedimentation rate of 0.67 ft/yr, with a dredge cycle of 2 ft every three years. Without maintenance, the Channel would shoal to 34 ft in the year 2018.

Lost Lake has sufficient capacity for the placement of material dredged from the Jacintoport Channel, as determined in the 50-Year Plan Spreadsheets in the PHA long term placement plan (PHA Plan, 2007). In 2040, the levee height at Lost Lake will be raised from 36 to 42 ft. This raising has been identified as necessary to hold the expected future volumes of dredged material from Jacintoport Channel and other sources. It is not required as a result of a possible AOM of Jacintoport Channel by Federal interests.

Economy and Commerce

For analysis purposes a conservative approach was taken. The fleet distribution of vessels calling on Jacintoport Channel is not expected to change under the future without project condition.

The majority of vessels calling on Jacintoport Channel are smaller ships conveying general cargo. The large vessels typically carry bulk grain shipments associated with U.S. foreign aid comprising a significant portion of the overall volume of commodities. The Jacintoport Terminal is approved by the U.S. Department of Agriculture (USDA) to handle Public Law 480 (P.L. 480) food aid cargo, and has an extremely efficient “spiralveyor” loading system, capable of loading 350 to 450 tons of bagged or boxed cargo per hour. Because these capabilities and certification for grain handling are not readily found at other terminals in the area, it is anticipated that the bulk carriers will continue to call at the Jacintoport Terminal even if the Channel draft were reduced due to lack of maintenance. Shipments to and from the Inbesa and HFO Terminals are by

necessity tied to their present locations, because the commodities are used at those locations.

Environmental Conditions

Maintenance dredging in the Channel is currently performed under the permits described below. It is anticipated that any future maintenance dredging will be required to meet similar permitting conditions and requirements.

DA Permit 18576, dated November 9 1988, authorized hydraulic dredging of the Jacintoport Channel from a depth of 36 ft MLT to a depth of 38 ft MLT to provide sufficient depth to accommodate deep draft vessels. The TCEQ reviewed the application for Amendment of Permit 18576, the Public Notice, SOF (June 7, 2006), and the Addendum to SOF (June 26, 2006), and has subsequently issued a certification that "there is reasonable assurance that the project will be conducted in a way that will not violate water quality standards". The TCEQ has additionally reviewed the proposed action for consistency with the goals and policies of the Texas CMP, as set forth in regulation 31 TAC §505.30 of the Coastal Coordination Council, and attests consistency with the CMP.

VII. ENGINEERING AND DESIGN CONSIDERATIONS

Channel Design

The existing Jacintoport Channel dimensions were reviewed to determine whether it conforms to appropriate engineering and design standards.

As the Jacintoport Channel "Y's" southwest off of the Houston Ship Channel at a 112 degree angle, the channel is 1600 wide. The Channel tapers down quickly to 200 feet for 1600 feet paralleling the Houston Fuel Oil Docks 2, and 3. The Channel then turns south 125 degrees for 2200 feet accessing the Jacintoport and Inbesa berthing areas. The combined dimension of the channel and two berthing areas at this point total 400 feet. The Channel is currently maintained at a depth of 40-foot MLT.

Paragraph 8-1 of the Engineering Regulation No. 1110-2-1404, 31 January 1996, Hydraulic Design of Deep-Draft Navigation Projects discusses channel width design factors,

> The design width of the channel will be determined to accommodate the design ship(s) representative of the project forecasted user fleet. This width need not be constant throughout the project but may vary as necessary so that the design ship can make a safe, efficient, and cost effective transit of the channel under the set of operation conditions chosen. Paragraph 8.4 suggests using interior channel width of 2.5 times the beam of the design ship.

Applying a factor of 2.5 to the largest beam (106) would call for a channel width of 265 feet. Combined with adequate berthing widths for a 106 foot beam vessel plus the recommended 25 feet of buffer between the channel and berthing areas, the required width across the channel and berthing areas at Station 7+00 would require a total width of 527 feet, 127 feet less than what is available. In a feasibility study of a new channel or a channel being designed to accommodate larger ships would use the rule of thumb factor 2.5 times the beam of the design ship as a starting point for determining the channel width. Optimization of the design would be achieved by using ship simulation to determine if a more cost effective width would be applicable. Applying the Engineering Regulation No. 1110-2-1404 to the Jacintoport Channel would result in a proposed channel width of 138 feet with two berths of 131 feet wide on either side of the channel. This dimension would include two appropriately sized berths for a 106 foot beam vessel plus 25 feet of buffer between the channel and each berth.

In the case of the Jacintoport Assumption of Maintenance, the Channel is already a safely functioning navigation system. As a point of reference, the Houston Pilots have made 1372 vessel transits to/from the Inbesa dock and a combined 4168 transits to/from Jacintoport 1, 2, and 3 over the course of the last 10 years without any serious incidents related to the physical layout or dimensions of the Jacintoport Channel, (reference letter dated June 20, 2012, from Robert Thompson, Presiding Officer, Houston Pilots).

Maneuvering and Docking Operations

To convey a sense of the operational safety in the Jacintoport Channel the ships using the Inbesa, Jacintoport and Houston Fuel Oil Docks were sampled. The largest vessels arriving at the Jacintoport and Inbesa docks are Panamax vessels with a length of 738 feet and a beam of 106 feet. The largest vessels arriving at the Houston Fuel Oil (HFO) docks 2 and 3 are tankships with a length of 821 feet and a beam of 144 feet.

In a letter to the U.S. Army Corps of Engineers dated 20 June 2012, the Houston Pilots noted the maneuvering and docking operations of the Jacintoport Channel, the HFO docks and the Inbesa Dock, particularly when vessels occupy dock #3 at HFO and docks at Jacintoport. Operations are described as follows:

> The largest vessels arriving at the Jacintoport and Inbesa docks are Panamax vessels with a length of 738 feet and a beam of 106 feet. The largest vessels arriving at the Houston Fuel Oil (HFO) docks 1, 2, and 3 are tankships with a length of 821 feet and a beam of 144 feet.
>
> All ships are brought into the channel with a speed appropriate to prevailing environmental conditions and ship maneuvering characteristics. Harbor tugs are normally made up alongside the vessels when transiting this area. According to ship owner preference, vessels are either taken head-in or are turned in the Houston Ship Channel and backed into the Jacintoport Channel. The dimensions of the harbor tugs used in the Houston Ship Channel are approximately 98 feet long. The space needed by the tugs to maneuver when made-up to the vessel and when extended on a back bell (pulling on the ship) varies depending on the location and tug make up. The harbor tugs are utilized in the berthing of all ships until the mooring lines on the ship are set. The number and capability of the harbor tugs used for a particular vessel transit is determined by the pilot based on written guidelines, prevailing environmental conditions, and vessel maneuvering characteristics.
>
> The maneuvering space for a vessel transiting the entrance to Jacintoport is adequate when a vessel (maximum beam permitted is 144 feet) is moored at HFO, as experience has shown that vessels with a beam of up to 144 feet have safely made this transit under a wide variety of environmental conditions with a Houston Pilot onboard. Likewise, maneuvering space is adequate in the Jacintoport channel when a vessel is berthed at the Jacintoport 1, 2, or 3, or Inbesa. Again experience has shown that ships with a beam of up to 106 feet have safely made this transit under a wide variety of environmental conditions as well. As a point of reference, the Houston Pilots have made 1372 vessel transits to/from the Inbesa dock and a combined 4168 transits to/from Jacintoport 1, 2, and 3 over the course of the last 10 years without any serious incidents related to the physical layout or dimensions of the Jacintoport Channel.

The Channel was constructed in accordance with applicable permits. The design of the Channel meets appropriate engineering and design standards and is functioning as intended.

Channel Design Evaluation

As part of the Federal AOM determination, the Channel construction must be evaluated under appropriate engineering and design standards. The Jacintoport Channel was reviewed under the USACE Engineering Manual 1110-2-1613 "Hydraulic Design of Deep Draft Navigation Channels", 31 May 2006, to determine whether the current construction conforms to current appropriate engineering and design standards.

The evaluation of the Channel design requires identifying the operating characteristics of the vessels using the Channel. A design vessel was chosen based on the ships historically calling on the Jacintoport Terminal. The selected design vessel has the following specifications:

Table 7: Jacintoport Terminal Design Vessel

Vessel Name	*Liberty Star*
Vessel Type	Bulker
DWT	64,059
Design Draft	43
LOA	738.1
Beam	105.6
Flag	USA

Sources: USACE Navigation Data Center; Sea-Web database.

The limits of the Channel and berthing areas presented in the maintenance plans and sections provided by PHA reflect the current berthing area usages within the Channel. The Houston Pilots' Association has restrictions on the terminal docks within the Channel which limit the vessels allowed to use those terminals. Based on these restrictions for the terminal docks, the berthing areas for the HFO and Jacintoport Terminals were adjusted to reflect the beam of the calling vessels plus a 25-ft buffer.

Figure 5 shows the potential Federal Channel layout as defined by actual berthing area usage. Figures 6A to 6C show the Channel and berthing area cross sections for this actual use layout. The first cross-sectional area ***(Figure 6A)*** shows the Inbesa Terminal directly opposite Jacintoport Dock 1 (approximate Sta. 3+00 to 9+25). The second cross sectional area (***Figure 6B***) shows the Inbesa Terminal directly opposite Jacintoport Dock 2 (approximate Sta. 9+25 to 10+00). The third cross-sectional area (Figure 6C) shows the extended Jacintoport Dock 3 on the north side of the Channel (approximate Sta. 15+5000 to 21+00). (Note: Figures 5 to 6C are shown below, and are also included in Attachment 1, Physical Analysis). Since berthing areas are not includable under the Federal AOM, the potential Federal Channel was then re-defined to be those areas of the Channel not being used as berthing areas.

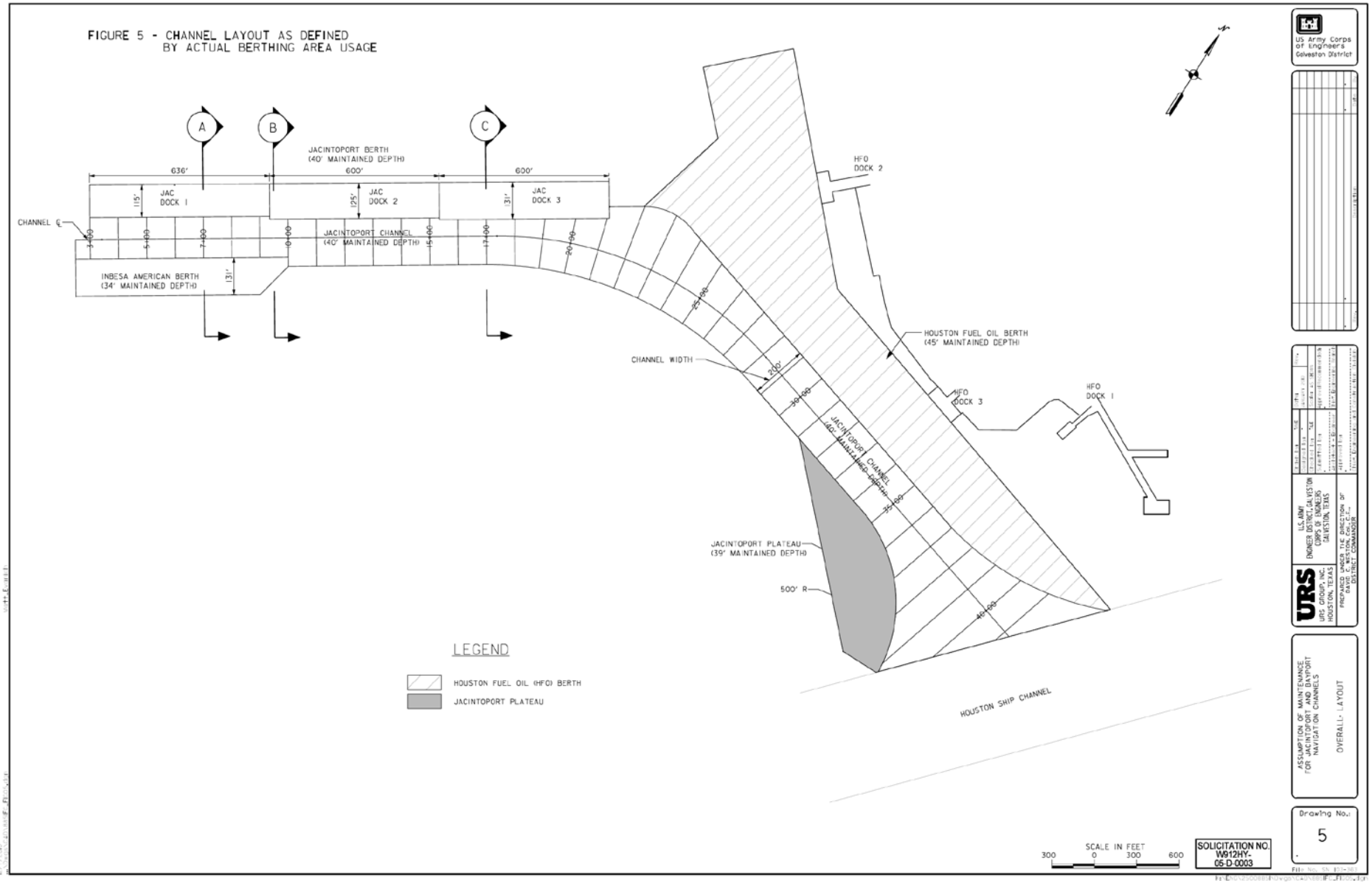
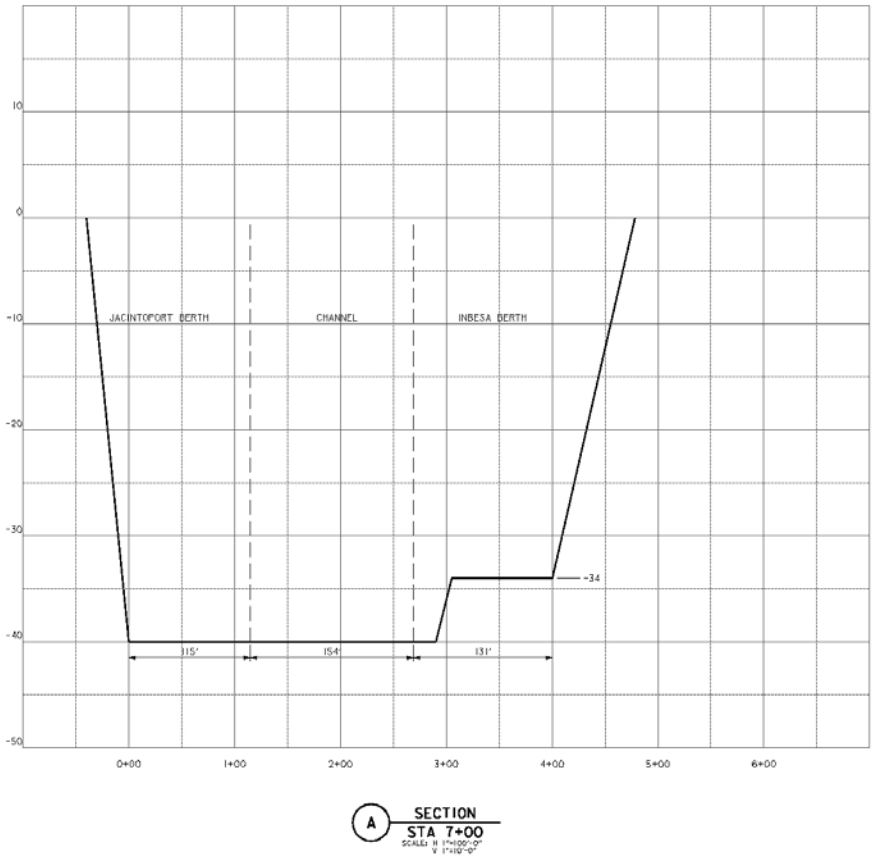


FIGURE 5 - CHANNEL LAYOUT AS DEFINED BY ACTUAL BERTHING AREA USAGE
A
B
C
JACINTOPORT BERTH (40' MAINTAINED DEPTH)
636'
600'
600'
JAC DOCK 1
JAC DOCK 2
JAC DOCK 3
115'
125'
131'
CHANNEL ℄
JACINTOPORT CHANNEL (40' MAINTAINED DEPTH)
INBESA AMERICAN BERTH (34' MAINTAINED DEPTH)
131'
HFO DOCK 2
HOUSTON FUEL OIL BERTH (45' MAINTAINED DEPTH)
CHANNEL WIDTH
200'
HFO DOCK 3
HFO DOCK 1
JACINTOPORT CHANNEL (40' MAINTAINED DEPTH)
JACINTOPORT PLATEAU (39' MAINTAINED DEPTH)
500' R
HOUSTON SHIP CHANNEL
LEGEND
HOUSTON FUEL OIL (HFO) BERTH
JACINTOPORT PLATEAU
SCALE IN FEET
300 0 300 600
SOLICITATION NO. W912HY-05-D-0003
US Army Corps of Engineers Galveston District
URS
ASSUMPTION OF MAINTENANCE FOR JACINTOPORT AND BAYPORT NAVIGATION CHANNELS
OVERALL LAYOUT
Drawing No.:
5

Figure 6A - Station 7+00 Cross Section as Defined by Actual Berthing Area Usage



A SECTION
STA 7+00

US Army Corps of Engineers Galveston District

URS GROUP INC. HOUSTON, TEXAS

US ARMY ENGINEER DISTRICT, GALVESTON CORPS OF ENGINEERS GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF DAVID C. WESTON, P.E. DISTRICT ENGINEER

ASSUMPTION OF MAINTENANCE FOR JACINTOPORT AND BAYPORT NAVIGATION CHANNELS

CROSS SECTION JACINTOPORT CHANNEL STATION 7+00

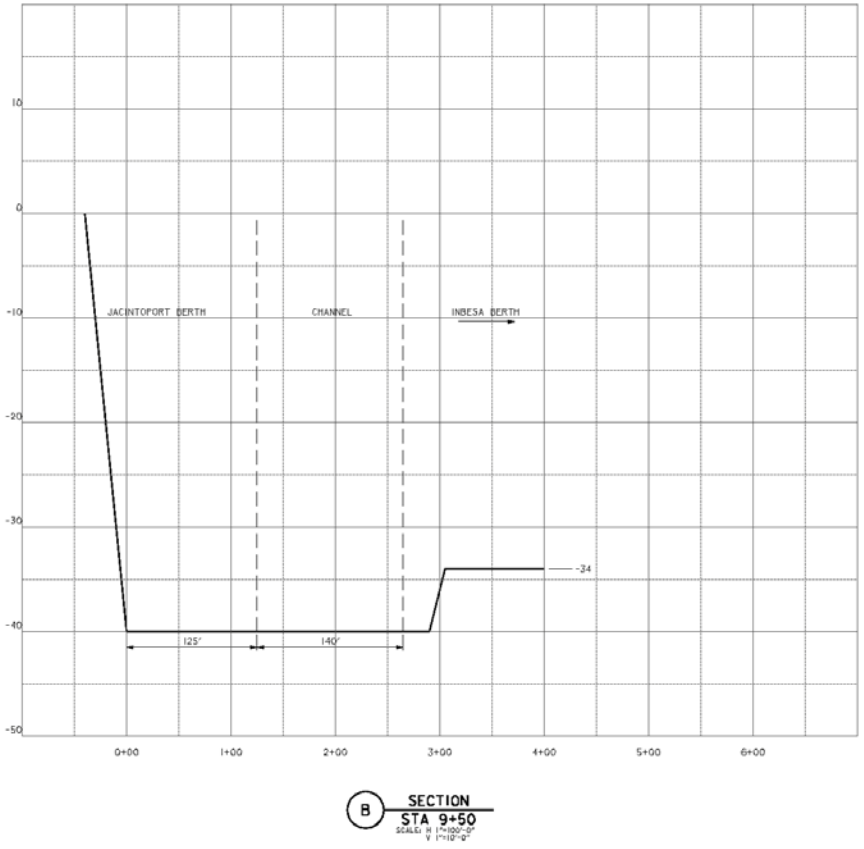
SCALE IN FEET 100 0 100 200

SOLICITATION NO. W912HY-06-D-0003

Drawing No.:

File No. SN 103-383

Figure 6B - Station 9+50 Cross Section as Defined by Actual Berthing Area Usage



B SECTION STA 9+50
SCALE: H 1"=100'-0" V 1"=10'-0"

US Army Corps of Engineers Galveston District

URS

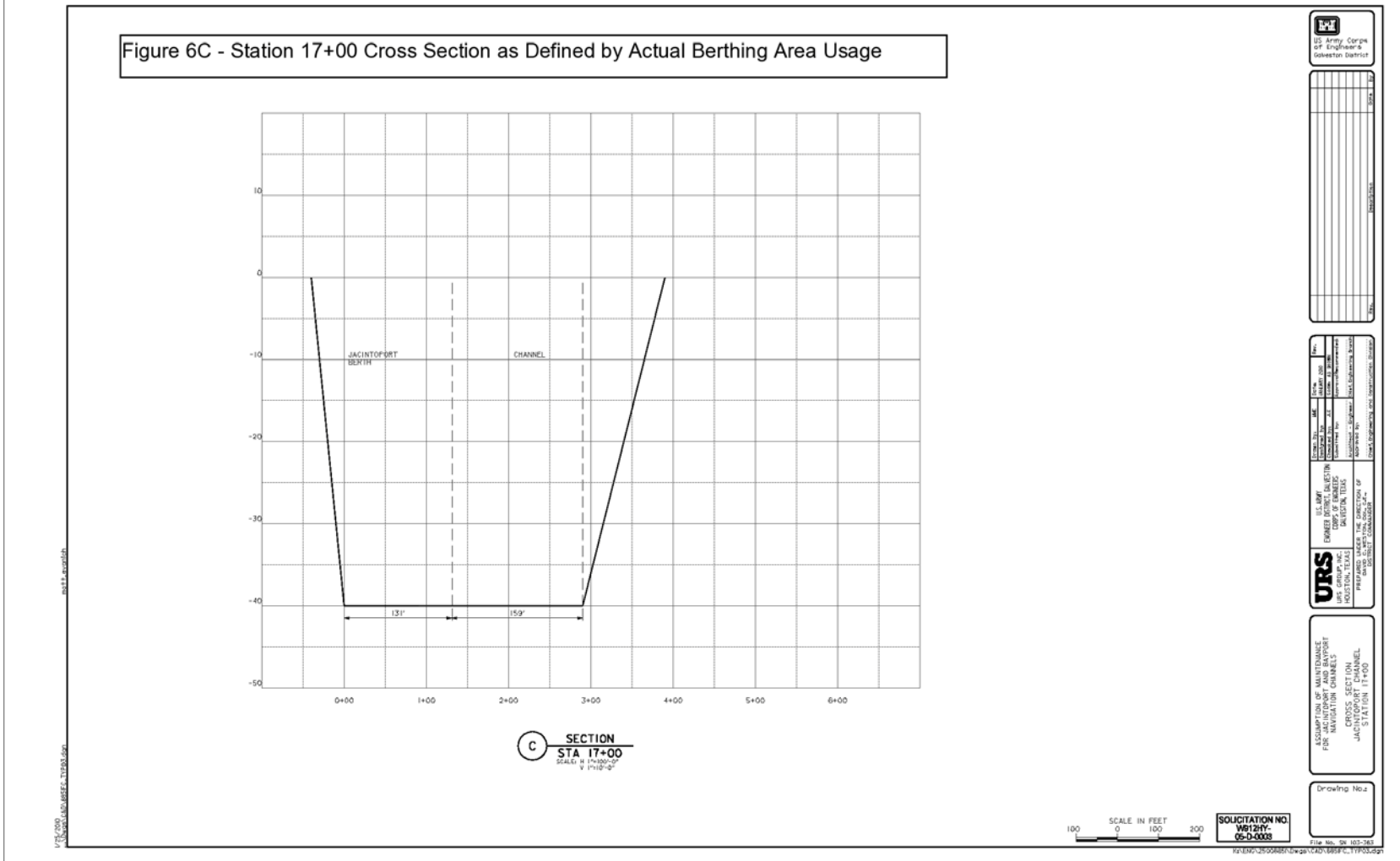
ASSUMPTION OF MAINTENANCE FOR JACINTOPORT AND BARBOURS CUT NAVIGATION CHANNELS
CROSS SECTION JACINTOPORT CHANNEL STATION 7+00

Drawing No.:

SCALE IN FEET 100 0 100 200

SOLICITATION NO. W912HY-05-D-0003

Figure 6C - Station 17+00 Cross Section as Defined by Actual Berthing Area Usage



USACE Engineering Manual 1110-2-1613 "Hydraulic Design of Deep Draft Navigation Channels", 31 May 2006, gives design criteria for channel width. Paragraph 8-4 suggests using an interior channel width of 2.5 times the beam of the design ship. Applying a factor of 2.5 to the design vessel beam of 106 ft would call for a channel width of at least 265 ft, 65 ft less than what is available as the Jacintoport Channel was originally defined (200 ft width), and 125 ft less than what is available based on the actual berthing area usage at the narrowest section between the Inbesa Terminal and Jacintoport Dock 2.

In a feasibility study for a new channel or a channel being designed to accommodate larger ships, the standard factor of 2.5 times the beam of the design ship would be the starting point for determining the channel width. Optimization of the design would be achieved by using ship simulation to determine if a more cost effective width would be applicable. In the case of the Jacintoport Channel, it is already a functioning channel land locked by berths on both sides on the Channel.

Though the Jacintoport Channel does not meet the current standards regarding the required width for the design vessels, there are restrictions and operational rules in place to actively manage risks to achieve safe operations within the Channel. The determination of whether the Channel meets the navigation requirements for the design vessel therefore must consider the operational and safety history of the Channel.

The Coast Guard Online Incident Investigation Report was searched for incidents listed under Inbesa, Jacintoport, and HFO. The Online Incident Investigation Report only lists those incidents closed after October 2002. **Table** 8 summarizes the relevant incidents.

Based on the Coast Guard Report, one collision (impact between moving vessels) and three allisions (vessels striking a fixed object or a stationary vessel) have been recorded since October 2002. None of the incidents involved ships becoming grounded on the floor of the Channel, thus it does not appear that the depth of the Channel was a factor in these incidents.

Table 8: Summary of Coast Guard Safety Incidents Closed After October 2002

Date	Type of Incident	Facility	Description of Incident
7/15/2002	Allision	Inbesa America Inc.	Vessel allided with Inbesa dock.
12/21/2005	Allision	HFO Terminal Co / Jacintoport Channel	Vessel 1 was moored at HFO, Vessel 2 was pushing Vessel 3 to Jacintoport. Vessel 2 pushed Vessel 3 into Vessel 1.
8/20/2006	Allision	HFO Terminal Co	Vessel 2 collided with dock while docking when trying to avoid another ship docking.
6/5/2003	Collision	Jacintoport Corporation	Vessel 1 collided with Vessel 2. No injuries or pollution, but damage greater than $500K, making this a major marine casualty.

The Houston Pilots' Association imposes navigation safety guidelines for the HSC and tug assistance requirements and dock draft limitations for terminals along the HSC, including the HFO, Inbesa, and Jacintoport Terminals. As of December 2009, the restrictions limit the vessel draft at Jacintoport Terminal Docks 2 and 3 to 37 ft MLT, Jacintoport Terminal Dock 1 to 39 ft MLT, and the Inbesa Terminal Dock to 34 ft MLT.

Per discussions with the Houston Pilots' Association, there are also maximum beam restrictions at the Jacintoport and HFO Terminals. Based on the potential for a 106-ft beam vessel to dock at the Inbesa Terminal, Jacintoport Terminal Dock 1 is restricted to a 90-ft beam vessel, Dock 2 is restricted to a 100-ft beam vessel, and Dock 3 is restricted to a 106-ft beam vessel. HFO Terminal Dock 1 is restricted to a 166-ft beam vessel, Dock 2 is restricted to a 144-ft beam vessel, and Dock 3 is not restricted, but a 145-ft beam vessel calling at this dock will cause restrictions at other docks within the Channel. Additionally, the draft of HFO Terminal Dock 2 is restricted to 42 ft MLT.

In order to increase navigation safety for vessels as they enter and exit the Jacintoport Channel, the Jacintoport Plateau was added to the original Channel design in 1995. The Jacintoport Plateau is located at the southern mouth of the Jacintoport Channel, maintained at a depth of 39 ft MLT, and is used by vessels as they execute arrival or departure turns. The PHA and Houston Pilots' Association stated that the Plateau is necessary to reduce the effects of a "pressure wave" that affects ships entering or exiting the Channel in which pressure from the ship's bow rebounds off the Channel wall, pushing the bow towards the deeper water of the HFO berthing areas on the east side of the Channel. The additional area of the Plateau allows a dissipation of these forces, and reduces the tendency of the ship's bow to veer from its intended course.

The Jacintoport Channel is currently maintained to a depth of 40 ft MLT, while the Jacintoport Plateau is maintained to a depth of 39 ft MLT. Northern portions of the Channel in this area are maintained to 45 ft MLT to assist with access to the 45 ft MLT berths at the HFO Terminal. Only the 40 ft MLT channel depth was considered for Federal AOM because the 45 ft MLT depth is only used by vessels accessing the HFO Terminal. Any benefits for depths below 40 ft MLT would accrue to a single private user. Therefore the AOM only considers depth to 40 ft MLT.

Sedimentation Rates and Dredging Frequency

Maintenance dredging in the Jacintoport Channel occurs approximately every three to five years; this includes the Channel, Jacintoport and Inbesa Terminals and the Plateau. The last dredging event took place in August 2012. It is assumed that the next dredge event would occur in 2015.

Sediment accumulation rates were estimated based on the August 14, 2006 dredging event. Dredge records provided for previous events did not distinguish between the amount dredged from the Channel versus amounts dredged from berthing areas and docks. Because this report only evaluates the future sedimentation within the eligible portion of the Federal Channel, the 2006 dredging records were used to determine the amount of dredged material removed from the Channel, Plateau and berthing areas. This estimated amount was then

divided over four years to estimate the sedimentation rates within each area of the Channel (the Jacintoport Channel is currently dredged every three to five years). Since the estimates were only based on one year of dredging records, a range of three estimated sedimentation rates was evaluated. Attachment 1, Physical Analysis, provides the range of sedimentation rates and the associated future dredging amounts. To estimate future dredging amounts, it was assumed that the Jacintoport Channel would be dredged concurrently with the HSC which is on a three-year dredging cycle.

Because detailed historic dredging information is limited, a range of sedimentation rates were analyzed. A low estimate, best estimate, and high estimate were chosen based on historic dredging information. The following range of values was evaluated to estimate future projected sedimentation based on the historic dredging information:

- Low estimate 0.50 ft/yr
- Best estimate 0.67 ft/yr
- High estimate 2.0 ft/yr

The best estimate of 0.67 ft/yr was selected and applied for the AOM analysis, including the evaluation of economic benefits of channel maintenance dredging (a sensitivity analysis for variations in the sedimentation rate, and the effect on project benefits and costs, is included in the Sensitivity and Uncertainty section of this report). At a sedimentation rate of 0.67 ft/yr, the Federal eligible portion of the Jacintoport Channel is estimated to accumulate approximately 26,000 cubic yards of material annually. To maintain the authorized depth of 40 ft MLT, the Channel would need to be dredged from the advanced maintenance depth of 42 ft MLT every three years at a sedimentation rate of 0.67 ft/yr. Therefore, the volume of dredged material from the Federal eligible portion of the Channel would be approximately 78,000 cubic yards per dredge event with a dredge event every three years.

At a rate of 0.67 ft/yr, the estimated annual amount of dredged material from the HFO berthing area would be approximately 17,000 cubic yards and from the Jacintoport berthing area would be approximately 6,000 cubic yards. Though not funded as part of the Federal AOM, the berthing area dredging is an associated cost and is included in the economic costs. This would yield approximately 69,000 cubic yards of berthing area dredging every three years.

VIII. DREDGED MATERIAL MANAGEMENT PLAN

Identification of Dredge Material Management Plan

The AOM requires a DMMP to address at least 20 years of future maintenance volume. Dredged maintenance material from the Jacintoport Channel will continue to go to Lost Lake as currently permitted. According to the HGNC Preliminary Assessment, the current DMMP shows that the remaining capacity in Lost Lake provides approximately 8.2 million cubic yards more volume than will be utilized through year 2029. Therefore, Lost Lake has enough capacity to continue receiving the dredge material from the Jacintoport Channel for the 20-year DMMP period.

Continued use of Lost Lake is selected as the preferred DMMP because:

- Lost Lake is the closest site to the Jacintoport Channel and provides the lowest dredging costs;
- Lost Lake requires no new construction or expansion over the 20-year period;
- The placement of Jacintoport Channel maintenance material at Lost Lake has been approved under several permits and no additional environmental impacts are anticipated;
- Construction of a new alternative placement area would incur high costs for real estate acquisition, construction of containment levees with mined borrow material and extensive environmental permitting;
- The Jacintoport Channel is highly industrialized and the maintenance dredging is not a desirable source of material for beneficial uses; and
- The next best alternative, Peggy Lake, would require a longer pumping distance and would be within approximately 700,000 cubic yards of capacity by year 2029. The increase in costs and capacity limitations under the high sedimentation scenario make this a less desirable alternative.

Allocation of Dredge Material Management Costs

The estimated Jacintoport Channel volumes were compared to the anticipated total volumes going to Lost Lake based on the HGNC Preliminary Assessment. The Jacintoport Channel volumes were then taken as a percent of the overall volume to Lost Lake to allocate a portion of the placement area management cost to the AOM.

IX. ECONOMIC JUSTIFICATION

Introduction

A requirement for the Federal AOM of a navigation channel is that the ASA/CW makes a determination that such maintenance is economically justified. This section describes the analysis conducted to determine if the AOM for Jacintoport Channel would be economically justified and result in a positive benefit-cost ratio (BCR). This section presents the historical vessel traffic including cargo and vessel fleet analyses. Transportation costs are provided for commodities shipped using the Jacintoport Channel at its current depth of 40 ft MLT and at a series of lesser depths. Costs for each dredge event are also evaluated. The estimated dredging costs and placement area maintenance costs were tabulated for the period of analysis and annual costs were calculated. Annualized benefits are compared to annualized costs to produce a BCR.

In the economic benefit analysis, the without project future condition or "no action" alternative is maintaining the Channel to the lesser depth of 34 ft MLT. This depth was chosen because it is the minimum depth that would allow the majority of the vessels currently calling on the Jacintoport Terminal to continue to do so. Any lesser depth could cause a major reduction in the capacity of the Jacintoport Channel and the terminals to service commodity shipments, changes in the composition of the vessels calling on the Channel, and would result in unreasonable transportation costs. The period of analysis is 50 years, and the designated interest rate of 4.000% for fiscal year (FY) 2012 was used for all calculations.

Benefit Calculations

An analysis was made of transportation costs at various channel depths to identify the impact of the reduction in channel depth that would occur if maintenance were not performed. In general terms, the transportation cost per ton of cargo will increase as the available channel depth decreases.

The benefits were calculated using the 2009 Jacintoport cargo tonnage, trade routes, and fleet distribution by deadweight tonnage. The pilot data for arrival and departure drafts from 2007 through 2009 was also reviewed and corroborates the 2009 Navigation Data Center information as representative of average conditions. **Table 9** shows the vessel characteristics, vessel operating costs, and fleet distributions used to determine transportation costs for Jacintoport Terminal.

Table 9: Vessel Characteristics Used to Calculate Transportation Costs
Jacintoport Terminal

Type of Vessel	DWT[(1)]	Design Draft	TPI[(2)]	Cost/hr at sea	Cost/hr at port	Number of Calls	Africa/ Europe Fleet Distribution	South America Fleet Distribution
Containership	9,500	25	54.7	$703	$350	88	5.6%	56.4%
General Cargo	20,000	32	78.2	$1,064	$462	53	24.3%	43.6%
General Cargo	30,000	36	100.1	$321	$604	8	23.6%	0.0%
Bulker	50,000	39	137	$1,177	$602	4	46.5%	0.0%

Sources: USACE Navigation Data Center; Sea-Web database; USACE EGM #11-05, USACE EGM 1110-2-1613

(1) DWT: Deadweight, or the total carrying capacity of the ship by weight, including cargo, fuel, oil, fresh waters, stores, crew, and baggage.

(2) TPI: Tons per Inch: number of tons required to change the draught of the vessel by one inch at a given draught

Jacintoport Terminal transportation costs were calculated for two different trade routes: an African and European composite and a South and Central American composite. **Table 10** shows the two trade routes, the distances in nautical miles, and the trade route tonnages that were used for benefit calculation.

Table 10: Trade Routes, Distances, and 2007 Cargo Tonnage
Jacintoport Terminal

Trade Route	Nautical Miles	Tonnage
Europe/Africa	8,758	302,367
South/Central America	2,329	687,387

Sources: USACE Navigation Data Center; www.distances.com

The round-trip cost per ton was calculated for each vessel type shown in **Table 9** and for each trade route shown in **Table 10**, by controlling depths ranging from 34- to 40- ft in 1-ft increments. The weighted average of the costs per ton was calculated for each trade route using vessel fleet compositions based on the percentage of commodity each vessel class carried by trade route for Jacintoport Terminal. The weighted average cost per ton and the 2009 trade route tonnage shown in **Table 10** was used to calculate the total transportation costs for each trade route by the controlling depth of the Channel.

As expected, the total transportation cost increases as the controlling depth decreases. This increase is the cost of not maintaining the Channel. Alternatively, the increase in transportation costs associated with shoaling is the benefit of channel maintenance. The increases in

transportation costs associated with lesser controlling depths compared to the current 40 ft MLT maintenance are shown in **Table 11**.

Table 11: Increases in Total Transportation Costs

	Channel Depth	Increased Transportation Costs
Increase in Transportation Costs by Depth	**39**	$ 104,427
	38	$ 227,693
	37	$ 452,933
	36	$ 700,823
	35	$ 974,967
	34	$ 1,279,775

In the without project future conditions, sediment will accumulate in the Channel at a rate of 0.67 ft/year resulting in ongoing reductions in the available depth. For every three years without maintenance, the Channel will shoal two ft, resulting in an increase in transportation costs. Within about 10 years, the Channel will have shoaled to a depth of 34 ft MLT, resulting in an annual increase of transportation costs. Based on the increased transportation costs in **Table 11** and the sedimentation rate of 0.67 ft/year, increased transportation costs were calculated for the period 2013 through 2063. These increased costs were converted to annual maintenance benefits using the Federal discount rate of 4.000%. The annual benefits for maintaining the Channel at 40 ft MLT are calculated to be $637,418.

Costs

An assessment was made of the costs associated with maintenance dredging the Jacintoport Channel to 40 ft MLT. General costs include charges arising from the completion of each individual component, as well as contingencies, engineering during construction, and construction management (supervision & administration – S&A). No real estate acquisition, assessment, or administration costs are anticipated for the AOM. Unit costs for material and equipment were developed using Cost Engineering Dredge Estimating Program (CEDEP) results.

Annual charges attributed to the maintenance of the Jacintoport Channel throughout the 50-year period of analysis consist of periodic dredging of the Channel every three years to maintain the project depth of 40 ft MLT with an advanced maintenance depth of two ft. For economic analysis purposes, additional project maintenance is included for dredging of associated berthing areas at the Inbesa and Jacintoport Terminals throughout the period of analysis.

This estimate was set-up by Fiscal Years (FY). The costs were further organized in accordance with the work breakdown structure. The midpoint date of each account code was provided by the project manager for developing the fully funded costs. The estimate was prepared in accordance with ER 1110-2-1302, dated 15 September 2008. The costs were escalated in accordance with the above Engineering Regulation and EM 1110-2-1304, dated 31 March

2012. All this data was imputed into the Total Project Cost Summary Sheet (TPCS). The baseline estimate provides for all pertinent elements for a complete project ready for operations.
These costs include all costs for GNF such as maintenance of the Jacintoport Channel and the Plateau, and associated non-Federal costs, particularly the costs of maintaining berthing areas. Although the associated costs are not eligible for Federal AOM, they must be included in the analysis of the BCR for the Channel.

Annual Costs

The annual charges include the annualized maintenance and annual rehabilitation costs for the Federal AOM of the Jacintoport Channel. The annual project cost summary is presented in **Table 12**.

Table 12: Jacintoport Channel Annual Project Summary Costs

	Project Costs	**Associated Costs**	**Total NED* Costs**
Number of Maintenance Cycles (50-yr Period)	16	16	16
Annualized Dredging Cost (including E&D + S&A)	$ 284,412	$ 67,642	$ 352,053
Total Annual Costs	**$ 284,412**	**$ 67,642**	**$ 352,053**

*** NED = National Economic Development**

Cost Sharing

Under the Federal AOM, the Federal Government would be responsible for maintenance dredging of the Jacintoport Channel and Plateau and a portion of the dredged material placement area management costs.

The allocation of the dredge material placement area maintenance costs is based on the percentage of placement area volume coming from Jacintoport Channel and Plateau. Approximately seven percent (7%) of the maintenance costs for Lost Lake are allocated to the Jacintoport AOM.

In summary: the annual Federal maintenance cost for the Jacintoport Channel is $284,412. The non-Federal sponsor will continue to be responsible for annual maintenance costs of associated non-Federal berthing areas at the Jacintoport Terminal at an estimated cost of $67,642. Thus, the total economic analysis cost for annual maintenance is $352,053.

The total cumulative project cost throughout the period of analysis, including escalated costs of each future operation and the sum total of all escalated project costs, is $23,309,000.

Summary of Benefits and Costs

The annual benefits, costs, net benefits, and benefit-cost ratio for maintenance dredging at 40 ft MLT plus two ft of advance maintenance dredging are provided in **Table 13**:

Table 13: Annual Benefits and Cost Comparison, 40 ft MLT Maintenance Dredging

Annual Benefits	$637,418
Annual Cost	$352,053
Net Benefits	$285,365
Benefit-Cost Ratio	1.8:1

Depth Justification

One of the requirements for Federal AOM is to evaluate the benefits and costs of maintaining the Channel at a lesser depth than current practice to document that the benefits for maintaining the last foot of channel depth exceed the cost of maintaining that increment. At a channel depth of 39 ft MLT, dredging would occur every three years, since the most efficient dredging plan is to maintain the same three-year cycle as the adjacent HSC. Allowing the Channel to fill in to 39 ft MLT would reduce the volume of the first maintenance cycle by 50%. The annual cost of dredging to 40 ft MLT is $352,053.

As further detailed in Attachment 4, Economic Analysis, total transportation costs (weighted by distance) were developed for a range of controlling depths. A reduction in channel maintenance depth from 40 ft MLT to 39 ft MLT increases transportation costs per ton by $97,484.

Sensitivity and Uncertainty

A sensitivity analysis was conducted on the costs and benefits of the selected plan of maintenance dredging at 40 ft MLT plus 2 ft of advanced maintenance dredging. The basic analysis conducted used the required FY2012 interest rate of 4.000% and the "best estimate" sedimentation rate of 0.67 ft/yr. The sensitivity analysis (**Table 14**) shows the effects on costs and benefits when the interest rate is set at the two previous federal interest rates, as well as 5% and 7%. The increase in interest rate results in a decrease in the BCR, as seen below. In each case, the selected plan retains a positive BCR.

Table 14: Sensitivity Analysis to Interest Rate Changes				
Interest Rate	**4.125%**[(1)]	**4.375%**[(2)]	**5%**	**7%**
Annual Benefits	$633,599	$625,958	$606,887	$547,310
Annual Cost	$351,778	$351,211	$349,718	$344,451
Net Benefits	$281,8214	$274,747	$257,169	$202,859
Benefit-Cost Ratio	1.8:1	1.8:1	1.7:1	1.6:1

(1) FY2011 discount rate

(2) FY2010 discount rate

X. ENVIRONMENTAL ACCEPTABILITY

A condition for Federal AOM under WRDA 2007, Section 5001 is a determination by the ASA/CW that "such maintenance is economically justified and environmentally acceptable".

"Environmental Acceptability" presumes that the non-Federal interest who submitted the request for AOM has or will obtain all the necessary Federal, State, and local permits for the maintenance construction activities. All of the inherent environmental concerns would therefore have been addressed via the various USACE Section 10/404 permit actions, where the USACE is responsible for preparing an EA and statement of findings demonstrating compliance with NEPA, and issuing a permit authorizing the work. The permitting process, including appropriate documentation that satisfies NEPA compliance, includes the collective administration of the Rivers and Harbors Act of 1899 (Section 10) and the Clean Water Act (Section 404).

The TCEQ additionally requires a Water Quality Certificate as a "special condition" of the USACE Section 10/404 permit authorization. This certification provides verification that the specified water quality parameters or analytes of the sediment core and/or returned hydraulic waters have been analyzed and compared to sediment quality guideline values. The PHA requires sediment sampling and enforces compliance to a "Listing of Chemicals of Concern" associated with dredged material (PHA, 2006 and PHA, 2009). The TCEQ coordinates with the PHA and the Texas CMP for consistency determinations with their goals and policies, in accordance with the Coastal Coordination Council.

An evaluation of available USACE permits, TCEQ water quality certification, and USACE placement area authorization and capacity for the for the project concludes that the necessary Federal, State, and local permit compliance requirements for the construction and current maintenance of the Jacintoport Channel have been secured (USACE, 2006).

A Draft EA and Finding of No Significant Impact (FONSI) associated with this decision document has been prepared which conclude that continued maintenance would result in minimal, localized, short term impacts to estuarine substrate and water quality.

XI. CONSISTENCY WITH FEDERAL POLICIES

Single Facility

Federal AOM can not be made on projects in which the benefits accrue to a single, privately-owned facility. In the Jacintoport Channel, the project benefits do not accrue to a single, privately-owned facility. The Jacintoport Terminal and Channel is owned and operated by the PHA, a public entity chartered by the State of Texas. There are two privately-owned facilities accessed by the Channel: the HFO Terminal and the Inbesa American, Inc. Terminal. Thus, the restriction does not apply to the Jacintoport Channel AOM.

Progressive Development

ER 1105-2-100, dated 22 April 2000, Page E-25, states that "[t]he federal interest is satisfied and the regular cost sharing requirements apply where the improvement serves/ benefits two or more properties having different owners or one publicly owned property at the outset." The Jacintoport Terminal is publicly owned by the PHA, and thus, this requirement is satisfied.

Berthing Areas

USACE policy requires that non-Federal interest be responsible for and bear all costs of maintaining berthing areas. Although USACE policy requires berthing areas to have an offset distance between the pier and a Federal channel as detailed in the USACE Engineering Manual 1110-2-1613 "Hydraulic Design of Deep Draft Navigation Channels", 31 May 2006, the berthing areas and channel at Jacintoport were constructed prior to the adoption of these standards. The dimensions of the Jacintoport Channel have generally provided for safe maneuvering of ships in the areas concerned. Further, the non-Federal sponsor understands that maintaining the berthing areas is a non-Federal responsibility and has obtained a Department of the Army permit to maintain the berthing areas.

Real Estate Requirements

The existing Channel is subject to navigational servitude and there is no requirement for channel improvement easements to construct and maintain channel right-of-way. The designated dredge material placement area at Lost Lake is also subject to navigational servitude. No relocations are required for the use of this facility. The non-Federal sponsor will provide lands, easements, and relocations that may be deemed necessary by the Government for the continued operation of the project.

Clean Out Channel

By memorandum, dated 4 November 1999, Subject: Rincon Canal System, Texas – Federal Maintenance, (Attachment 3), the ASACW advised that future projects would not be assumed in a shoaled condition. In 2012, the Jacintoport Channel was dredged by the non-Federal sponsor to a depth of 40 ft below MLT, plus 2 ft of advanced maintenance dredging. The non-Federal sponsor understands this and agrees to be in compliance.

XII. SUMMARY

Section 5001 of the Water Resources Development Act of 2007 authorizes the Federal AOM for Jacintoport Navigation Channel (including a channel flare separately known as the Plateau) provided that the Assistant Secretary of the Army for Civil Works (ASA/CW) make a determination that such maintenance is economically justified and environmentally acceptable and that the Channel was constructed in accordance with applicable permits and appropriate engineering and design standards. This report is provided in response to that legislation.

The Jacintoport Channel is maintained by the PHA under USACE and State permitting to a depth of 40 ft below MLT and the Plateau to 39 ft MLT. The Channel serves three terminal facilities, two of which are private.

Current maintenance dredged material is permitted to be placed in the nearby Federal facility known as Lost Lake. This facility serves Federal and non-Federal disposal from several reaches of the HSC and has sufficient capacity for the next 20 years. The average annual contribution from the potential federalization of the Jacintoport Channel and Plateau is approximately six percent (6%) of the average annual disposal into Lost Lake.

A Draft EA and FONSI have been prepared and the existing permit documents have been reviewed. The PHA has obtained and complied with the necessary Federal, State, and local permits and requirements. The Draft EA and FONSI are being coordinated with the public and state and Federal resource protection agencies. Upon finalization of the EA and FONSI, a Decision of Record will be issued by the District Commander.

The economic analysis has determined that channel maintenance to 40 ft MLT produces a benefit-to-cost ratio of 1.8:1, with average annual benefits of approximately $637,418; costs of $352,053; and net benefits of $285,365. These are based on a conservative approach of constant traffic, a fixed fleet, and encompass a full range of sedimentation rates over the period of analysis.

The Jacintoport Channel is an existing and fully functional navigation system and as such the channel can be considered as having been constructed in accordance with applicable permits and appropriate engineering and design standards. Through traffic management enforced by the Houston Pilots, the Channel generally functions safely. Recently, the USACE approved the assumption of Federal maintenance for the Point Comfort Turning Basin, Port Lavaca, Texas where USACE dimensions were not achieved, but performance demonstrated a safely functioning channel.

XIII. RECOMMENDATION

I have evaluated the Jacintoport Channel (a side channel of the Houston-Galveston Ship Channel Federal navigation project) for compliance with Section 5001 of the Water Resources Development Act of 2007 and related guidance and found that this non-Federal channel meets the criteria for Federal assumption of maintenance. Economic analysis indicates that the benefit-to-cost ratio is 1.8:1, with average annual net benefits of $637,418. Project benefits accrue to multiple users. An Environmental Analysis has demonstrated that all necessary Federal, State, and local permits have been obtained and all requirements have been met. The Channel does not meet USACE design dimensions, but the Channel generally functions safely due to traffic management enforced by the Houston Pilots' Association. There is a precedent in that the USACE recently approved the assumption of Federal maintenance at Point Comfort Channel Extension, Port Lavaca, Texas where USACE dimensions were not achieved, but performance demonstrated a safely functioning channel.

I have determined that the Federal assumption of maintenance is economically justified and environmentally acceptable, and that the Channel generally functions safely through traffic management enforced by the Houston Pilots' Association. Therefore I recommend that the Federal Government assumes maintenance of the Jacintoport Channel.

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. Consequently, the recommendations may be modified within the discretion of the Commander, HQUSACE.

_____ _____

Date

Christopher W. Sallese
Colonel, Corps of Engineers
District Engineer