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BOSTON HARBOR MASSACHUSETTS DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT

COMMUNICATION

FROM

THE ASSISTANT SECRETARY, CIVIL WORKS, THE DEPARTMENT OF DEFENSE

TRANSMITTING

THE FINAL FEASIBILITY REPORT AND FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

PART 2 OF 3

MAY 1, 2014.—Referred to the Committee on Transportation and Infrastructure and ordered to be printed

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BOSTON HARBOR
MASSACHUSETTS

NAVIGATION IMPROVEMENT STUDY

FEASIBILITY REPORT
AND SUPPLEMENTAL ENVIRONMENTAL
IMPACT STATEMENT
AND MASSACHUSETTS
ENVIRONMENTAL IMPACT REPORT

APPENDIX A
PUBLIC INVOLVEMENT AND
PERTINENT CORRESPONDENCE

THIS APPENDIX UPDATED THROUGH APRIL 2013

BOSTON HARBOR, MASSACHUSETTS NAVIGATION IMPROVEMENT STUDY

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Massachusetts Executive Office of Energy and Environmental Affairs – Letter to Massport on MEPA Process and FEIR Scope – 12 December 2012
New England District – Letter to National Marine Fisheries Service (NMFS) on Essential Fish Habitat – 10 December 2012
North Atlantic Division (NAD) – Memo to USACE Headquarters – 7 December 2012
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    Stellwagen Bank National Marine Sanctuary, Scituate, MA
    MA Executive Office of Energy and Environmental Affairs
    Mashpee Wampanoag Tribe
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    Massachusetts Historical Commission (SHPO)
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New England District – Letter to Massport on FCSA Amendment – 8 September 2009
New England District – Memo to NAD on FCSA Amendment – 28 August 2009
USACE Emails Approving CWRB Response Framework & Timeline, 13 August 2009
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Corps Headquarters – Memorandum on Response Framework – 4 August 2009
USACE Emails among Corps Vertical Team, 28 to 30 July 2009 Includes 29 July 2009 Memorandum on Framework and Survey Scope
USACE Emails Documenting Post 2008 CWRB Activities and Decisions, 7-8 July 2009
Massport – Letter to NAE – 22 June 2009
New England District – Letter to Massport – 2 June 2009
Corps Headquarters – Letter to Massport – 23 March 2009
Corps Planning Center of Expertise for Deep Draft Navigation – Memo, 31 July 2008
Massport – Project Commitment Letter to NAE – 28 July 2008

National Marine Fisheries Service – Email to NAE on ESA – 21 July 2008
Boston Harbor Docking Pilots – Letter to NAE on Chelsea Creek – 17 July 2008
U.S. EPA, Region I – Email to NAE on Air Quality Compliance – 11 July 2008
New England District – Response Letter to U.S. EPA – 8 July 2008
New England District – Response Letter to NMFS – 30 June 2008
MWRA – Email to NAE on Chelsea River Utilities – 22 May 2008

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National Marine Fisheries Service – Letter to NAE and EOEEA – 2 June 2008
U.S. Fish and Wildlife Service – ESA Letter to NAE – 14 May 2008
Department of the Interior, Office of Environmental Policy & Compliance – Letter to NAE – 2 June 2008

State Agencies
Massachusetts Executive Office of Energy and Environmental Affairs Secretary's Certificate on the Draft SEIS/EIR – 13 June 2008
Massachusetts Office of Coastal Zone Management – Letter to NAE – 2 June 2008
Massachusetts Dept of Environmental Protection – Letter to EOEEA – 2 June 2008
Massachusetts Board of Underwater Archaeological Resources – Letter to NAE – 2 June 2008
Massachusetts Historical Commission, SHPO – Letter to NAE – 5 May 2008
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Massachusetts Division of Marine Fisheries – Letter to EOEEA – 2 June 2008

Municipal Agencies
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Town of Winthrop, Town Council – Letter to NAE Forwarding Comments From a Constituent – 30 May 2008

Non-Governmental Organizations and Private Individuals
Boston Marine Society – Letter to NAE – 1 June 2008
The Boston Harbor Association – Letter to NAE – 2 June 2008
Boston Harbor Pilots Association – Letter to NAE – 2 June 2008
Save the Harbor, Save the Bay – Letter to NAE – 2 June 2008

Part 4. Draft Feasibility Report and Draft SEIS/EIR Transmittal Documents

Public Notice for Draft Feasibility Report and DSEIS/DEIR – 18 April 2008
Federal Register, Vol. 73, No. 76, Page 21121 – Notice of Availability – 18 April 2008
New England District – Press Release for Draft Report/SEIS – 18 April 2008
Massport – MEPA Filing Letter – 11 April 2008
New England District – Transmittal to Massport – 10 April 2008
New England District – Transmittal to Governor Patrick – 10 April 2008
New England District – Transmittal to Lieutenant Governor Murray – 10 April 2008
New England District – Transmittal to Senator Edward M. Kennedy – 10 April 2008
New England District – Transmittal to Senator John F. Kerry – 10 April 2008

New England District – Transmittal to Congressman Michael E. Capuano – 10 April 2008
New England District – Transmittal to Congressman William F. Delahunt – 10 April 2008
New England District – Transmittal to Congressman Stephen F. Lynch – 10 April 2008
New England District – Transmittal to Congressman Edward J. Markey – 10 April 2008
New England District – Transmittal to Congressman John F. Tierney – 10 April 2008
New England District – Transmittal to Boston Mayor Thomas M. Menino – 10 April 2008
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New England District – Transmittal to Chelsea City Manager Jay Ash – 10 April 2008
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New England District – Transmittal to U.S. Fish & Wildlife Service – 10 April 2008
New England District – Transmittal to NMFS Northeast Region – 10 April 2008
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New England District – Transmittal to MA EOEEA Secretary Bowles – 10 April 2008
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New England District – Transmittal to Wampanoag Tribe of Gay Head – 10 April 2008
New England District – Transmittal to Mashpee Wampanoag Tribe – 10 April 2008
New England District – Federal Register Notice Transmittal to US EPA – 8 April 2008 With Copy of Notice of Availability – Signed 8 April 2008

Part 5. Correspondence Received During Preparation of the Draft Feasibility Report and DSEIS

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New England District – Letter to MA Board of Underwater Archaeological Resources – 4 October 2007
New England District – Letter to US Coast Guard, First District MSO – 14 August 2007
New England District – Letter to Boston Harbor Pilots – 3 August 2007
New England District – Letter to MA CZM on Beneficial Use – 30 July 2007
Boston Harbor Pilots Association – Email to NAE – 30 June 2007
Massachusetts Office of Coastal Zone Management – Letter to NAE – 28 June 2007
U.S. EPA – Letter to NAE on Beneficial Use – 25 June 2007
U.S. Fish and Wildlife Service – F&W Coordination Act Letter to NAE – 29 May 2007
New England District – Letter to MA EOEA on Beneficial Use – 24 May 2007
New England District – Letter to U.S. EPA on IWS Beneficial Use – 27 April 2007
New England District – Letter to U.S. Fish & Wildlife Service – 24 January 2007
New England District Memorandum – Regulatory Division – Suitability Determination for Dredged Material Disposal – 8 December 2006
U.S. EPA – Email to NAE Concurring in Suitability Determination – 8 December 2006
New England District – Letter to Applied Coastal Research & Eng. Inc. – 13 October 2006
Massachusetts Division of Marine Fisheries – Memo to NAE – 25 October 2005
New England District – Letter to MA EOEA – 14 September 2005

Massachusetts Division of Fisheries and Wildlife – Letter to NAE on State Endangered and Threatened Species – 16 September 2005
National Marine Fisheries Service – Letter to NAE – 6 September 2005
New England District – Letter to MA EOEA – 6 July 2005
U.S. EPA – Letter to NAE – 30 June 2005
Agreeing to participate in development of the SEIS as a Cooperating Agency
Massachusetts Division of Fisheries and Wildlife – Letter to NAE – 31 May 2005
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Massachusetts Office of Coastal Zone Management – Letter to NAE – 24 May 2005
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National Marine Fisheries Service – Letter to NAE on EFH – 14 February 2005
Massachusetts Division of Fisheries and Wildlife – Letter to NAE – 14 February 2005
New England District – Letter to US Fish & Wildlife Service – 25 January 2005
New England District – Letter to MA Division of Fisheries and Wildlife – 25 January 2005
New England District – Letter to National Marine Fisheries Service – 10 January 2005
New England District – Letter to MA Division of Marine Fisheries – 16 December 2004
New England District – Letter to MA Board of Underwater Archaeology – 22 June 2004
Massport – Letter to NAE on Study of Chelsea River – 17 June 2003
U.S. EPA – Letter to Massport – 11 June 2003
New England District – Letter to University of Massachusetts – 19 May 2003
National Marine Fisheries Service – Letter to NAE – 19 May 2003
Agreeing to participate in development of the SEIS as a Cooperating Agency
U.S. EPA – Letter to NAE – 16 May 2003
United States Coast Guard, First District MSO – Letter to NAE – 15 May 2003
Agreeing to participate in development of the SEIS as a Cooperating Agency
U.S. Fish and Wildlife Service – Letter to NAE – 14 May 2003
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New England District – TWG Letter to U.S. Fish and Wildlife Service – 14 May 2003
New England District – TWG Letter to University of Massachusetts – 14 May 2003
New England District – TWG Letter to Save the Harbor/Save the Bay – 14 May 2003
New England District – TWG Letter to National Marine Fisheries Service – 14 May 2003
New England District – TWG Letter to MIT Sea Grant Program – 14 May 2003
New England District – TWG Letter to MA Coastal Zone Management – 14 May 2003
New England District – TWG Letter to MA Dept of Environmental Protection – 14 May 2003
New England District – TWG Letter to U.S. EPA – 14 May 2003
New England District – TWG Letter to The Boston Harbor Association – 14 May 2003
New England District – TWG Letter to MA Div of Marine Fisheries – 14 May 2003
New England District – Letter to the Wampanoag Tribe of Gay Head – 18 April 2003
New England District – Cooperating Agency Letter to MA EOEA – 11 April 2003
New England District – Cooperating Agency Letter to U.S. Coast Guard – 11 April 2003
New England District – Cooperating Agency Letter to U.S. EPA Region I – 11 April 2003
New England District – Cooperating Agency Letter to U.S. F&WS – 11 April 2003
New England District – Cooperating Agency Letter to NMFS – 11 April 2003

New England District, Regulatory Division – Letter to NSTAR and MWRA – 20 March 2003
MA EOEA – Secretary's ENF Certificate and EIR Scope – 10 March 2003
With Attached Comment Letters to MA EOEA
Massachusetts Department of Environmental Protection – 27 February 2003
Massachusetts Division of Marine Fisheries – 27 February 2003
Massachusetts Office of Coastal Zone Management – 27 February 2003
Massachusetts Water Resources Authority – 28 February 2003
Massachusetts Turnpike Authority – 27 February 2003
City of Boston, Environment Department – 28 February 2002 (2003)
The Boston Harbor Association – 28 February 2003
NSTAR, Electric Operations – 28 February 2003
Massachusetts Port Authority – Letter Enclosing ENF to MA EOEA – 31 January 2003
New England District – News Release on Public Meeting – 7 August 2002
MA Board of Underwater Archaeological Resources – Letter to NAE – 26 August 2002
Federal Register – Vol. 67, No. 164 – 23 August 2002 – Notice of Intent for SEIS
New England District – Letter to MA Board of Underwater Archaeological Resources on Cultural Resource Survey Scope – 20 August 2002

Part 6. Correspondence During Approval of the Reconnaissance Report and FCSA

New England District – Letter to Massport on FCSA Execution – 30 April 2002
HQUSACE – Memorandum to NAD Approves Proceeding to Feasibility Phase – 17 April 2002
Massachusetts Port Authority – Letter to NAE on FCSA Commitment – 1 March 2002
Massachusetts Port Authority – Letter to NAE on 905(b) – 12 October 2000
New England District – Letter to Massport on 905(b) Approval – 20 September 2000
North Atlantic Division – Memorandum to NAE on 905(b) Approval – 18 August 2000
HQUSACE – Memorandum to NAD Approves 905(b) Reconnaissance – 11 August 2000

APPENDIX A
PUBLIC INVOLVEMENT AND PERTINENT CORRESPONDENCE

Public Involvement Plan for the Boston Harbor Deep Draft Final Feasibility Study and Final SEIS/EIR

Public Information and Scoping Session

At the initiation of the Feasibility Study, Massport hosted a public information and study scoping session on 5 September 2002 at the Black Falcon Terminal in South Boston. Advance notice to the meeting was provided by U.S. Army Corps of Engineers (USACE) and the Massachusetts Port Authority (Massport) in News Releases and Memoranda. The Corps and Massport provided an overview of prior and ongoing project efforts and a description of the reconnaissance recommendations, feasibility study scope and timeline, NEPA process, and proposed public involvement plan. Massport also discussed the importance of the channel deepening to the future of the Port of Boston. A question and answer session and dialogue on study scope followed the presentations.

Cooperating Agencies

By letters dated 11 April 2003, the USACE sent invitations to Federal and State agencies and inviting participation in preparation of the SEIS as Cooperating Agencies. The US EPA, US Coast Guard, National Marine Fisheries Service and Massachusetts Office of Coastal Zone Management all responded in the affirmative. These agencies have each been active in the study's development and in evaluation and review of study products and reports.

State Regulatory Process (MEPA) Notice and Scoping

The Commonwealth of Massachusetts consolidates scoping for environmental permitting under the Massachusetts Environmental Policy Act (MEPA) office, an arm of its Executive Office of Energy and Environmental Affairs (MA EOEEA), a State cabinet level office. The MEPA process requires project proponents to file an Environmental Notification Form (ENF) with the MEPA office and with notice to State and local agencies and the public. There is a public review period for the ENF during which a scoping session or hearing is held. At the conclusion of the comment period the Secretary of MA EOEEA issues a Certificate that includes the required scope of environmental studies the State will require. Massport filed the ENF with the State on 31 January 2003. The MEPA Scoping Session was held on 25 February 2003 at the Black Falcon Terminal and included project presentations by Massport and the USACE. The MA EOEEA Secretary's Certification on the ENF was issued on 10 March 2003. The Certification and comment letters are included in this Appendix. Those documents, along with the ENF, and a comment/response table, are also included in Appendix P – *Massachusetts Regulatory Review Documents.*

The Draft Feasibility Report and Draft SEIS/EIR were released to the public and agencies on 11 April 2008 for concurrent Federal and State review. The joint Federal and State review period closed on 2 June 2008. A public meeting was held 20 May 2008 in Boston. The Secretary of the MA EOEEA issued a Certification of the Draft EIR on 13 June 2008, providing and summarizing the agency and public comments the State had received on the draft documents and outlining the requirements for addressing those comments and providing additional information in the Final EIR.

Public Review of Draft Feasibility Report and SEIS/EIR

The public comment period under the Federal National Environmental Policy Act (NEPA) and State MEPA processes closed on 2 June 2008. A total of 17 comment letters were received in response to both the Federal and State review processes; four from Federal agencies, seven from State agencies, the City of Boston, the Town of Winthrop, and four local non-governmental organizations or associations with interest in the harbor. The comment letters, annotated for significant comments, are included in Part 3. A Comment-Response table, cross-referenced to the annotated letters, is included at the end of this appendix immediately prior to the letters.

Boston Harbor Technical Working Group

The Boston Harbor Technical Working Group (TWG) was established in the 1990s as a means of managing interagency and public coordination for the Design Phase and preparation of the EIS for the Boston Harbor Main Tributaries Deepening Project authorized by Congress in 1990 and constructed between 1998 and 2002. The Boston Harbor TWG functions as a port-specific dredging team and has remained in operation to help facilitate the two major maintenance dredging actions in the harbor from 2004 to 2012. In May 2003 the participating agencies and groups were asked and agreed to continue their work with the TWG as part of the current deep draft navigation improvement study. The Boston Harbor TWG includes the following:

Corps of Engineers (USACE) – New England District (NAE)
Massachusetts Port Authority
U.S. Environmental Protection Agency – Region I
U.S. Fish and Wildlife Service
National Marine Fisheries Service
United States Coast Guard – MSO Captain of the Port
Massachusetts Institute of Technology – Sea Grant Program
City of Boston – Environment Department & Conservation Commission
City of Revere - Conservation Commission
City of Chelsea - Conservation Commission
Boston Harbor Pilots Association
Massachusetts Office of Coastal Zone Management
Massachusetts Department of Environmental Protection
Massachusetts Division of Marine Fisheries
Massachusetts Executive Office of Energy and Environmental Affairs – MEPA Office
University of Massachusetts at Boston

Massachusetts Water Resources Authority
The Boston Harbor Association
Save the Harbor/Save the Bay

Both the USACE and Massport have engaged contractors to assist in the studies and documentation required for the feasibility study. Contractor personnel regularly take part in the TWG meetings and presentations. Contractors include:

For the USACE
- Battelle International (Environmental)
- David Miller Associates (Economics)
- University of Massachusetts Archaeological Services
- GEI Consultants (Sediment & Geophysical)
- TG&B Marine Services (Sediment Sampling)
- Applied Marine Sciences, Inc. (Sediment Testing)
- Ocean Surveys Inc. (Geophysical)
- CDM/Smith (Air Quality)
- CR Environmental (Sediment Sampling and Testing)
- Woods Hole Environmental Laboratories (Sediment S&T)

For Massport
- AECOM (formerly EarthTech – Environmental, Regulatory & AQ)
- University of Massachusetts Boston (Economics)
- Norbridge, Inc.

Meetings of the Boston Harbor Technical Working Group were held periodically during the feasibility study as follows:

10 June 2003 – Black Falcon Terminal, South Boston – Initial TWG Meeting for Study
27 January 2004 – Massachusetts Transportation Building, Boston
22 June 2004 – Massachusetts Transportation Building, Boston
5 January 2005 – Massachusetts Transportation Building, Boston
29 June 2005 – Black Falcon Terminal, South Boston
29 November 2005 – Black Falcon Terminal, South Boston
23 January 2006 – Black Falcon Terminal, South Boston
10 April 2006 – Black Falcon Terminal, South Boston
25 July 2006 – Black Falcon Terminal, South Boston
15 August 2007 – Black Falcon Terminal, South Boston
18 December 2007 – Black Falcon Terminal, South Boston
19 May 2008 – Massachusetts Transportation Building, Boston
21 July 2008 – Black Falcon Terminal, South Boston
3 December 2012 – Black Falcon Terminal, South Boston

A subgroup of the TWG was established to examine the effects of blasting operations on fisheries resources, investigate means of minimizing blasting impacts and ultimately recommend methods and procedures for future use. The group first met 4 February 2008 at the New England District offices in Concord, MA. The group will re-convene once Design Phase subsurface explorations results are available to enable development of a sequencing plan for project construction that will minimize resource impacts.

Boston Harbor Port Operators Group

The Port Operators Group (POG) is chaired by the US Coast Guard MSO Boston and Massport and meets about 11 times a year, on the third Wednesday of the month at either the Black Falcon Terminal or the conference room at the Boston Autoport. The POG includes many of the same parties participating in the project through the TWG. Additionally the POG includes terminal operators, shippers, law enforcement, tug companies, and other harbor interests. The POG focuses on issues of port operations and security, but also receives updates on issues such as whale sightings and activities in Massachusetts Bay, activities and conditions with respect to the Stellwagen Bank National Marine Sanctuary, and ongoing construction activities in the harbor and bay from project proponents and managers. The New England District project manager for Boston Harbor represents the USACE at the POG meetings and provides regular updates on ongoing maintenance dredging activities and the progress of the deep draft navigation improvement feasibility study.

Massachusetts State Dredging Team

The Massachusetts State Dredging Team (MASDT) is chaired by the Massachusetts Office of Coastal Zone Management. The team has met quarterly since MA CZM took over hosting the meetings from USEPA in late 2006. The MASDT consists of representatives from most of the agencies and groups comprising the Boston Harbor Technical Working Group. At each dredging team meeting the USACE and Massport provide updates on Boston harbor projects and activities including the Deep Draft Navigation Improvement Feasibility Study. Specific aspects of the Improvement Study, including the scope of channel improvements, resource studies, and beneficial use proposals, have been the subject of detailed presentations to the MASDT. State dredging team meetings where developments in the deep draft feasibility study were briefed have been held as follows:

14 December 2005 – Black Falcon Terminal, South Boston
24 January 2006 – US EPA Region I, Boston
17 October 2006 – US EPA Region I, Boston
20 December 2006 – MACZM Offices, Boston
18 January 2007 – MACZM Offices, Boston
8 March 2007 – MACZM Offices, Boston
15 May 2007 – MACZM Offices, Boston
15 November 2007 – MACZM Offices, Boston
16 January 2008 – MACZM Offices, Boston
28 January 2011 – MACZM Offices, Boston
19 October 2012 – MACZM Offices, Boston

Annual Regional Federal Agency Coordination

The U.S. EPA, U.S. FWS, and NMFS with responsibility for New England and for Boston Harbor in particular have held several sessions over the course of the feasibility study to update agency management on study progress and interim findings, and to foster improved interagency coordination. The Federal agencies meet annually, generally in the second quarter of the Federal fiscal year when project budget allocations typically become known to

review last year's project activities and be briefed on the coming year's river and harbor work. No meetings were held in 2006 or 2008 due to the lateness of the budget allocations. A project by project presentation and discussion is use to surface and help resolve any outstanding issues and concerns. The status of the Boston Harbor Feasibility Study and the work plan for the coming year's study activities is briefed and discussed by the agencies. Only the last couple meetings since 2008 are listed as economics was the primary discussion for the Deep Draft Project from 2008 to 2011. No meetings were held in 2012.

30 January 2002 – New England District, Concord, MA
15 January 2003 – New England District, Concord, MA
21 January 2004 – New England District, Concord, MA
20 January 2005 – New England District, Concord, MA
26 February 2007 – New England District, Concord, MA
10 March 2011 – New England District, Concord, MA
19 September 2011 – New England District, Concord, MA

New England Regional Dredging Team Coordination

New England's Regional Dredging Team (NERDT), known also as the Sudbury Group after its original meeting place at the Great Meadows National Wildlife Refuge in Sudbury, Massachusetts, meets twice annually to discuss issues of regional scope for the dredging and regulatory programs. Each meeting includes a briefing on the status and progress of the Boston Harbor Feasibility Study.

2 May 2002 – New England District, Concord, MA
17 May 2005 – Kittery, Maine, Town Council Room
16 November 2005 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
5 October 2006 – Kittery, Maine, Town Council Room
15 February 2007 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
10 May 2007 – Kittery, Maine, Town Council Room
20 November 2007 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
29 May 2008 – New Hampshire DES Offices, Portsmouth, NH
13 October 2010 – New Hampshire DES Offices, Portsmouth, NH
6 December 2011 – New Hampshire DES Offices, Portsmouth, NH
8 May 2012 – Great Meadows National Wildlife Refuge, Sudbury, Massachusetts
27 November 2012 – Save the Bay Offices, Providence, Rhode Island

Other Agency Coordination

The New England regional offices of the Federal agencies also meet at least annually for a Mid-Level Managers Meeting (MLM), which typically involves staff one management level above those that attending the NERDT meetings. These managers meet to resolve policy and process issues referred up by the NERDT. The MLM is been briefed in detail on the Boston Harbor Feasibility Study progress at each meeting.

Additionally the USACE has met with the U.S. Coast Guard to brief that agency on the project and solicit their input into issues including project design, port safety and security,

anchorage needs, replacement of the Chelsea Street Bridge, and navigation traffic concerns related to project construction.

The USACE has also met with the National Park Service at their Boston offices to discuss their comments on the draft Feasibility Report and their concerns with project construction and post-project vessel traffic and the potential for impacts to NPS properties in the harbor.

The USACE and US EPA and their contractors have also met at USACE District office in Concord, MA on 11 October 2007 to discuss the details and feasibility of the proposed beneficial use of dredged materials to cap the former Industrial Waste Site in Massachusetts Bay. Also discussed was the development of a demonstration effort to examine controlled capping at the MBDS.

Before establishment of the TWG and MASDT the USACE has also met with Massachusetts Office of Coastal Zone Management (MACZM) and other agencies to provide briefings on the feasibility study progress and to refine the study scope, provide detail on individual study tasks, and to help define design and regulatory concerns.

Other agency coordination meetings and briefings are listed below:

15 August 2002 – Feasibility Study Initiation Meeting with Sponsor – Fish Pier, South Boston
14 February 2003 – Meeting between NAE, Massport and MACZM, Boston CZM Offices
17 March 2003 – Meeting with Massport, University of Maine and University of Massachusetts Amherst to Plan Archaeological Survey Scope – NAE, Concord, MA
20 June 2003 – Project Briefing for U.S. Coast Guard at NAE on Chelsea Street Bridge
2 July 2003 – Meeting with USACE and USCG at USCG Headquarters, DC
9 July 2003 – Federal Agency Briefing on Boston Harbor – NAE Offices, Concord, MA
30 September 2004 – MLM Meeting at New England District, Concord, MA
16 March 2005 – MLM Meeting at New England District, Concord, MA
7 July 2005 – Teleconference between USCG and NAE on Port Safety and Security
26 October 2005 – MLM Meeting at New England District, Concord, MA
31 January 2006 – Meeting with NAE, Massport and FAA, Logan Airport, East Boston
15 November 2006 – MLM Meeting – at New England District, Concord, MA
15 March 2007 – MLM Meeting at New England District, Concord, MA
22 May 2007 – Meeting between NAE, NAD, PCX, Massport and Contractors on ITR
16 July 2007 – Meeting between NAE and EPA-I on IWS Capping Beneficial Use
13 September 2007 – MLM at New England District, Concord, MA
14 August 2008 – Meeting between NAE and National Park Service, Boston, MA
10 March 2011 – MLM Meeting at New England District, Concord, MA
19 September 2011 – MLM Meeting at New England District, Concord, MA
10 October 2012 – ESA/EFH Meeting between NAE and NMFS at Gloucester, MA

Public Notice, Meetings and Hearings

In addition to the public information and scoping session in September 2002, and the periodic meetings of the TWG and POG, various outreach activities have been held for the harbor improvement study.

Public Meeting – Boston Harbor Inner Harbor Maintenance SEIS – Black Flacon Terminal – 14 February 2006

After approval by USACE Headquarters (HQUSACE) of release of the Draft Feasibility Report and DSEIS/DEIR for agency and public review, the District published the draft report, with advance notice to the Governor and Congressional interests, on 11 April 2008. A Public Notice and other advance materials consisting of project summaries and fact sheets were also distributed to Congressional interests, State and local public officials and agencies, and other interested parties. A Notice of Availability for the draft documents was provided to EPA's NEPA office on 11 April and was published in the Federal Register on 18 April 2008. A joint Press Release from Massport and the USACE was made on 18 April 2008.

Public Meeting – Boston Harbor Deep Draft Navigation Improvement Project – Draft Feasibility Report and Draft SEIS/SEIR – Black Flacon Terminal – 20 May 2008. This meeting was held during the 45-day public review period to solicit public comment on the draft documents.

Other Outreach and Communications

3 August 2004 – Meeting held with Massport, MADMF, Massachusetts Lobstermen's Association and Boston Harbor Lobstermen to identify potential sites for investigation for hard bottom habitat creation using rock and other hard materials removed by the project.

28 March 2007 – Meeting held with Massport and China Overseas Shipping Company (COSCO) at their offices in Seacaucus, New Jersey to discuss the shipper's plans for service with or without port deepening.

22 April 2008 – Project presentation to a meeting of Massachusetts Harbormasters, hosted by the U.S. Coast Guard, Sector Boston, Commercial Street, Boston, Massachusetts.

PUBLIC AND AGENCY REVIEW COMMENTS ON APRIL 2008 DRAFT FEASIBILITY REPORT AND SEIS/EIR AND RESPONSES

GENERAL RESPONSES

The availability of the Draft Feasibility Report and Draft Supplemental Environmental Impact Statement/Massachusetts Draft Environmental Impact Report (SEIS/EIR) was published in the Federal Register on 18 April 2008. Copies of the documents were mailed to Federal, State and municipal agencies, interested parties and elected officials on 10-11 April 2008. A public notice was published, and a joint press release by the USACE and Massport issued 18 April

2008. The public comment period for both the Federal and State review processes closed on 2 June 2008, and the MEPA Certificate was issued by the Secretary of the Massachusetts Executive Office of Energy and Environmental Affairs on 13 June 2008. A letter from the MEPA Office dated 12 December 2012 confirmed that the project changes described in this document did not require any change to the 2008 Final EIR Scope Certificate.

The USACE and Massport reviewed the comments provided by the public, and by municipal, State and Federal agencies on the Draft Feasibility Report and Draft SEIS/EIR. A meeting of the Boston Harbor Dredging Technical Working Group and a Public Information Meeting were held on 19 and 20 May 2008, respectively, to present the study recommendations, solicit comments and answer questions on the project. Responses to these comments are provided in this section of the Public Involvement Appendix.

A number of commenting parties had common concerns with certain aspects of the proposed project. These mainly dealt with the nature and firmness of commitments by the USACE and Massport for additional Design Phase investigations, planning and NEPA compliance on specific areas and topics. The following paragraphs provide responses on these topics.

1. USACE Civil Work Process and Project Implementation Schedule

The nature of the USACE Civil Works process, project phasing, and the relationship to the NEPA process was discussed with the agencies in the Technical Working Group meeting. Large USACE civil works projects require specific Congressional authority to initiate studies and construction. The Feasibility phase, for which this report and SEIS have been prepared, is intended to answer the request by Congress for a report and recommendation on whether Federal interest in further navigation project improvements to Boston Harbor is warranted. This includes providing a specific recommendation on proposed project features, and an estimated cost of those improvements. NEPA requires an open and transparent decision-making process and an opportunity for public comment.

The feasibility phase has investigated the proposed navigation improvements to the level of detail necessary to answer the Congressional request for a report, consistent with the USACE published Planning Guidance and policies governing the civil works project investigations. The Feasibility Report and Final SEIS are the Executive Branch's decision document and will provide Congress the necessary information to decide whether or not to authorize the recommended project or other improvements to the harbor. Following public and agency review of the Draft Feasibility Report and Draft SEIS, the USACE District prepares the draft Final Feasibility Report and Final SEIS. These documents will be reviewed within the USACE and the Department of the Army at the Washington level, and a decision made as to whether to release a final report for review at the Federal cabinet level, to the public, and for approval by the affected State(s). After those reviews are completed, the Final Feasibility Report and SEIS and the Chief of Engineers Report would be prepared, a Record of Decision (ROD) would be issued by the Assistant Secretary of the Army for Civil Works, and the reports forwarded to Congress.

Once the final Feasibility Report and Final SEIS are approved and the ROD issued, the project may advance into the Design Phase (Planning, Engineering and Design, or PED), subject to funding. The Design Phase will conduct any necessary field investigations needed to support detailed design of the project, prepare and publish any additional NEPA/MEPA documents related to Design Phase investigations and address significant changes made during Design Phase. Also during the PED, any amended regulatory approvals required due to design changes will be secured, and documents necessary to solicit bids for the project prepared.

The Feasibility Report identifies activities and their estimated costs to be undertaken in the Design Phase. These include: subsurface investigations to identify locations of and characterize rock requiring removal. A rock removal method will be developed in consultation with the TWG. A project sequencing plan, air quality mitigation plan and additional investigations related to potential beneficial uses of rock and other dredged material will be undertaken as well as development of monitoring plans for the project and remote sensing archaeological survey to identify historic properties within areas of potential effect. The Design Phase cannot be initiated until the final Feasibility Report is approved and forwarded to Congress and a design agreement is executed with the project sponsor.

The Design Phase investigations will yield more detailed data on the several technical issues and topics listed in the discussions below. A number of these may result in changes to or refinements of the Federal project base plan, and may require preparation of additional NEPA/MEPA documents. One or more additional NEPA/MEPA documents may be prepared to address any changes. At this time the following Design Phase activities are anticipated:

- Conduct subsurface investigations, revised dredged material quantities and prepare a blast mitigation plan.
- Conduct remote sensing archaeological survey to identify historic properties within project areas of potential effect.
- Conduct resource characterization and dredge area monitoring baseline of the benthic environmental, fisheries and shellfisheries as needed.
- Develop a construction sequencing plan for removal of rock and non-rock material needed for channel deepening.
- Pending changes to Federal conformity guidelines, conduct air quality emissions conformity evaluations may be needed to determine the appropriate means of meeting the emissions. Adjustments to the construction sequencing plan would be made according to whatever final means of meeting air quality requirements is selected.
- Investigate additional beneficial use opportunities for rock with the State and local communities.
- Rock reef habitat creation opportunities will be further investigated with the NMFS, U.S. EPA, the Commonwealth, and other interested TWG members
- Coordinate with the U.S. EPA regarding the potential use of dredged material to cap the former Industrial Waste Site. U.S. EPA will need to take regulatory action to permit placement of these materials as cap at that site.

2. Continuation of the Interagency Technical Working Group

During the last three major dredging projects for Boston Harbor, the Boston Harbor Dredging Technical Working Group (TWG) has met and provided comments, during the design and construction of those projects. The USACE and Massport have committed to continuing involvement of the TWG throughout the design and construction of this project, both as a means of outreach to the participating parties, and as a means of engaging and soliciting technical input on Design Phase investigations and adaptive management during construction and any post-construction monitoring. In addition, interested agencies from the TWG are invited to participate in sub-groups to help develop and comment on specific plans for blast mitigation measures, construction sequencing, air quality conformity, and consideration of beneficial use options for the rock and dredged material. The TWG would continue to include Federal, State and municipal agencies with a regulatory interest in the harbor and port, and those established non-governmental organizations (NGOs) with the technical expertise and experience critical to developing and providing comment on the necessary investigations and planning for detailed design of the project.

3. Development of the Rock Removal Approach and Blasting Mitigation Plan

The Design Phase of the project includes an extensive boring and probing program to supplement and refine the results of the acoustic surveys and historic boring data that the Feasibility Report relied on for its estimates. This work is critical to most of the remaining design efforts and will be accomplished during the first year of the Design Phase. Once the subsurface exploration program is completed, the division between rock and glacial till, and the exact nature of the rock to be removed, will be understood. In the Feasibility Report, all hard material identified by the acoustic surveys is classified as rock requiring blasting for removal. This is assumed to be a worst case scenario, as prior work at Boston and other New England harbors in recent years has shown that acoustic surveys overestimate the volume of bedrock. .

Once the subsurface design effort is completed, the USACE will determine the appropriate rock removal method for each project segment. Using this information, the USACE and Massport will work with interested TWG agencies to refine plans for the range of possible rock removal methods, which includes blast mitigation measures, that may be used for the project. These plans will be developed in concert with the larger construction sequencing plan (discussed separately) for the entire project. These plans will address environmental concerns.

The subsurface effort may show areas where rock can be removed economically by means other than drilling and blasting. During construction of the last Boston Harbor Navigation Improvement Project between 1998 and 2001, areas of rock in the Reserved Channel Turning Area, the Reserved Channel and in the inner confluence at the Head of the Main Ship Channel were removed by ripping the ledge with a large toothed bucket. The cut into the ledge in those areas was shallow; approximately two feet, and those outcrops at that shallow depth were sufficiently weathered and fractured to permit this method of removal. Some strata, while not sufficiently fractured to permit bucket ripping, may prove removable by other mechanical means, such as a hydraulic hammer, as has been possible in limited areas with the

deepening of the Elizabeth River Channel in New Jersey. A hydraulic hammer was also used in the spring 2008 removal of several small rock pinnacle areas in the Broad Sound North Entrance Channel. Some rock areas for the Boston Harbor Deep Draft Improvement Project may lend themselves to similar methods of removal without drilling and blasting. The boring program in the Design Phase will provide the information on the appropriate rock removal method.

However, some level of caution is in order. The depth of the rock cut at Boston is estimated to be between eight to fifteen feet in many areas, as the channel is being deepened from -40 feet at mean lower low water (MLLW) down to -47 feet MLLW. The Broad Sound North Entrance Channel will be deepened to a controlling depth of -51 feet MLLW. In all channels where rock is encountered the required channel depth will be increased two feet as a safety measure. For all channels a two-foot allowable overdepth in all materials is possible. Rock at that depth may not be weathered or fractured sufficiently to avoid a need for blasting. The blasting estimates for the Boston Harbor Deep Draft Improvement Project currently call for two drill barges, each with a three-gang drill rig, with blast daily for each. A hydraulic hammer would work around the clock, except when it moves between areas to allow a dredge to remove what has been fractured.

At this time, a few predictions as to likely components of the blasting plan can be made. For project construction to proceed on schedule, with minimal interruption and minimal excess mobilization-demobilization costs, drilling and blasting operations will need be underway in some area(s) of the harbor the majority of the time. Due to weather and sea state concerns, drilling and blasting in the Broad Sound North Entrance Channel will not likely occur in periods when heavy winter storms are expected. Fisheries observers and marine mammal observers would be present during blasting operations. Fish detection and fish startle systems would be employed.

For the Main Ship Channel Extension segment that extends up-harbor to about 1,000 feet downstream of the Ted Williams Tunnel, the USACE will coordinate development of the rock removal plan with the Massachusetts Department of Transportation, the owners of the I-90 tunnel to ensure no impact to the tunnel.

The blasting efforts conducted for the ledge pinnacle removal project in 2007-2008 employed several means of avoiding and minimizing fish kills, including use of the fish observer and a fish startle system, and blast hole stemming. Even so, four of the blast events in November and December of 2007 resulted in fish kills of varying size. An After Action Report prepared by the USACE determined that the placement of the fish startle system and side scan sonar on the blast barge may not be as effective as employing this system on a separate vessel (See Appendix Y in the FSEIS). This alternate method was employed in the most recent rock removal project in 2012 and no fish kills were experienced with this new method.

In response to comments from NMFS and others, the potential for noise in the water generated by blasting to impact whales in Massachusetts Bay was also investigated. The results of that investigation have been included in the FSEIS. The investigation concluded that noise would be confined to the short distance from the blast site of no more than 1500 feet, with allowance for an additional safety zone outside the calculated noise impact zone. The nearest concentrations of whales in the Bay are located several miles seaward around

Stellwagen Bank. The potential for blasting noise to interfere with the whale-tracking buoy system in Massachusetts Bay will be investigated during the Design Phase. The nearest of these buoys is located in the shipping lanes seaward of the precautionary buoy, about 10.5 miles east of the seaward-most blasting area in the entrance channel.

As stated above, the After Action Report on the 2007 blasting work and its impacts, and the results of the additional evaluation of blasting noise on aquatic resources, as well as those from the 2012 blasting have been included in the Final Feasibility Report and FSEIS/EIR. It is expected that the calculated blast safety zones presented in that report would be protective of Federally listed threatened and endangered species that could occasionally occur in the project area, including whales, sea turtles and Atlantic sturgeon. In addition, lessons learned from the previous blasting in Boston Harbor will be incorporated, where appropriate into the blasting mitigation measures. Some of these lessons include the development of a communication plan between the fish observer and the contractor, and deploying the fish startle system on an alternate vessel instead of the blast barge. Additional measures to minimize blasting impacts to listed species can be found in the Final Feasibility Report and FSEIS/EIR.

4. Beneficial Use of Rock - Investigation of Potential Rock Reef Sites

The USACE and Massport would prefer to find an acceptable beneficial use for the one million± cubic yards of blasted rock that would be generated by the improvement project, rather than merely disposing of it in 300 feet of water at the designated Massachusetts Bay Disposal Site (MBDS); the current base plan. Rock and other dredged material should always first be considered as a public resource for beneficial use. Many environmental resource agencies raise concerns about the potential loss of hard bottom habitat when dredging of hard bottom is proposed at any project in New England. Accordingly the USACE's first consideration was to reuse this excess blasted rock material to create new hard bottom habitat. However, some resource agencies believe that creation of additional hard bottom habitat in Massachusetts Bay at the expense of covering existing soft-bottom habitat may not be desirable.

In order for the USACE to recommend including such a beneficial use component in the project it must either (1) entail no or minimal additional cost to the Government, (2) have any additional cost paid for by non-Federal interests, or (3) involve a use where the benefits of that use outweigh the additional cost, and have any additional cost to the project cost-shared between the USACE and a non-Federal public agency. Accordingly, a zone of feasibility for reef creation siting was established whereby the reduced hauling costs to the more distant MBDS would offset by any additional project costs for beneficial use site investigations, controlled dumping practices, and monitoring of site recovery and recolonization.

The intent of the reef creation option was to create hard-bottom habitat, not merely for adult lobster, but also other species that prefer this type of habitat. Five candidate reef creation sites were selected with input from the local lobstermen and the State marine fisheries staff at a meeting held on 3 August 2004. The goal was to identify large areas where existing rocky habitat was less represented than sandy or softer substrates. The analysis to date as presented in the Feasibility documents was limited to bottom types, bathymetry, Essential Fish Habitat,

and benthic resource characterization. As no real consensus developed among the Federal and State agencies during the feasibility study as to the desirability of reef creation in Massachusetts Bay, additional examination was deferred until the Design Phase, when more specific information on the quantities and types of rock and other hard materials to be generated by the project would become known. Other reviewing agencies also identified concerns about the desirability of replacing soft-bottom habitat with rock reefs that may take years to colonize, and would supplant the functions and value of the existing soft-bottom habitat at these sites.

In response to Federal and State agency concerns expressed during meetings of the project's Technical Working Group, the District has committed to working with these agencies during the Design Phase to examine these issues, define the exact type and quantity of materials available for such use, and examine the candidate sites in greater detail to determine the value of the existing habitat relative to the anticipated value of the reefs. Should reef creation proceed, technical design issues such as mound width and elevation, mound spacing, setbacks from existing hard bottom areas, cultural resource presence and protection, and targeted species will all require further evaluation. A plan for monitoring recovery and recolonization of any constructed reef site will also be developed. Some State agencies have suggested that perhaps only half, or some other portion, of the rock should be made available for reef creation, and making the rest available for other uses if found feasible (see next comment).

If it is determined that rock reef creation is desirable and feasible, and will be included in the final design of the Federal Navigation Improvement Project, then the results of the additional investigations, reef design, and habitat recovery monitoring plans will be published in an additional NEPA/MEPA document if necessary.

5. Other Beneficial Uses for Rock Removed from the Project

In addition to reef habitat creation, some or all of the blasted rock could prove suitable for other beneficial uses. Making the rock available to industry for processing as aggregate or for other construction purposes has been mentioned. Making the rock available to State agencies or area municipalities for use in public projects, particularly shore protection, has also been mentioned. Some of these are discussed below. The Design Phase of this project will include consultation and collaboration with these agencies and others to determine what economically practical beneficial options may exist. The following information will be incorporated into the Beneficial Use and Conclusions sections of the Feasibility Report.

The Massachusetts Office of Coastal Zone Management (MA CZM) is working with other State agencies and industry to identify other potential beneficial uses of the rock beyond reef creation. However, without knowing exactly when the Deep Draft Project will be authorized and funds appropriated for construction, it is difficult to generate interest or get any commitment from other parties to take the rock. At this time no parties interested in receiving this material have been identified.

Massport, MA CZM and the USACE are discussing how making the rock available to upland users might be accomplished without increasing the cost to, or delaying the construction of the navigation project. The three agencies met on 18 June 2008 with a contractor identified

by the State to discuss the nature of the rock material expected to be removed, and limitations the dredged process would place on that material and opportunities for processing and re-using that material. Massport is investigating whether some of its waterfront property may be available for rehandling of this material. The Massport Marine Terminal and the Boston Autoport are possibilities. Other non-Massport properties such as the Fore River shipyard site in Quincy or partnerships with existing dry bulk terminals like Eastern Minerals should also be explored by any party interested in receiving this material.

Processing this material for aggregate, or use for specific construction projects, including shore protection, would require significant effort. Should the State or a private party agree to accept the rock at the dredge, or pay to rehandle material ashore at some point on the harbor, the Federal Deep Draft Navigation Improvement Project could save some of the transportation cost associated with placement of the rock at the designated ocean site.

Rock removed will be of a wide range of sizes in any particular scow-load; likely ranging from fist-sized up to several tons. There will be no ability to separate particular sizes of rock from a scow-load on the water without causing construction delays and increasing costs. Any sorting or processing would need to occur onshore. There are at least two large public shore protection projects proposed in close proximity to Boston Harbor (Winthrop Shores and Nantasket Beach) that might benefit from receipt of this material if it proves to be of a type suitable for those projects, and it can be transported and processed for such use economically compared to other sources.

The State and the Department of the Interior have also expressed an interest in rock as shore protection to stop erosion of some of the harbor islands. Most of the harbor islands are included in both a State Park and a National Recreation Area. The USACE and Massport will consult with the agencies managing these islands to determine if such needs can be reasonably met, and whether these agencies are willing to undertake the rehandling and additional transportation costs for rock from the project.

Once the design-phase subsurface investigations have been completed, more exact estimates of rock type and volumes will be known. Estimates can then be made of production rates and potential uses. The USACE and Massport have committed to working with the State to identify practicable beneficial uses beyond in-water placement once the Design Phase data has been developed.

Any changes to the Federal base plan for disposal of the rock at the MBDS would require publication of such changes in an additional NEPA/MEPA document. Should new proposals for reuse of the rock involve non-Federal projects, then the project proponent would need to fund and conduct any necessary investigations and documentation, and secure all regulatory approvals needed for such use or project(s) before the navigation project is advertised in order to use project rock.

6. Beneficial Use of Non-Rock Dredged Material – Former Industrial Waste Site Capping Potential and Demonstration

The USACE and the U.S. Environmental Protection Agency have proposed using some or all of the non-rock dredged material to create a cap of the former Industrial Waste Site (IWS) located in Massachusetts Bay north of and partially overlapping the existing Massachusetts Bay Disposal Site (MBDS). As outlined in the Draft Feasibility Report, SEIS and EPA's memorandum included in Appendix R, capping the IWS would remove any remaining potential conflict between fishing activities in the Bay and the sediments and disposed materials at that site. While the barrels and containers used to dispose of chemical and medical waste at the IWS from the 1940s to 1970s have largely deteriorated, sampling in the 1990s showed no contaminant levels of concern. However, EPA has indicated that radiological waste disposal containers are still intact. Dragger trawl scars are visible throughout the site, and fishermen occasionally bring up corroded waste containers. EPA believes there remains a potential for fishing activity to disturb exposed barrels and sediments at the site. EPA and the USACE believe that up to 11 million cubic yards of clay and other parent sediments generated by the harbor improvement project represents a one-time opportunity to cap the IWS and isolate any of its sediments and debris from the environment.

The principal concern discussed in the Feasibility Report and SEIS, and voiced by other agencies, is whether or not such a capping operation can be designed and accomplished in a manner that would limit the disturbance and resuspension of existing bottom sediments at the IWS. To address these concerns, and to develop a better understanding of the methods and feasibility of such a deep water capping operation using largely clay material, the USACE conducted a demonstration project in 2008 using Boston blue clay material dredged from Boston Harbor as part of the Boston Inner Harbor Maintenance Dredging Project. In that demonstration, illustrated in Figure 41 of the Feasibility Report, the USACE placed clay in targeted rows at an undisturbed portion within the MBDS well removed from the IWS. The demonstration assessed the ability to precisely place individual loads of material with split-hulled scows and the ability to limit impact to ambient sediments by building an initial berm of material and then advancing laterally by placing material on the flank of the berm. Monitoring and results of the demonstration will be coordinated with the TWG agencies.

Design Phase investigations by the USACE and EPA, including the results of the capping demonstration effort, may lead to a decision not to pursue capping of the IWS using the dredged materials from the Boston Harbor Deep Draft Improvement Project. In that case, the Federal base plan for disposal of those materials at the MBDS would be followed, unless another cost-effective beneficial use can be identified. EPA would modify the MBDS boundaries to permit placement of dredged materials in areas of the IWS now outside the designated MBDS boundary.

7. Construction Sequencing Plan Development

The Design Phase of the project will include development of a Construction Sequencing Plan to limit the impact of construction activities on harbor resources to the extent practicable. The USACE and Massport will work with interested TWG member agencies to develop this plan in a manner similar to the development and adaptive management of the rock removal including a blasting mitigation plan. Drilling, blasting and dredging production rates will then

be developed for each channel segment. The final determination of the air quality compliance mitigation methods to be used for the project will also be determined. This will permit a determination of construction durations for each piece of the project.

Critical times of year and geographic distribution within the harbor for various species of concern will be developed after additional resource surveys have been completed and with input from the TWG agencies. These spatial and temporal restrictions will be charted along with the project construction durations. A best fit of construction activities relative to resource concerns will then be developed. The intent will be to minimize to the extent practical any conflict between construction and resources, while permitting the project to proceed with minimal interruption and impact.

8. Benthic Resource Definition and Recolonization Studies for Dredged Areas

The benthic community in Boston Harbor has changed dramatically since the cessation in 1991 of sludge disposal in Boston Harbor, the conversion in 1998 of wastewater treatment from primary to secondary treatment, and the relocation of the wastewater discharge outfall from Boston Harbor to Massachusetts Bay in 2000. This is particularly true in the northern part of the harbor, where the proposed Deep Draft Project is located, where an increase in species diversity and numbers has been observed.

Benthic grab samples were collected from the navigation channels in 2003. Infaunal communities within the project study area are clearly separable into two geographic regions. The first extends from the innermost region, the Mystic and Chelsea Rivers to the vicinity of the Reserved Channel. Within this region, infaunal abundances are very low to low, and species numbers are also very small or small. The second region extends from the Reserved Channel to the mouth of the harbor and includes the Lower Harbor, Main Ship Channel, and President Roads Anchorage Area. Infaunal abundances here range from medium to large and species numbers range from medium to large. Infaunal abundances in the Outer Harbor (the entrance channels) are somewhat lower, but the species numbers are similar, than those in the Lower Harbor, Main Ship Channel, and President Roads Anchorage.

The variation in species diversity and abundance can be partially related to the substrate type and the location within the harbor. Physical samples were collected in 2002 to determine grain size of the material to be dredged. The results of these tests show that the improvement material corresponds to the sidescan and sub-bottom profile data. That is, coarser grained (predominantly sand and gravel in the Outer and Lower Harbor) and finer grained sediment (clay) in the upper portion of the harbor and rivers. After improvement dredging of the Chelsea River and Mystic River in 2000, the underlying parent material composed mostly of Boston blue clay was exposed. Until this material is reworked, or silt overlays the blue clay, very low numbers of benthic organisms were or will be observed in this habitat.

Deepening the navigation channels could change the substrate composition, in particular the Lower and Outer Harbor. In areas where recent maintenance or improvement dredging since 1998 has exposed parent glacial material (clay, till and bedrock) the proposed deepening will not be likely to change the current condition as recovery of these areas has not yet been completed. In some areas channel deepening will expose a different substrate. Bedrock exposure will increase slightly as the deepened channels will be closer to the bedrock

basement. Appendix Q to the Draft Feasibility Report/SEIS/EIR contains maps which compare the various harbor bottom classifications for the existing condition with improvement for either a 45-foot or 48-foot channel system. Overall the exposed areas of bedrock and course till will increase as channel depth increases.

Pre- and post-monitoring of the benthic and shellfish community is proposed for the various channel segments to document a baseline and to monitor the extent of recovery over time and potential changes in the infaunal and macrofauna benthic community. Proposed monitoring could include Sediment Profile Imaging (SPI) camera, benthic grabs, lobster traps (vented/ventless), divers to conduct early benthic phase lobster surveys, and/or a towed camera. Pre-construction baseline characterization surveys would be conducted during the Design Phase and no more than about one year before construction. Post-construction monitoring could begin one year after construction has been completed and continue for three to five years. Input from the Technical Working Group participants would be solicited on the details of the monitoring plan. The monitoring effort would need to be cost-shared with the project sponsor. The results of additional resource characterization investigations and detailed monitoring plans will be published in an additional NEPA/MEPA document, if required.

9. Air Quality Compliance Methodology and Alternatives

The method presented in the Draft Feasibility Report and SEIS/EIR used construction activity shut-down periods, in combination with a requirement that construction equipment meet projected 2011 emissions requirements, to ensure that construction plant emissions did not exceed compliance thresholds. By remaining below deminimis emission levels during construction, the project would not need to undergo a general conformity analysis that would require offsetting 100 percent of the project's construction emissions. While the shut-down method does keep the project in compliance with current emissions limits, it extends the construction period by the total of the shutdown terms, delaying project benefits. Project costs are also increased by additional demobilization and remobilization costs, and additional cost escalation for the extended construction duration. Delaying completion of the project by six months or more would also delay the start of benthic recolonization and ecological recovery of the dredged areas where work was delayed. The construction shutdown also does not reduce total project emissions or result in long-term emission reductions beyond those otherwise provided as a result of the project through a reduction in truck-miles for the New England region. The USACE and Massport would prefer an approach that further reduces or offsets emissions from project construction if a cost-effective source or method can be identified during the Design Phase.

The Draft Feasibility Report and SEIS/EIR stated that the USACE and Massport would revisit the air quality question during the Design Phase as construction durations for the various project segments became more defined by design level investigations. Several commenters questioned why commitments to other methods couldn't be made at the Feasibility phase.

Construction equipment used for this project would be required in the project specifications to have more efficient cleaner burning technologies so as to be compliant with EPA's 2011 tier 3 and tier 4 emissions standards. Even with this requirement, annual emissions thresholds for some pollutants would be exceeded without further reduction measures. Without construction

shutdowns to limit emissions in any one calendar year to below the conformity threshold level, the project would need to mitigate 100 percent of all emissions through some combination of emissions credits or emissions reduction offset measures. Substitution of any of these measures would require a general conformity analysis. Even so, such methods may prove less costly than construction shutdowns and require further consideration during project design once the extent of required ledge removal and other components of a construction sequencing plan are better known.

During the preparation of the Draft Feasibility Report and DSEIS/DEIR, available sources of credits were investigated. Credits need to be for the precursors of the same non-attainment pollutant that needs to be mitigated, if permitted by the State air pollution control authority, for the year(s) in which the project would occur, and from the same, or nearby, maintenance or non-attainment area as the project. While credits that meet these requirements may be available, it is not known exactly when Congress would authorize the project, or when project construction funds would be appropriated. The Government cannot commit to expenditure of construction phase funds until after authorization and appropriation. Until then no commitment can be made to any holder of credits that the Government could purchase those credits.

An alternative compliance option is offsets; investments in new technology or replacement of existing sources of emissions with more modern less emitting sources. Some offsets used for other recent navigation projects outside New England include refitting existing vessels with new cleaner engines, and replacement of municipal vehicle fleets in part with alternative fuel vehicles. The USACE and Massport will continue to explore potential offset opportunities during the Design Phase and will discuss these options with the TWG and agencies.

Project measures to demonstrate Air Quality Conformity cannot be finalized in the Feasibility Phase due to factors such as uncertainties in the project timeline, the availability of credits in the years that they would be required to offset construction- related emissions, and the potential for conformity regulatory changes to occur in the near term. The only means of complying with air quality requirements that is certain at the Feasibility Phase is construction period shutdowns that avoid exceeding the emissions thresholds and thus avoid triggering general conformity analysis. The USACE and Massport concur with reviewers of the Draft Feasibility Report and Supplemental EIS/ EIR that alternative Air Quality compliance strategies that result in real reductions in construction air emissions should be considered when additional information can be developed. Although not currently eligible for consideration in the Conformity Analysis, it should be noted that a key benefit of the proposed harbor deepening is the regional reduction of on-road emissions as a result of more New England based cargo being handled through the Port of Boston.

The Air Quality analysis will be re-examined following the Design Phase field investigations and development of a construction sequencing plan to determine if a more desirable and cost-effective means of compliance exists that would mitigate emissions rather than merely deferring them over a longer construction duration with shutdowns. The USACE and Massport are committed to working with EPA, the State, and interested TWG participants with experience in Air Quality mitigation issues to develop an appropriate air quality compliance strategy, should one still be required. This could be accomplished through establishment of a formal TWG Air Quality subcommittee. Any changes in Federal and State standards, conformity guidance, and implementation plans will be incorporated into the

revised analysis at that time. Should any change in the method of ensuring compliance of the project with air quality requirements result from this review, the USACE and Massport would give notice of these changes to the public and provide an opportunity for public comment through the General Conformity analysis and review process.

10. SSFATE (Turbidity) Monitoring and Impacts

An SSFATE model was used to predict the direction and concentration of the turbidity plume from dredging, and the thickness of the deposition layer for the Outer Harbor Maintenance Dredging Project in Boston Harbor. Grain sizes representative of silt were selected for use in the modeling to predict the resulting turbidity plume when the dredge was operating in the Lower Harbor, the President Roads Anchorage area, and the Broad Sound North Entrance Channel. The model may be found on the USACE New England District website.

The results of the SSFATE model predicted that the concentration of the turbidity plume at the mid-depth water column level would generally range from 30 to 60 mg/l with occasional readings of 80-90 mg/l near the dredge. In general the plume stayed within the navigation channel throughout the tide cycle. The SSFATE model also predicted the resulting thickness of the re-suspended material overlaying the bottom once the plume settled. Bottom thickness ranged from 0.01 to 0.1 mm outside the navigation channel, and up to 1-2 mm immediately adjacent to the dredge.

The SSFATE model is usually conservative in predicting turbidity plumes from dredging operations. Actual monitoring of the plume during dredging and disposal of the Boston Harbor Navigation Improvement Project (tributaries deepening project) in 1998-2001 showed that the plume stayed confined to the navigation channel and was generally difficult to discern beyond 600 feet down-current of the dredge or disposal event.

Plume monitoring was completed for the Boston IHMDP during dredging, ship passage and disposal into the CAD cell from June 30, 2008 through October 28, 2008. Plume tacking included cross channel transects 300 feet up-current of the dredge and from 100 to 1500 feet down-current of the dredge. Dredge plumes were monitored during four slack tides (two high and two low), two ebb and two flood tides in each study area (near the inner confluence and halfway between Castle Island and Spectacle Island) (USACE, 2009).

The Boston IHMDP dredge plume monitoring showed the dredging plumes to be of relatively low concentrations and localized to the immediate dredge area (within 500 feet for the highest turbidity readings) (USACE, 2009). In strong tidal currents the plumes were narrow and concentrated near the dredge (150-250 feet wide), up to 20 NTU above background, and usually present from surface to bottom and then they widened, dissipated and settled to the lower half to two-thirds of the waver column as they were carried down the channel by the tide. The plumes dissipated to background levels typically between 1000 and 1500 feet down-current. As the dredge plumes dissipated they tended to be found across the full width of the channel in the lowest one-third (or less) of the water column at low concentrations (<5 NTU above background) as they approached background levels. During slack tide conditions the dredge plumes pooled beneath the dredge, typically no wider than 100-150 feet wide and dissipated to background levels in as little as 500 to 1000 feet down-current of the dredge.

The dredge plumes were typically confined to the channel, although low concentration plume filaments were observed on two occasions as far as 650 feet from the channel in the southern monitoring area where current flows are more complex, but did not impact any nearby sensitive resource areas.

Since the material to be dredged from the Boston Harbor Deep Draft Improvement Project is parent material composed of Boston blue clay and glacial till, the turbidity plume is expected to be smaller or at least not greater than the turbidity plume monitored during the Boston Harbor Navigation Improvement Project or the Inner Harbor Maintenance Dredging Project.

SPECIFIC RESPONSES TO CORRESPONDENCE RECEIVED

In addition to commonly raised issues and comments, each agency and individual commenter raised specific comments and questions on a variety of topics and concerns. Specific responses to these comments are provided below. Responses are made to these parties in a specific order as follows; first, from letters received to our request in 2012 for any updated information, and then in response to the release of the Draft SEIS/EIR in 2008:

Letters Received in 2012:
- Federal Agencies
  - U.S Department of Homeland Security, U.S. Coast Guard – 7 November 2012
  - U.S. Environmental Protection Agency – 9 November 2012
  - National Marine Fisheries Service (EFH Consultation) – 26 November 2012
  - National Marine Fisheries Service (Section 7) – 27 November 2012
- State Agencies
  - Massachusetts Historical Commission – 18 October 2012
  - Massachusetts Executive Office of Energy and Environmental Affairs
    - Office of Coastal Zone Management – 24 October 2012
    - Office of Coastal Zone Management – 26 October 2012
    - Office of Coastal Zone Management – 29 November 2012
    - Board of Underwater Archaeological Resources – 27 November 2012
    - MA Environmental Policy Act (MEPA Office – 12 December 2012
  - Massachusetts Water Resources Authority – 9 November 2012

Letters Received in 2008:
- Federal Elected Officials – None Received
- State and Municipal Elected Officials – None Received
- Federal Agencies
  - U.S. Environmental Protection Agency – 23 May 2008
  - National Marine Fisheries Service – 2 June 2008
  - U.S. Fish and Wildlife Service – 14 May 2008
  - Department of the Interior, Office of Environ Policy & Compliance – 2 June 2008
- State Agencies
  - Massachusetts Executive Office of Energy and Environmental Affairs
    - Secretary's Certificate on the Draft SEIS/EIR – 13 June 2008
  - Massachusetts Office of Coastal Zone Management – 2 June 2008
  - Massachusetts Department of Environmental Protection – 2 June 2008
  - Massachusetts Board of Underwater Archaeological Resources – 2 June 2008

Massachusetts Historical Commission, SHPO – 5 May 2008
Massachusetts Water Resources Authority – 2 June 2008
Massachusetts Division of Marine Fisheries – 2 June 2008
Municipal Agencies
City of Boston, Environment Department – 2 June 2008
Town of Winthrop, Town Council – 30 May 2008
Non-Governmental Organizations and Private Individuals
Boston Marine Society – 1 June 2008
The Boston Harbor Association – 2 June 2008
Boston Harbor Pilots Association – 2 June 2008
Save the Harbor, Save the Bay – 2 June 2008

The page reference to copies of the correspondence received and reproduced in this appendix is shown at the beginning of the responses to each party. The source of the comment is identified by number annotated on the correspondence and referenced to the response.

Correspondence from Re-Initiation of Coordination in 2012

U.S. Department of Homeland Security, U.S. Coast Guards – Letter to NAE – 7 November 2012	**Letter at Page A-2-71**
Comment USCG-01	Although the Coast Guard is charged with maximizing efficiencies of the Marine Transportation System (MTS), we do not feel that this one foot reduction is proposed project depth will negatively impact current and future needs of the MTS for the Port of Boston.
Response	Comment noted.

U.S. Environmental Protection Agency, Region 1 – Letter to NAE – 9 November 2012	**Letter at Page A-2-59**
Comment EPA-01	We suggest that the USACE discuss the general conformity issue with us after the proposed implementation rule for the 2008 ozone standard is published.
Response	The USACE and Massport are currently re-examining the expected air quality impacts of the project with reference to the revised air quality determinations. The results of that examination will be discussed with the TWG when they become available.
Comment EPA-02	As addressed in our 2008 scoping comments, the Boston area carbon monoxide attainment area [Middlesex County (part) Cities of Cambridge, Everett, Malden, Medford, and Somerville; Norfolk County (part) Quincy City; and Suffolk County (part) Cities of Boston, Chelsea, and Revere], with an associated maintenance plan would also trigger General Conformity provisions.
Response	Comment noted.

Comment EPA-03	On Monday April 25, 2010, EPA finalized revisions to the General Conformity Regulation (64 FR 17254-17279). The USACE may be able to take advantage of the flexibility and benefits offered by the revised general conformity rule. We should plan to discuss this issue at the upcoming Technical Working Group meeting.
Response	Agreed. The USACE and Massport added this topic to the TWG agenda for the 3 December 2012. The USACE and Massport are currently re-examining the expected air quality impacts of the project with reference to the revised air quality determinations. Any EPA regulatory revisions would be incorporated in the Design Phase conformity analysis. The results of that examination will be discussed with the TWG when they become available.
Comment EPA-04	Should any new onroad mobile modeling be required, MOVES should be used in developing the onroad mobile emission inventories.
Response	If needed, then MOVES would be used to develop the onroad mobil emission inventory.
Comment EPA-05	Our 2008 comments on the DSEIS noted our objections to the proposed blasting activities and rock reef creation due to a lack of information relative to the extent and impact of both. Our letter strongly encouraged the USACE to meet and work with us and other interested federal and state agencies to resolve those issues. Absent any meaningful coordination on both issues over the past four years, we note that the basis for our objections has not changed.
Response	See General Topics #2 and # 3 above for additional information and responses to this comment. Section 7 consultation has been conducted for effects of blasting on listed species and NMFS has concurred that the proposed blasting is not likely to adversely affect any NMFS listed species. Blasting mitigation measures will be developed in coordination with the TWG as well as other interested federal and state agencies.
Comment EPA-06	Moreover, we believe that these discussions are an important part of the USACE work to develop a comprehensive and defensible FSEIS and we would hope that interagency coordination can help to resolve our outstanding objections in advance of the finalization of the FSEIS analysis.
Response	See General Topics #2 and #3 above and response to previous comment. USACE will is planning to work with TWG and other interested agencies to develop mitigation measures for rock removal/fracturing and beneficial use of fractured rock.

U.S. Department of Commerce National Oceanic and Atmospheric Administration – National Marine Fisheries Service – Letter to NAE – 26 November 2012 – Habitat Conservation	**Letter at Page A-2-46**
Comment NMFS-01	Although your letter indicates that you will share additional information and details of the project as they are developed during the Design Phase of this project, it does not specify whether or not the information we requested in our June 2, 2008 letter will be provided.
Response	Additional investigations would be conducted during the Design Phase of the project, see general topic #8 above. This information will be shared with NMFS and published in supplemental NEPA documents if necessary.
Comment NMFS-02	In fact several of these BMPs were incorporated in the blasting conducted in September 2012, and we note that you reported no fish kills during that recent rock removal work. However, this project involved removing just over 3,000 cy over a three-day period of blasting in September, which is a time when minimal presence of diadromous fish are expected in Boston Harbor.
Response	First, it should be noted that only about 500 cy of rock was removed over a few weeks; not 3,000 cy over a 3-day period. However, measures that were taken to reduce these blasting impacts included: stemming, blast delays, use of fish observers, sonar monitoring, and a fish startle system to deter fish. One noted difference from previous blasting in Boston Harbor was the location of the fish startle system on an alternative vessel, which appeared to be more effective in deterring fish from the presence of the blast location since the deterring system could operate until very shortly before a blast. An underwater blasting TWG will be formed during the Design Phase to explore the practicality and feasibility of any potential mitigative measures (including project sequencing). Recommendations agreed to by the TWG and the USACE to reduce potential blast impacts will be incorporated into the design specifications for the Deep Draft Project. USACE will work with the Technical Working Group to develop a blasting mitigation measures that seeks to minimize impacts to critical resources during sensitive time periods in the various areas of the harbor. Also see general topics #2 and #3 above.
Comment NMFS-03	We continue to contend that an underwater blasting technical working group is needed for the proposed BHDDNIP. The complexities of underwater blasting, as well as the diverse technologies and best management practices that are available, require a thorough review by a technical working group composed of federal and state resource and permitting agencies.
Response	Agree. See response NMFS-02 above. Also see general topics #2 and #3 above.
Comment NMFS-04	We continue to believe the FSEIS/FEIR should consider the effects of the loss of soft bottom habitats as a result of the creation of artificial reefs relative to the overall ecosystem functions and values.

Response	As a matter of USACE policy, rock and other dredged material should always be considered first as a public resource. Many environmental resource agencies raised concerns about the potential loss of hard bottom habitat when dredging hard bottom is proposed at any project in New England. Accordingly, our first consideration was to reuse any rock material removed to create new hard bottom habitat. However, some resource agencies believe that creation of additional hard bottom habitat in Massachusetts Bay at the expense of covering existing soft-bottom habitat may not be desirable. See general topic #4 and #5.
Comment NMFS-05	We continue to believe the results of this demonstration project should be considered in the FSEIS/FEIR to determine the efficacy of using the dredged material from the proposed BHDDNIP to cap the IWS.
Response	Results of the pilot project to demonstrate the efficacy of using the dredged material to cap barrels at the IWS are summarized in the FSEIS/FEIR with reference to a detailed report to be published in the spring of 2013. The results of this pilot project showed that the potential to cap barrels at the IWS should be successful. See general topics # 6.
Comment NMFS-06	To avoid impacts to winter flounder spawning, egg, larvae, and juvenile development habitat, no dredging or underwater blasting should be conducted between February 1-June 15 of any year in any areas of the Mystic River and Chelsea River, and the Reserved Channel, and the Main Ship Channel and Turning Basin landward of the Conley Terminal.
Response	Only a small portion of the Mystic River navigation channel located opposite the Medford Street Terminal is proposed to be deepened; no underwater blasting is proposed for this area. The proposed area to be dredged is relatively small, especially when compared to the total amount of available area in the Mystic River for winter flounder habitat; therefore no significant impact to overall winter flounder habitat from dredging impacts is expected in the Mystic River. Winter flounder spawn in shallow waters less than six meters (<20 feet) deep (EFH, 1999). The navigation channels proposed to be deepened in Boston Harbor are -35 feet MLLW or more. Thus, the navigation channels would not be considered prime winter flounder spawning habitat. Plume monitoring was conducted between 1998 and 2000 for the Boston Harbor Navigation Improvement Project (BHNIP). Monitoring was conducted when both navigation channels were dredged and during disposal into Boston Harbor CAD cells. Plume monitoring was also conducted for the Inner Harbor Maintenance Dredging Project (IHMDP) in 2008 (Battelle, 2009). This monitoring showed that the plume stayed confined to the navigation channel. The only exception was the area just south of Castle Island where variable currents carried a filament of the plume out of the channel as far as 650 feet, away from the potential winter flounder spawning area near Governors Island. Maximum turbidity levels within the plume were low (~12 NTU above

	background). Therefore, while we disagree with this EFH conservation recommendation for the above areas proposed for navigation channel deepening, we will seek to accommodate the February 1 to June 15 environmental window to avoid dredging in the most sensitive areas for winter flounder to the extent practicable. We will coordinate with the TWG to help determine the extent of sensitive areas and period of concern for the various areas of the harbor during that timeframe. This restriction, however, will need to be evaluated during the Planning, Engineering and Design Phase (Design Phase) once the overall project sequencing plans are developed and taking into account potential blasting and air quality emission impacts.
Comment NMFS-07	In order to protect EFH forage species, no dredging or underwater blasting should be conducted between March 1-June 30 of any year in any areas of the Mystic River and Chelsea River channels and private terminals berths, the Reserved Channel and terminal berths at Massport facilities, the Main Ship Channel and terminal berths, and the Turning Basin west of the Conley Terminal to avoid adverse impacts on upstream spawning migrations of alewife, blueback herring, rainbow smelt.
Response	As mentioned above, both the BHNIP and the IHMDP plume monitoring showed that, except for the area just south of Castle Island, the plume stays confined to the navigation channel. See general topic # 10. The proposed deepening of the Chelsea River would increase the depth of the entire navigation channel by an additional two feet. Based on the above plume monitoring results, and the large areas of the harbor not impacted by a dredge plume, no impedance to upstream spawning migrations of alewife, blueback herring, and rainbow smelt is expected during dredging. However, given its confined nature, dredging in the Chelsea River could potentially impede upstream migration of fish species that may be present. We will coordinate with the TWG to determine what species are present at what time of year and then determine the appropriate means to minimize impacts, if necessary.
Comment NMFS-08	For the remaining sections of the BHDDNIP (i.e., Main Ship Channel east of the Conley Terminal, President Roads Anchorage, Broad Sound North Entrance Channel, maintenance of the 35-foot deep lane of the North Entrance Channel, 30-foot deep Broad Sound South Entrance Channel, 15-foot deep Nubble Channel and 35-foot deep MLLW Barge Anchorage), an underwater blasting plan should be developed during the Planning Engineering, and Design Phase of the proposed project. The underwater blasting plan should be convened as soon as possible to begin evaluating data from the proposed Boston Harbor Main Ship Channel rock removal project, as well as gathering information from other past underwater blasting projects in this and other regions. This technical working group should identify and evaluate the most current knowledge on the science and management of underwater blasting and monitoring needs that can be directly related to the proposed BHDDNIP.

Response	An underwater blasting TWG will be formed during the Design Phase to explore the practicality and feasibility of any additional potential mitigation measures (including project sequencing). Recommendations agreed to by the TWG and the USACE to reduce potential blast impacts will be incorporated into the design specifications for the Deep Draft Project. See general topic # 3.
Comment NMFS-09	Recommendations of this [Blasting] Technical Working Group should be incorporated into the FSEIS/FEIR
Response	It should be noted that funding will not become available for use in the development of the underwater TWG and the subsequent development of blasting mitigation measures until the project enters the Design Phase. Therefore, any recommendations of this TWG cannot be incorporated into the FSEIS/FEIR.
Comment NMFS-10	Alternative beneficial reuse of rock material that avoid and minimize adverse impacts on biologically productive soft bottom habitats should be evaluated more fully within the FSEIS/FEIR, including using rock for upland construction purposes and the use for ongoing shore protection projects.
Response	In order for the USACE to recommend including a beneficial use component in the project, it must either (1) entail no or minimal additional cost to the Government, (2) have any additional cost paid for by non-Federal interests, or (3) involve a use where the benefits outweigh the additional cost, and have any additional cost to the project cost-shared between the USACE and a non-Federal public agency. Accordingly, a zone of feasibility for reef creation siting was established whereby the reduced hauling costs to the more distant MBDS would be offset by any additional project costs for beneficial use site investigations, controlled dumping practices, and monitoring of site recovery and recolonization. In addition to reef habitat creation, some or all of the removed rock could prove suitable for other beneficial uses such as making the rock available to industry for processing as aggregate or for other construction purposes. Making the rock available to State agencies or area municipalities for use in public projects, particularly shore protection, was considered during preparation of the Draft Feasibility Report, but no parties interested in receiving the rock at their cost were identified. Therefore, the Federal base plan for rock disposal as laid out in the Feasibility Report and FSEIS/FEIR is placement at the MBDS. The Design Phase of this project will include additional consultation and collaboration with interested agencies and others to determine what, if any, economically practical beneficial use options for this material may exist at the time of construction and what parties are interested in receiving that material for their own uses. At this time however, without interested parties and uses identified, there are no quantifiable beneficial uses to evaluate. See general topics # 5.

Comment NMFS-11	The results of the demonstration capping project within the IWS should be evaluated more fully within the FSEIS/FEIR in order to determine the efficacy of using the dredged material from the proposed BHDDNIP to cap the IWS and to assess potential impacts to biological communities within the MBDS.
Response	Detailed results of the capping demonstration project will be available in a report expected to be finalized in spring 2013 (too lengthy to include within the FSEIS/FEIR). The DAMOS Program has monitored the benthic community at MBDS for several decades. The results of this monitoring are also summarized in the FSEIS/FEIR and clearly show that the benthic community recovers after placement of dredged material at the disposal site. See general topic #6.
Comment NMFS-12	Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to these EFH conservation recommendations, including a description of measures you intend to adopt for avoiding, minimizing, or offsetting the impact of the project on EFH. In the case if a response that is inconsistent with our recommendations, Section 305(b)(4)(B) of the MSA also indicates that our must explain your reasoning for not following the recommendations.
Response	A letter dated December 6, 2012 was sent to NMFS in response to the EFH conservation recommendations received.
Comment NMFS-13	Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.9209(l) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations. Since additional information will be generated as you undertake the Planning, Engineering, and Design Phase of the BHDDNIP, it may affect the basis of our EFH conservation recommendations, which would require the re-initiation of our EFH consultation
Response	Additional information acquired during the Design Phase investigations will be provided to NMFS. If the results affect the EFH consultation recommendations, the consultation will be reinitiated.
Comment NMFS-14	As discussed above, the BHDDNIP supports populations of shellfish and American lobster, and a number of species of anadromous fish that use the area for various stages of their life history, including the spawning migrations of blueback herring, alewife, and rainbow smelt. In order to avoid adversely affecting the sensitive spawning periods of these species, we recommend all EFH conservation recommendations listed above be adopted.
Response	See responses NMFS-06 and 07 above as well as general topics #2, 7, 8, and 10.
Comment NMFS-15	Unfortunately, the lack of site-specific details for a project of this magnitude required us to take a risk-averse approach in the issuance of our EFH conservation recommendations in order to ensure protection of fishery

	resources and habitats. As additional information becomes available which would affect the basis of our EFH conservation recommendations, re-initiation of the consultation may be warranted.
Response	It is acknowledged that NMFS took a risk-averse approach to the issuance of the EFH conservation recommendations in light of your determination that the Deep Draft Project lacks site-specific details at this time. If additional information acquired during the Design Phase investigations would affect the EFH consultation recommendations, the consultation will be reinitiated.

U.S. Department of Commerce National Oceanic and Atmospheric Administration – National Marine Fisheries Service – Northeast Region – Letter to NAE – 27 November 2012 - ESA	**Letter at Page A-2-26**
Comment NMFS-01	This analysis relies on the full implementation of all special conditions listed above; we consider these to be part of the proposed action. It is important to note that project plans may be refined in the future. Prior to the USACE entering into any contracts or carrying out any dredging or blasting, updated project plans and special conditions will be provided to us. At that time we will determine if there are likely to be any effects that we did not consider here and, if there are, re-initiation of this consultation will be necessary.
Response	Concur.
Comment NMFS-02	Re-initiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, re-initiation would be required. As noted above, we expect that you will provide us with refined project plans once they are available.
Response	Concur; refined project plans will be submitted as available

The Commonwealth of Massachusetts – Massachusetts Historical Commission – Letter to NAE – 18 October 2012	**Letter at Page A-2-81**
Comment MHC-01	In regards to the project change, the MHC advises that the USACE should review the results of previous identification efforts for historic properties in the area of potential effect, and evaluate the potential of the currently proposed

	project to affect previously identified historic properties, or properties not yet identified that may be located in the project area that have not yet been sufficiently surveyed for historic properties.
Response	Concur. USACE responded with a letter dated 4 December 2012..
Comment MHC-02	The MHC looks forward to review of scopes for any additional proposed archaeological identification and evaluation efforts, and the USACE findings and determinations in accordance with 36 CFR 800.
Response	The surveys proposed are for the Chelsea River channel widening areas only. These surveys are included in the Design Phase scope, and input will be sought from the MHC and the BUAR during that phase. Additional survey efforts may be required for disposal of dredged material at the MBDS and Industrial Waste Site and/or creation of new beneficial use sites.

The Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs Office of Coastal Zone Management – Letter to NAE – 24 Oct 2012	**Letter at Page A-2-80**
Comment CZM-01	CZM is requesting additional information on commitment/planning by USACE and Massport to pursue viable options regarding alternatives for beneficial reuse beyond the creation of the rock reefs, including both shore protection and upland use.
Response	We are committed to working further on beneficial use for the rock to be removed from this project. See response letter dated October 26, 2012 for additional detail.

The Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs Office of Coastal Zone Management – Letter to NAE – 26 October 2012	**Letter at Page A-2-72**
Comment CZM-01	CZM has received the necessary information to initiate their federal consistency review for the proposed project.
Response	CZM Federal Consistency Review Schedule noted.

The Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs Office of Coastal Zone Management – Letter to NAE – 29 November 2012	**Letter at Page A-2-23**
Comment CZM-01	Based upon our review of applicable information, we concur with your certification and find that the activity's effects…are consistent with the CZM enforceable program policies…If the above-referenced project is modified in any manner….it is incumbent upon the proponent to notify CZM.
Response	Comment noted.

The Commonwealth of Massachusetts – Board of Underwater Archaeological Resources Executive Office of Energy and Environmental Affairs – Letter to NAE – 27 November 2012	**Letter at Page A-2-25**
Comment BUAR-01	The Board notes the updated plan specifically calls for deepening access to the Chelsea River. This area is considered archaeological sensitive, particularly in relation to the 1775 Battle of Chelsea Creek and the loss of HMS *Diana*. The recommendation that a remote sensing archaeological survey should be conducted for the areas of potential affect in the Mystic River and Chelsea River Channels remains applicable.
Response	Email communication between USACE and BUAR provided more detail regarding the proposed project activities in Chelsea River and the IWS. USACE concurred and commented in a letter dated 4 December 2012.

Massachusetts Water Resources Authority – Letter to NAE – 9 November 2012	**Letter at Page A-2-62**
Comment MWRA-01	MWRA's concerns continue to focus on the need to protect MWRA's infrastructure in two locations within the project area: • Reserve Channel: where NSTAR's four-mile 115 Kv Submarine Cross Harbor Cable runs the entire length beneath the channel and continues across the Harbor to Deer Island. • Chelsea Creek: where MWRA has an active 36-inch diameter water main that crosses the Creek supplying East Boston and Logan International Airport.
Response	.Phone communication between USACE and MWRA indicated that the Deep Draft Project would not interfere with the water main pipe crossing the Chelsea Creek. See comment below for the Reserved Channel.

Comment MWRA-02	For these reasons, it is extremely important that the ACOE and Massport be satisfied that any plans which NSTAR may have to protect or to relocate the cable be sufficient to ensure its integrity. To date, NSTAR has not shared its plans with MWRA. MWRA remains very concerned about the protection of the cable which is a vital and non-expendable item of infrastructure upon which MWRA relies heavily.
Response	The U.S. Attorney's office is currently in negotiations with MWRA and NSTAR to ensure that the cable will not impact the Deep Draft Project.
Comment MWRA-03	Any future dredging and/or blasting in the Reserve Channel or the Chelsea Creak area should be carefully coordinated with MWRA through the 8 (m) permitting process.
Response	The project's non-Federal sponsor, Massachusetts Port Authority, is responsible for acquiring any MWRA 8(m) permit, should one be required for the project. Massport will discuss and coordinate with MWRA on any needed approvals.

The Commonwealth of Massachusetts, Executive Office of Energy and Environmental Affairs – 12 December 2012	**Letter at Page A-2-6**
Comment MEPA-01	Based on the review of the information you presented, I concur that the project changes do not warrant filing of a Notice of Project Change or revisions to the Scope for the FEIR.
Response	Comment noted.

Correspondence through Release of the Draft Report/DSEIS/EIR in 2008

U.S. Environmental Protection Agency, Region I – Letter to NAE – 23 May 2008	**Letter at Page A-3-1**
Comment EPA-01	EPA requested that the USACE consider means of ensuring air quality compliance other than construction shutdowns and to provide an analysis of tradeoffs and costs for shutdowns compared to securing credits or offsets.
Response	Please see general topic #9 above for a response to this comment.
Comment EPA-02	EPA recommended the establishment of two "advisory panels" of State and Federal stakeholders to address issues they believed were outstanding, including air quality compliance, rock reef creation impacts, and blasting impacts.
Response	As discussed in general topics #2, 3, 4, 8 and 9 above, the USACE and Massport have committed to continuing involvement of the Boston Harbor

	Dredging Technical Working Group (TWG) throughout the Design and Construction Phases of the project to solicit technical input to project design and adaptive management approaches during construction and post-construction monitoring. Sub-groups of the TWG will be convened as needed to address specific issues, including those mentioned by EPA.
Comment EPA-03	EPA applied its rating system for NEPA documents to the Draft SEIS. EPA rated the base plan for disposal of dredged material at the MBDS, and the use of non-rock material for capping the IWS as "Lack of Objections-Adequate." EPA rated the blasting of ledge from the navigation channels and beneficial use of blasted rock to creation hard bottom (rock reef) habitat as "Environmental Objections-Insufficient Information."
Response	All available information on these topics and plans has been included in the Draft and Final Feasibility Report and SEIS/EIR. Additional investigations required to completely evaluate these two aspects of the project will need to await the detailed Design Phase of the project. The USACE and Massport have committed to making these investigations and working with the TWG agencies to develop a blasting plan, construction sequencing plan, and full investigation and evaluation of the reef creation alternative and other beneficial use opportunities for the blasted rock. The USACE and Massport will develop and file additional NEPA/MEPA documents needed to document these investigations and detailed plans, and any resulting project changes. See general topics #1, 3, 4, and 5 above for a response to this comment.
Comment EPA-04	In its specific comments attachment, EPA discussed the potential impacts of blasting and called for development of a blasting plan to minimize impacts. EPA also requested the USACE examine whether or not realignment of the channels could reduce rock removal quantities.
Response	See general topic #3 above for the blasting plan discussion. The existing channels at Boston are the result of nearly 14 decades of channel improvements to deepen and widen the port's navigation arteries. The original controlling depth in the harbor in the 1860s was 17 feet at mean low water (MLW), and the first dredging project was to establish a 23-foot channel depth. Successive projects up to 2001 dredged and blasted these channels to the present 40-foot authorized depth, with rock often removed to a greater depth over most areas. Shifting the channel alignments would move the proposed dredging areas into shallower areas where ledge has not already been reduced to the 40-foot or greater depth, increasing blasting and dredging requirements. The Feasibility report examined the harbor's three entrance channels to determine which would require the least work to deepen to 45 feet or beyond and concluded that the 40-foot North Entrance Channel would require less blasting and dredging than either the 30-foot South Entrance Channel or the 27-foot Narrows Channel. No further investigation on this topic is planned.

Comment EPA-05	EPA requested that the USACE "commit to an extensive monitoring program spanning the entire project life cycle that will provide real-time information on the impacts of blasting", and that such a plan be developed in consultation with the TWG.
Response	See general topics #2 and 3 above for a response to this comment.
Comment EPA-06	EPA requested that the USACE "work to make sure that the public is kept fully informed of the blasting program and work group discussions as the project advances.
Response	See general topics #1, 2 and 3 above for a response to this comment.
Comment EPA-07	EPA stated that it "does not object to the disposal of project generated material at the MBDS."
Response	Noted
Comment EPA-08	EPA stated with respect to the industrial waste site that "the area is technically closed to fishing ..."
Response	It is the USACE understanding that this statement is incorrect; that neither NMFS or the NEFMC have "closed" the site to fishing.
Comment EPA-09	EPA raised concerns with the rock reef sites, their suitability for reef development, the substitution of soft bottom habitat for hard bottom habitat, and TWG involvement in further consideration of this alternative, and full investigation of this alternative before preparing a Final SEIS.
Response	Please see general topics #1, 2 and 4 above for a response to this comment.
Comment EPA-10	EPA requested that the USACE evaluate impacts of blasting on the acoustic monitoring system established with listening buoys in the shipping lanes. The system was established to provide ships transiting to and from the harbor with real time data on the location of whales, thereby reducing the potential for ship strikes. EPA also suggested consultation with NMFS on the potential for blasting impacts on whales, and inclusion of use of the acoustic monitoring system in contract documents.
Response	The USACE investigated the potential for noise from blasting activities in the harbor to impact whales in Massachusetts Bay and the listening buoys located in the separation zone of the Boston Harbor traffic lanes. A conservative calculation for the zone radii on the distance underwater noise would travel to create a nuisance for marine mammals was estimated to be approximately 1500 feet safety zone relative to the outermost area of blasting for the project in the Broad Sound North Entrance Channel. Based on distribution maps for whales in Massachusetts Bay, and the location of the listening buoys more than 10.5 miles from the seaward end of the harbor entrance channel, it was determined that the noise from blasting would not affect whales or the operation of the listening buoys. This has been coordinated with the National Marine Fisheries Service. The National Marine Fisheries Service has

	concurred with the USACE determination that the proposed Boston Harbor Deep Draft Navigation Improvement Project is not likely to adversely affect any listed species under their jurisdiction (See letters dated November 7, 2012 and November 27, 2012). The USACE will include a requirement in our contract specifications that Contractor(s) must monitor the results of the listening buoy acoustic data for the presence of whales in the project area and take the necessary precautions.
Comment EPA-11	EPA believes that the USACE and Massport should fund and carry out post-construction monitoring of any rock reef habitat creation site, and work with the TWG to "explore this issue".
Response	The DSEIS (page 2-25) states that such monitoring of recolonization rates would be important. The estimated cost for such a monitoring plan is included in the project cost estimates. See general topics #2 and 4 above for further response to this comment.
Comment EPA-12	DSEIS page 3-23: EPA staff has observed European oysters within Boston Harbor along the Winthrop and East Boston shorelines.
Response	Noted. We have included this information in the FSEIS/EIR.
Comment EPA-13	DSEIS page 3-83: The DSEIS notes that only transient marine mammals are found in Boston Harbor. EPA believes that harbor seals and harbor porpoise are regular seasonal visitors to the harbor. Harbor porpoise are routinely observed around the Charles River dam in the spring during anadromous fish inward migration. They have also been observed in Chelsea Creek. Harbor seals have been observed year round throughout the harbor.
Response	Noted. The USACE has included this information in the FSEIS/EIR.
Comment EPA-14	EPA requested information on the change in water intake (cooling, ballast) with larger ships compared to usage with current vessel sizes.
Response	The USACE discussed this question with COSCO and MSC, the two largest container shippers using the Port of Boston. Both shippers did not expect that ballast water requirements would increase at Boston with larger vessels. With the deepened channels, ships would be taking on more cargo, and would therefore require less ballast water than at present, even with larger vessels. MSC stated that larger vessels coming into service with newer engines have closed cooling systems. The first requirement for these vessels upon arrival at Boston, their first stop after crossing the Atlantic, would be to take on fresh water from the dock to fill their cooling system. Salt water intakes are on a separate loop that draws heat off the fresh water loop and return to the harbor. The closed system reduces intake requirements.
Comment EPA-15	EPA suggested that the USACE should look at the cumulative impact of additional barge traffic to the MBDS to the risk of ship strikes on whales.

Response	The USACE currently has a mechanism in place to reduce the risk of a vessel collision with whales (whale observers will be on board scows transiting to the MBDS between February 1 and May 31). In addition, the Contractor will be required to monitor the buoy listening system for whales in the area. No vessel collisions with whales have occurred since monitoring disposal at the MBDS.
Comment EPA-16	EPA stated that this project would cause a conversion of between 1100 to 1300 acres of soft-bottom habitat to hard substrate.
Response	The project's total dredging area would impact a total of about 1200 acres of the harbor bottom. Existing bottom classification data and subsurface data indicate that post-construction conditions would include more surface exposure of bedrock and blue clay than existing conditions. However only a portion of the 1200 acres would be different habitat than the existing bottom. Bottom type change maps were included in Appendix Q. These will be updated using information developed from the Design Phase subsurface explorations.
Comment EPA-17	EPA stated that the SEIS should "analyze the cumulative impact to benthic habitat from this project and the large number of other projected projects in the harbor."
Response	Section 4.5.3 of the Final SEIS/EIR describes the cumulative benthic habitat from the Boston Harbor navigation projects and disturbance from other projects.
Comment EPA-18	EPA stated that the USACE should satisfy the issue of general conformity before issuing the Final SEIS. We also note that in paragraph 2 of page 9 of EPA's letter they state: "Should the USACE adopt ... enforceable environmental commitments that insure the use of new equipment with more stringent EPA emissions standards, and enforceable dredging schedule, then general conformity would be satisfied by the action falling below emission thresholds."
Response	See general topics #1 and 9 above for a response to this comment. EPA's statement repeated above indicates that the plan for combining the use of new cleaner construction equipment and construction shutdown periods, would if enforced contractually, satisfy emissions requirements. While concurring with EPA's statement, the USACE and Massport have committed to investigating alternative means of air quality compliance during the Design Phase to determine the most cost effective means of meeting the requirements. Pending U.S. EPA regulatory changes will also have a potential effect on the reanalysis.
Comment EPA-19	EPA stated that the USACE focused more emphasis on efforts to avoid triggering offset requirements of general conformity, and should analyze the relative cost and benefits of avoidance against the impacts of stretching the construction schedule over more years.

Response	See general topic #9 above for a response to this comment. The USACE "goal" was to develop and present an implementable project. When commitments to availability of future credits proved unobtainable and offset opportunities for the construction period were not able to be identified at this time, the combination of shutdowns and use of cleaner equipment proved the only option which could be said with any certainty was available to meet the requirements. As stated above, the Corps and Massport have committed to investigating alternative means of USACE air quality compliance during the Design Phase to determine the most cost effective means of meeting the requirements.
Comment EPA-20	EPA notes that offsets for a time-limited project such as this construction may be supplied using time-limited discrete emission reduction credits.
Response	As noted in General Comment #9, the USACE will investigate the feasibility of purchasing emission credits (including time-limited discrete emission reduction credits) and/or offsets in the next Design Phase of the project. The USACE will discuss the use of time-limited discrete emission reduction credits for this project with EPA.
Comment EPA-21	EPA also suggests that construction operations that occur during the winter may avoid the ozone season and emissions outside the ozone season may be excludable from the conformity analysis.
Response	At this time the proposed construction period shutdowns would occur for a six month period every other year from 1 October to 31 March. This is to limit construction to nine months per year while limiting the impact of shutdowns to a single 6-month period spanning two calendar years, rather than two separate 3-month periods. Pollutants other than ozone are of concern and need to be avoided by the shutdowns. With demobilization-remobilization costs at about $4 to 6 million per event avoiding work during the summer ozone season would have significant additional costs. See general topic #9 above for additional information and response to this comment.
Comment EPA-22	EPA notes that the USACE base plan for air quality compliance includes a requirement for Contractor equipment to meet EPA's emission reduction standards. EPA asks that a Record of Decision on this project include an enforceable commitment to include this requirement in the project specifications.
Response	The USACE concurs with including this requirement in the project specifications should it be necessary to include such a requirement in the final project plan after conclusion of the air quality compliance review during the Design Phase. EPA is among the agencies requesting that the USACE conduct an evaluation of whether construction shutdowns are the best method of compliance compared to credits and offsets. As stated in general topic #9 above the USACE and Massport have committed to conducting such a review and involving EPA, the State and interested TWG members in that analysis.

Comment EPA-23	EPA states that the relevant non-attainment or maintenance plan "areas for the project are the Boston-Lawrence-Worcester (E. Mass), MA moderate eight-hour ozone non-attainment area and the Boston area carbon monoxide attainment area with an associated maintenance plan."
Response	The Final SEIS/EIR has been updated to reflect the latest regulatory designations.
Comment EPA-24	EPA requests that tables in the SEIS and Appendix O be revised to reflect recent changes in EPA ozone standards.
Response	Please see general response topic #9 above. The FSEIS/EIR has been updated as of December 2012 to address the regulatory issues raised in the comments. The Air Quality analysis will be re-examined following the Design Phase field investigations and development of a construction sequencing plan. The USACE and Massport will work with EPA, the State, and interested TWG participants with experience in Air Quality mitigation issues to develop an appropriate air quality compliance strategy, should one still be required. Changes in Federal and State standards and implementation plans will be incorporated into the revised analysis at that time.
Comment EPA-25	EPA requests that tables in the SEIS be revised to reflect changes in State Implementation Plans for ozone as recently submitted to EPA.
Response	Please see response to comment EPA-24 above.
Comment EPA-26	EPA notes that EPA's proposed revisions to the general conformity regulations may provide more flexibility and benefits to the project's air quality evaluation.
Response	The USACE notes that the FSEIS/EIR has been updated as of December 2012 to address regulatory concerns raised in the comment. We will include consideration of the revised regulations should they be in place at the time the Design Phase air quality conformance review is conducted.
Comment EPA-27	EPA requested that back-up data and calculations for the air quality analysis be provided to complete their review.
Response	The additional data and calculation files requested by EPA have been provided by the USACE to EPA separately.

National Marine Fisheries Service – Letter to NAE – 2 June 2008	**Letter at Page A-3-13**
Comment NMFS-01	The Service noted that while the EFH assessment contained in the DSEIS/ DEIR addresses many of the issues associated with the project, specific information described later in their letter, is necessary for the Service to evaluate anticipated impacts. Upon receipt of the additional information, the Service will provide appropriate specific EFH conservation recommendations.

Response	As requested, the USACE will provide the additional information when available and include that information, the Service's recommendations, and any further USACE response in an additional NEPA document covering the additional resource studies to be conducted in the Design Phase. EFH conservation recommendations were received in a letter dated November 26, 2012 and responded to in a letter dated December 10, 2012.
Comment NMFS-02	The Service noted that due to the low populations of alewife and blueback herring throughout the Commonwealth of Massachusetts, the MADMF has prohibited all harvest of these species. In addition, rainbow smelt has been identified as a "species of concern" by the Service
Response	Noted. The USACE has included this information in the FSEIS/EIR in Section 3.3.5.
Comment NMFS-03	The Service noted that the proposed dredging and the resulting suspended sediment and deposition may result in adverse effects to fishery resources and habitats. The Service also indicated that larval stages of winter flounder may be susceptible to impacts from suspended sediment due to abrasion.
Response	SSFATE modeling results indicate that very low sedimentation rates are expected to occur outside the navigation channels from dredging. These rates are not expected to be different than naturally occurring rates from weather, tidal conditions, and/or ship conditions. Monitoring of the plume from the Boston Harbor Inner Harbor Maintenance Dredging in 2008 confirmed earlier plume monitoring results that indicate the dredge plume does not travel outside the navigation channel to winter flounder spawning areas.
Comment NMFS-04	The Service remains concerned that dredging activities and associated plumes of contaminated sediment have the potential to impair migration of anadromous species.
Response	The parent material to be dredged is composed of Boston blue clay, glacial till and rock and is not contaminated. This material has been approved by EPA as suitable for ocean water disposal. In addition, previous monitoring for the BHNIP showed that the width of the plume generally stayed within 200 feet of either side of the dredge. As the harbor is approximately 2,000 feet wide at the narrowest point, the turbidity plume should not inhibit the movement of anadromous fish.
Comment NMFS-05	The Service noted that a laboratory study found that rainbow smelt avoided suspended sediment when concentrations were in excess of 20 mg/l.
Response	Previous monitoring for the BHNIP showed that the width of the plume generally stayed within 200 feet of either side of the dredge and was difficult to discern beyond the edge of the plume. As the harbor is approximately 2,000 feet wide at the narrowest point, the turbidity plume should not inhibit the movement of anadromous fish.

Comment NMFS-06	The Service suggested that results of the real-time dredge plume tracking effort to be undertaken during the Inner Harbor maintenance project in 2008 be used in part to develop a dredging sequencing plan.
Response	The USACE agrees and intends to work with the TWG agencies to develop a construction sequencing plan for the project, including blasting and dredging. The sequencing plan, other detailed project plans developed during the Design Phase, and the results of the investigations used to develop those plans will be included in supplemental NEPA/MEPA document filings. See general topic #7 above for additional information and response to this comment.
Comment NMFS-07	The Service requested that an analysis of blasting impacts be incorporated into the EFH assessment and that a blasting plan be developed. Information needed to respond to this comment and to develop a blasting plan for the project will not be available until the Design Phase of the project has advanced to completion of the subsurface field effort.
Response	See general topics #2 and 3 above for additional information and response to this comment.
Comment NMFS-08	The Service requested that an After Action plan being developed to discuss the four fish kill events during the ledge pinnacle removal project in 2007 be incorporated into the recommended blasting plan. The Service also Discussed the TWG subgroup established to examine underwater blasting and that this group be engaged in development and approval of the blasting plan.
Response	The USACE concurs in these recommendations as further discussed in general topics #2 and 3 above. The After Action Report on the 2007 blasting operation and fish kill events is included in this Final SEIS/EIR.
Comment NMFS-09	The Service stated that as Massport recently indicated that the Marine Terminal could be used as a transfer facility, that upland alternatives for disposal of the rock should be explored more fully.
Response	The USACE and Massport have recently had additional discussions with MACZM. Please see general topic response #5.
Comment NMFS-10	The Service requested that the FSEIS/FEIR consider the loss of soft bottom habitats as result of the creation of artificial reefs relative to the overall ecosystem functions and values.
Response	Demersal species such as American plaice, Atlantic halibut, summer flounder, winter flounder, windowpane flounder, witch flounder, red and white hake, and yellowtail flounder may be present in the finer sediments at the proposed enhancement sites. The placement of a rock reef in the fine sediment areas of the proposed enhancement sites would displace some of these EFH listed species, but not all. Some EFH species such as juvenile and adult American plaice, juvenile Atlantic halibut, and adult winter flounder may also continue to use the rock reef as habitat. This information will also be added to the Final SEIS. This also will be considered as the USACE and Massport work with the

	TWG to further assess the potential creation of rock reef sites are discussed in general topic response #4.
Comment NMFS-11	The Service stated that the results of the capping demonstration effort should be presented to the Federal and State resource agencies in order to determine if this method is acceptable for use for the IWS capping project.
Response	Please see general topic response #6. The USACE and EPA reviewed the results of the capping demonstration with the TWG.
Comment NMFS-12	The Service will provide specific EFH conservation recommendations, as appropriate upon receipt of the following information: 1) a sequencing plan, 2) a comprehensive blasting plan, 3) an alternative beneficial reuse options alternatives discussion, and 4) results of the upcoming capping demonstration project at the MBDS.
Response	The USACE will provide the requested information to the Service and will publish the results of the Design Phase investigations in supplemental NEPA documents. This is further discussed in general topics #3, 5, 6, and 7. EFH conservation recommendations were provided in a letter dated November 26, 2012 and responded to in a letter dated December 10, 2012.
Comment NMFS-13	The Service notes that on occasion Federally endangered whales may enter Boston Harbor
Response	No blasting will occur in Boston Harbor if marine mammals are present in the area. Appropriate actions will be taken if the presence of the dredge and barge operation would interfere with the movement of any whale observed in the project area.
Comment NMFS-14	The Service requested that the USACE reinitiate Section 7 Endangered Species Consultation because the currently proposed blasting operation was not considered.
Response	Section 7 Consultation with the Service was reinitiated to address the effects of blasting on Federally listed whales, sea turtles and Atlantic sturgeon, and NMFS has concurred with USACE' determination that the proposed blasting is not likely to adversely affect any NMFS listed species (See letters dated November 7, 2012, and November 27, 2012).
Comment NMFS-15	The Service requests that additional information on the underwater noise resulting from blasting as well as information on project timing, sequencing, and monitoring be included in correspondence with the Service for listed species.
Response	The USACE has investigated the potential for noise from blasting activities in the harbor to impact whales in Massachusetts Bay and is coordinating this information with NMFS. That information will be included in the FEIS. The USACE will also provide the remaining information requested by the Service. Additional information on the effects of blasting on whales, sea turtles and Atlantic sturgeon has been added to the FSEIS/EIR.

U.S. Fish and Wildlife Service – ESA Letter to NAE – 14 May 2008	**Letter at Page A-3-22**
Comment F&WS-01	In its letter of 14 May 2008 the U.S. Fish and Wildlife Service provided its final comments under Section 7 of the Endangered Species Act and stated that "no Federally-listed or proposed threatened or endangered species or critical habitat under the Service's jurisdiction are known to occur in the project area."
Response	Noted

U.S. Department of the Interior, Office of Environmental Policy and Compliance, Boston, MA – Letter to NAE – 2 June 2008	**Letter at Page A-3-24**
Comment DOI-01	The DOI stated that indirect impacts of dredging on intertidal habitat were not fully addressed, "such as altered wave energy or sediment transfer dynamics due to increases shipping traffic with larger vessels." DOI also stated that they were concerned with direct and indirect effects of the project on maritime cliff and beach communities from changes in "erosion rates and patterns in the harbor."
Response	The navigation improvement project proposes to deepen the existing 40-foot deep navigation channels to 48 feet (50 feet in the case of the entrance channel). These channels are already periodically dredged for maintenance purposes every 16 to 40 years. The shoaling rates in Boston's channels are very low leading to the conclusion that their presence, maintenance and the deepening under this project will have no effect on wave energy reaching the shores of the harbor islands, most of which are directly exposed to the open Atlantic. There is a significant distance between nearly all of the harbor islands and the channels to be dredged. The closest of the harbor islands to the dredged channels, Lovells, Gallops, and the Nixes Mate shoal are located in areas where the channel will not require dredging to deepen it as natural scouring of the bottom by tidal currents provides depths of 50 to 90 feet. The northern end of Long Island at the former Fort Strong was armored by previous projects, and some ledge removal is required along the channel margin closest to this headland. However no impacts are anticipated given the hard nature of the material at that location. Shipping is not expected to increase with the recommended improvements. In fact the number of ships transiting the harbor is expected to decrease, primarily due to conversion of the petroleum tankships and cement carriers to less frequent calls by larger vessels. The base economic case for containership traffic increases vessel size, but only for the four weekly services now calling on the port. Other economic scenarios projected the addition of a single weekly service for a total of five container ship calls weekly. No increase in vessel-related erosion is anticipated at the harbor islands.

Comment DOI-02	DOI stated that excessive noise and light would affect park visitor experience and degrade park habitat.
Response	The dredge plant activities will be minor sources of noise and light compared to the other activities of the Port, airport and City. Lovells and Gallops Islands are located more than ¾ of a mile from the nearest dredging areas. Submarine blasting will not result in surface noise and will only occur in daylight. Lighting on dredge equipment working at night will be insignificant compared to lights from the airport, seaport or the MWRA sewage treatment plant (STP) on Deer Island.
Comment DOI-03	DOI stated that dredging activities would likely impact the viewshed of the park.
Response	Dredging plant vessels would be insignificant objects compared to the 1000+-foot long tankships and containerships transiting the channel several times a day and using the anchorage. The port, airport and STP are far larger objects than a 100-foot long dredge barge ¾ of a mile to several miles distant. The dredge and drilling plants will move over the entire project area of more than 10 miles of channel. The floating plant would only be in any particular channel reach for several months before moving on to the next area of the project.
Comment DOI-04	DOI stated that island archaeological sites are subject to indirect impacts of the project's influence on erosion rates and patterns in the harbor. DOI also stated that historic structures on the harbor islands may be sensitive to impacts from dredging and increased ship traffic.
Response	See response to DOI-1 above. The USACE is aware of the seawalls at Fort Warren on Georges Island; in fact the USACE built the seawalls at Fort Warren, Lovells, Long and Gallops Islands and most of the other armored headlands and islands around the harbor as "works of preservation" as part of the Boston Harbor Federal Navigation Project in the early to mid 1800s, with modifications made during construction of the various coast defenses. Fort Warren is located more than 1.4 nautical miles from the nearest dredging location along a channel (The Narrows Channel) that is not proposed for dredging under this project. Therefore, the proposed project is not expected to have an impact on the historic structures on the harbor islands.
Comment DOI-05	DOI asked what volumes/rates of suspended sediment would not be contained during dredging operations, and what "trajectories" these suspended sediments might take.
Response	Refer to Section 4.2.1 in the SEIS for this information.
Comment DOI-06	DOI asked about the results of chemistry performed on samples.
Response	The materials to be removed by the navigation improvement project to deepen the harbor are parent materials of largely glacial origin. These materials were sampled by coring, and physical tests were conducted that determined them to

	be glacial till, Boston blue clay, sand and gravel. These materials were excluded from further chemical testing due to their non-industrial origin. The fine blue clay is very cohesive and contains no contaminants. There will be no contaminants released from the dredging and disposal of these materials. This improvement dredging material has been approved by EPA for ocean water disposal at the MBDS.
Comment DOI-07	DOI asked "what is meant in the report by sediment disposal will not disrupt navigation."
Response	Disposal at the MBDS will occur in areas removed some distance from the shipping lanes in areas of about 300 feet of water. The MBDS is located approximately 20 miles east of Boston and is not located within any Federal navigation channels. MBDS is an active EPA-approved dredged material disposal site and is marked on navigation charts. Therefore there will be no impact on shipping from either disposal activities or the disposal mounds formed on the ocean floor.
Comment DOI-08	Feasibility report discussion on sediment characteristics and quality should be more "clear and meaningful."
Response	Comment Noted
Comment DOI-09	Appendix K, Sediment Sampling, presents a data compilation with no discussion or synthesis of results.
Response	Comment Noted. Appendix K is intended only to present test results.
Comment DOI-10	Appendix J, Geology, should be revised to state that the lower till may be Wisconsonian or pre-Wisconsonian while the younger till is not post-Wisconsonian
Response	Comment Noted
Comment DOI-11	NEPA requires an analysis of deepening all New England ports, as other ports may seek deepening if Boston is deepened. Deepening other New England Ports should be considered as alternatives to Boston Harbor or in addition to Boston Harbor deepening.
Response	A detailed discussion on the non-structural alternatives and why these alternatives do not meet the project purpose is available in the Feasibility Report. The Feasibility Report was attached to the Draft SEIS/EIR and circulated to the public for review. There are no proposals currently to deepen either of New England's two other 40-foot ports, as was discussed in the Feasibility Report section on alternative ports. The only two other 40-foot ports in New England are New London CT and Providence RI. New London was deepened to 40 feet solely for the Navy's use and neither the Navy nor the other deep draft users have any need to deepen that harbor further. There are no container terminals or large petroleum

	terminals at New London, nor any sites available for development of such facilities. Providence recently underwent a major maintenance dredging operation, its first dredging project since 1970. CAD Cells were constructed beneath the upper harbor basin at elevations that will limit future deepening as no need for future port deepening was anticipated by the State of Rhode Island.
Comment DOI-12	Completion of maintenance dredging will "reset the colonization clock" in 2009. Resources in the harbor and at the disposal sites may change before the deepening project is authorized and constructed, a process which could take a decade or longer. DOI recommends that the Feasibility Report and SEIS include a "look back" requirement to review the impacted resources in coordination with other agencies.
Response	Please see general topics #1, 2 and 8 above for additional information and response to this comment. The USACE cannot predict in what timeframe Congress may act on any recommendation to deepen Boston Harbor. There near-term timeline is for construction to begin in late 2014 and take up to three years to complete.
Comment DOI-13	DOI requests that additional hydrographic surveys be conducted of the channels to be dredged and expanded out 1000 feet from the channel limits to monitor adjacent areas to determine if erosion or accretion results from deepening the channels. These expanded surveys should be conducted pre and post-dredging, one-year post-dredging and then every three years for an additional nine years. Data should be evaluated against the pre- and immediate post-dredging baselines.
Response	The USACE will conduct additional hydrographic surveys during the Design Phase, immediately before dredging commences on each channel segment and after dredging of each segment is complete. For channels of this depth and width surveys are typically extended about 200 feet outward from the side slopes of the channels to examine slope stability and ensure adequate coverage. Boston Harbor's navigation channels shoal very slowly, requiring maintenance dredging every 16 to 40 years, with the entrance and Main Ship Channels having the longest maintenance cycle, and the inner channels in the Mystic and Chelsea Rivers having the shortest. The dredging and maintenance of the channels have had no discernible effect on the elevations of surrounding sub-tidal flats as these areas do not produce shoal materials for the channels at any significant rate. The USACE sees no need to expand the typical survey limits further unless any channel segment were to exhibit shoaling. In that case the limit of the next survey would be expanded in the likely source direction. However, without a demonstrated need, the survey cost and limits would be held to the area of the channel, its side slopes and immediate area as at present. Similarly, post-construction surveys would not be conducted outside of the typical condition survey cycle presently followed for the various channels.

	Harbor pilots, the USCG and other port users keep a close eye on depth conditions in the channels and advise the USACE of any problems. The USACE performs additional surveys when these parties report any reduction in controlling depth. If shoaling is found sooner than expected, then it would make some sense to investigate the potential sources more distant from the channel. In the absence of any such shoaling, the USACE sees no need to increase the frequency of post-dredging condition surveys.
Comment DOI-14	USGS states that the reference provided for its data is no longer current.
Response	Noted. The web link reference has been updated.

Massachusetts Executive Office of Energy and Environmental Affairs – Certificate of the Secretary on the Draft SEIS/EIR – 13 June 2008	**Letter at Page A-3-29**
Comment EOEEA-01	The Certificate on page 2 states that the TWG "will develop conditions for the Water Quality Certification, evaluate disposal alternatives and modify construction and monitoring techniques as necessary to ensure adequate environmental protection."
Response	This seems to misrepresent the role of the Technical Working Group. As stated in general topic response #2, the USACE [and Massport] will continue to involve the TWG in the scoping of Design Phase studies, evaluation of study results, development of monitoring plans, development of the blasting and construction sequencing plans, and adaptive management of environmental protection measures employed during construction. However, it is the USACE, and not the TWG that will develop and propose these plans. The USACE will frequently seek and rely on the technical expertise of the members of the TWG in developing its plans, and provide the TWG members with opportunity to review and comment on all scopes and Design Phase studies and plans. The USACE will apprise the TWG of any developments in project impacts during construction and will seek the TWG input to solving any situations that may develop. If a Water Quality Certificate is required for the project (see below), our understanding is that development of conditions is the responsibility of MA DEP, although they would likely solicit input from the TWG as well as the USACE and Massport on appropriate conditions.
Comment EOEEA-02	The Certificate on page 3 states that the project requires a 401 Water Quality Certification and it may require an 8(m) permit from the Mass Water Resources Authority.
Response	The USACE will seek a Water Quality Certification from the State only if disposal or other placement of dredged materials occurs in State waters. A WQC will not be sought for dredging activities, which are characterized as deminimis discharges under the Clean Water Act, or for placement of dredged

	material seaward of the territorial sea in Federal Waters where the Marine Protection Research and Sanctuaries Act is the regulatory authority and not the Clean Water Act. The project's non-Federal sponsor, Massachusetts Port Authority, is responsible for the acquisition of the MWRA 8(m) permit if needed. Massport is aware of the requirement and will coordinate with MWRA on its acquisition. See response to comment MWRA-08.
Comment EOEEA-03	The Certificate on page 4 states that "because the proponent [Massport] is a state agency and, under a cost sharing agreement is responsible for providing a significant percentage of the project costs, MEPA jurisdiction extends to all aspects of the project that may cause significant Damage to the Environment including air quality, water quality, threatened and endangered species, marine habitat, fisheries and historic and archaeological resources.
Response	Comment acknowledged
Comment EOEEA-04	The Certificate on page 4 states that the several prior dredging projects at Boston required removal of only a small amount of rock compared to the proposed project, and the volume of parent material is 3 to 6 times greater than that for the last improvement project. Due to the fish kills during blasting with the current maintenance project the large volume associated with this improvement project is a significant concern.
Response	The USACE and Massport share the Secretary's concern. The After Action Report on the 2007 blasting operation and fish kill events has been included in the Final SEIS/EIR (see Appendix Y). Blasting and construction sequencing plans and monitoring programs will be developed with input from the TWG agencies as described in general topic responses #3, 7 and 8. These plans will be published in supplemental NEPA/MEPA documents during the Design Phase of the project. It should be noted that during the most recent blasting in September of 2012, there were no apparent fish kills. In addition, lessons learned from the previous blasting in Boston Harbor will be incorporated, where appropriate into the blasting mitigation measures. Some of these lessons include the development or a communication plan between the fish observer and the contractor, and that the fish startle system will be deployed on an alternate vessel instead of the blast barge to facilitate longer effectiveness.
Comment EOEEA-05	The Certificate noted that the evaluation of beneficial reuse of the rock was not thorough and should be re-evaluated.
Response	Additional beneficial uses for the blasted rock will be investigated during the next Design Phase of the project. Please see general topic response #4.
Comment EOEEA-06	The Certificates states on page 6 that the Final EIR should address whether any of the material would be appropriate for beach nourishment at Winthrop Beach.

Response	The Federal project base plan is to dispose of the material at the MBDS. As has been stated in general topic response #4, the USACE and Massport are willing to work with the State and others during the Design Phase to determine if other practicable beneficial use options for the rock exist. However, whether or not any of the dredged materials to be generated by the navigation project are suitable for use on any other project must be determined by the proponent of such project(s). The Corps will better define, through surveys and subsurface explorations, the quantities, locations, and physical nature of the material to be removed for channel deepening. That information will be shared with all interested parties. The responsibility for further investigation, testing, design and regulatory approvals for any project or party desiring to take the materials generating by dredging rests with those parties. The Federal project will not bear those costs or conduct those evaluations. During construction, any additional costs associated with rehandling, processing or transporting materials for use on other projects, such as Winthrop Beach, would need to be funded by non-Federal parties and would not be a cost to the Federal Navigation Project.
Comment EOEEA-07	If the artificial reef is intended to serve as a major mitigation commitment, then close consultation with the state and federal agencies…is needed to identify a site and develop a design that meet the project objectives.
Response	For clarification purposes, at this time the artificial rock reef would be developed as a beneficial use, not as mitigation. We have not identified any significant adverse environmental impacts from the navigation dredging that in our view would require compensatory mitigation. The Federal base plan is to dispose of the rock at the MBDS if a practicable beneficial use can not be identified. See response to General Topic Response #4 regarding our commitment to working with the State and Federal agencies on identifying appropriate site(s), design, placement methodology, and monitoring for the rock reef.
Comment EOEEA-08	The Draft SEIS/EIR generally characterizes impacts as insignificant and/or temporary in nature, even though the dredging project will convert more than 1,100 acres of soft bottom to hard bottom.
Response	Table 4-1 in the DSEIS/EIR states that between 186 and 518 acres of soft bottom would be used for the rock reef, not 1,100 acres. In addition, Table 2-5 in the DSEIS/EIR states that the habitat enhancement sites would create a permanent (not temporary) change from soft bottom to mixed hard bottom habitat. In the dredged areas, the Feasibility Report states that 1205 acres of bottom habitat would be impacted through dredging, including side slopes and about 20 acres of previously undredged areas where the channels and turning basin require widening. Many areas will have the same post-construction bottom type as before dredging, however there will be a variety of pre-dredge v. post-dredge changes in bottom type over the project. In general, the deeper the channels are dredged, the more hard-bottom materials will be exposed, such as

	till and rock. Appendix Q to the Draft report contains maps of the existing and post-construction bottom types (for a 45 and 48-foot channel depth). These maps and the areas of various bottom types existing and with the project will be refined once the Design Phase field exploration programs have been completed.
Comment EOEEA-09	The Draft SEIS/EIR does not provide the "After Action Report" or identify revisions to protocols or mitigation. …the DSEIS/EIR does not provide a sequencing schedule to minimize fish impacts.
Response	The "After Action Report" has now been completed and is included as Appendix Y to the Final SEIS/EIR. The "After Action Report" provides a base from which to develop the Blasting Plan for the Deep Draft Project. The Blasting Plan would also inform the development of the larger construction sequencing plan. See General Topic #3 for additional discussion on the Blasting Plan.
Comment EOEEA-10	The Draft SEISIEIR indicates that, development of more detailed data, including more extensive borings to characterize the type and quantities of rock to be removed, will not be conducted until the final Design Phase.
Response	This is correct. Please see general topic response #3 for development of the blasting plan during the Design Phase.
Comment EOEEA-11	EOEEA notes that comments from MA DEP and US EPA state that credits should be pursued as a means of air quality compliance and if not that any construction shutdowns be targeted to summer.
Response	Please see general topic response #9 for information on Design Phase air quality compliance investigations. Currently, construction shutdowns are targeted to the winter months so that a single extended shutdown (with its $4 to $6 million demobilization-remobilization costs) would suffice for two calendar years' emission reduction requirements.
Comment EOEEA-12	Cultural resource investigations to be continued – Page 9 EOEEA notes that the SEIS indicates that borings and remote sensing surveys should be conducted for the widening of the Chelsea River Channel to assess the presence of cultural resources, and that the Draft EISIEIR indicates that the USACE will continue consultation with the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (BUAR).
Response	These statements are correct. The MHC and BUAR have both concurred in the determination of no cultural resource impacts from work in the lower and outer harbor. The USACE has agreed to develop a scope of work for areas of Chelsea River that may not yet have been fully investigated, and to conduct those surveys during the Design Phase. Disposal of dredged material at the IWS and/or creation of beneficial use sites may require additional surveys and evaluation as well as coordination with MHC and BUAR.

Comment EOEEA-13	Review of the Draft SEIS/EIR, review of comment letters and consultation with state agencies indicate support for the proposed project. Although additional review of alternatives is not warranted, there are significant outstanding issues that must be resolved regarding development of measures to avoid, minimize and mitigate project impacts.
Response	We concur with this statement and will work with the agencies during the Design Phase to adequately investigate and address the remaining issues.
Comment EOEEA-14	The EOEEA notes that in the event that the Final EIS does not fully address the remaining issues, EPA has noted that an additional NEPA process may be necessary to engage the agencies and public on supplemental information during the Design Phase of the project. EOEEA also notes that State MEPA regulations allow the filing of a Notice of Project Change (NPC) subsequent to the review of the Final EIR that can be used to provide public review of significant changes to the project and/or development of additional information/analysis.
Response	This is the overall plan that the USACE and Massport have presented in the Draft and Final Feasibility Report and SEIS/EIR. The Design Phase commitments are spelled out in the several general topic comments, and in other commitments made in these responses.
Comment EOEEA-15	EOEEA state that a Water Quality Certificate, issued by MA DEP, will be the vehicle for establishing enforceable mitigation commitments, that adequate resource characterization and mitigation commitments will be necessary for CZM to issue Consistency, and that the Final EIR should provide information on 401 WQC standards and demonstrate project consistency with these requirements. EOEEA states that provision of adequate resource characterization and mitigation will balance the need for more conservative mitigation approaches such as strict dredging windows.
Response	The USACE agrees that best management practices should be employed to the extent practicable to limit impacts, whether significant or not. Given current project status we do not at this time believe that there are any adverse resource impacts from this project of such significance as to require compensatory mitigation. As stated in general topic response #7 and #8 we will conduct additional resource characterization investigations in the Design Phase in consultation with the TWG and will develop a construction sequencing plan to best avoid impacts to identified resources in different areas of the harbor and different times of the year. CZM consistency concurrence was issued on November 29, 2012. A Water Quality Certificate would only be needed if disposal of unsuitable maintenance material into the Main Ship Channel CAD cell or for creation of rock reef (State waters) is needed.
Comment EOEEA-16	EOEEA notes that the Final EIR must provide more information on sequencing including the location, timing and methods of proposed blasting and anticipated impacts on marine resources. The Final EIR should further illustrate how much hard bottom is impacted, how much will be converted to

	other habitat and how much may be created within the project site. In addition, a pre- and post-monitoring plan must be developed for the project as a whole, including the artificial reef if that remains as a project component
Response	Please see general topic responses #3, #4, #6, #7 and #8 above.
Comment EOEEA-17	The Final EIR should identify total impacts (permanent and temporary) to Land Under the Ocean. It should include a timeline and plans that clearly illustrate where and when the BHNIP, IHMDP, OHMDP and the BHDDNIP overlap. It should provide a plan that clearly delineates areas that BHDDNIP will alter that have not been disturbed by the BHNIP, IHMDP and OHMDP. The Final EIR should include maps that clearly delineate resource areas including eelgrass beds and shellfish habitat.
Response	As stated in response to comment EOEEA #08 above, the Design Phase subsurface investigations will result in updating the survey and bottom classification maps already included in the Draft Report. The timeline and work conducted for the BHNIP have been described in detail in the Phase II report prepared by ENSR at the conclusion of that project. There will be no timeline overlap between the other projects and the Deep Draft Improvement Project. Shellfish beds in proximity to the navigation project are mapped. All eelgrass beds are greater than 1,000 feet from the project sites. Maps showing the Deep Draft Project relative to the existing project areas will be prepared.
Comment EOEEA-18	EOEEA stated that the Final EIR should assess noise impacts associated with the blasting, in particular, for blasting associated with the Mystic River and Chelsea River.
Response	There is no blasting in the Mystic River. Blasting in the Chelsea River will be limited to a small are of ledge requiring less than 2000 CY of rock removal in the area adjacent to the petroleum terminals at the upstream turning basin in Revere. Submarine blasting generates only negligible surface noise due to charge size, the significant depth of water (>40 feet) at low tide, and measures taken to reduce shock waves. Noise has not been and will not be a factor with submarine blasting for this project.
Comment EOEEA-19	Monitoring plan & Resource characterization – page 11
Response	Please see general topic response #8 above.
Comment EOEEA-20	The total amount of conversion of soft-bottom habitat to hard substrate should be identified and conversion should be identified on project plans.
Response	Please see response to comment EEOEA #08 above.
Comment EOEEA-21	EOEEA stated that MA DMF noted concern with softshell clam habitat that will be impacted by dredging in the Chelsea River, including permanent loss through habitat conversion. The Final EIR should include a clear delineation of the shellfish habitat potentially impacted by dredging and assess the functional loss to other species.

Response	The DSEIS/EIR noted that softshell clam habitat is present along the banks of the Chelsea River. The population was determined to be negligible as softshell clam was noted in only one grab sample collected in the area of this identified habitat. Also see response to EOEEA #17 above.
Comment EOEEA-22	EOEEA states that the Final EIR should identify any elements of the project that are located within the Cod Conservation Zone.
Response	Portions of the project occur within the Cod Conservation Zone. Fisheries and cod are discussed in the FEIS/EIR at Section 3.3.5, 4.2, and 5.3. The Cod Conservation Zone was designated to shut down fishing for cod in specified areas of Massachusetts Bay during winter months to protect aggregations of cod engaged in spawning, and as currently envisioned the project will not be active during some winter months due to Clean Air Act conformity issues and winter weather safety restriction on rock removal and dredging activities in the entrance channels. Due to this timing of the shutdowns, it is not expected that aggregations of spawning cod will be impacted. Moreover, as discussed in Section 5.3 of the FEIS/EIR, cod are not expected to be found in the dredging areas. To the extent that the winter shutdown schedule changes or that aggregating cod are expected to be found in the project area, and are expected to be affected by dredging operations, this can be taken into account in determining how the project is sequenced, as we do for other species.
Comment EOEEA-23	EOEEA stated that the sequencing plan should include a plan for sequencing the most disruptive and potentially damaging aspects of the project (e.g. blasting) to avoid sensitive locations during critical times of the year.
Response	Please see general topic response #7 above. The blasting mitigation measures will be used in part to inform the larger sequencing plan for the project to avoid and minimize significant impacts to critical resources while permitting the project to proceed.
Comment EOEEA-24	EOEEA stated that a minimum of one year of biological surveys of fisheries resources and habitat should be completed to support a rational sequencing plan, and that DEP and DMF should be consulted to determine what data is necessary to support sequencing and monitoring. EOEEA also stated that the plan should consider timing of disposal to dredge contaminated material early phases so that it can be capped with clean material dredged in subsequent phases.
Response	See response to General Topics #7 and #8. The USACE and Massport anticipate including DEP and DMF, and the TWG for consultation during the Design Phase on the data needed to support sequencing and monitoring. There is no "contaminated material" associated with the navigation improvement project. All harbor maintenance dredging will have been completed before the improvement project commences and the harbor's channels have very low shoaling rates. All improvement material has been approved by EPA for disposal at the MBDS.

Comment EOEEA-25	Communicate with lobstermen – page 12 The proponent should establish plans for communication with the fishing and lobstering communities regarding construction activities and timing to avoid impacts and conflicts
Response	As with the recently completed and currently ongoing navigation projects in Boston Harbor, the USACE will provide, through its contractors, a public notice informing the fishing and shellfishing communities of the location and timing of dredging.
Comment EOEEA-26	EOEEA noted that the blasting plan should consider avoidance measures (shifting channel limits, and rock removal by bucket ripping rather than blasting), and should consider sequencing and time of year restrictions, and technological approaches including use of additional acoustic fish exclusion devices and consideration of bubble curtains.
Response	Please see rock removal including blasting mitigation measures and the later construction sequencing plan.
Comment EOEEA-27	EOEEA noted that EPA stated that the Final EIR should evaluate the potential for impacts of blasting on the recently installed buoy listening and monitoring system
Response	The FEIS/EIR addresses this issue and concludes that the blasting will have no impact on the buoy listening system. The nearest buoy is more than 10.5 miles from Finns Ledge at the outer end of the entrance channel – the seaward-most location of blasting. See Section 4.2.5 of the Final SEIS/EIR.
Comment EOEEA-28	EOEEA notes a need to re-assess beneficial uses for the rock material, and to reconsider upland disposal options as a first priority and creation of the proposed reef as a secondary consideration, in addition to consulting with MA CZM regarding an upland disposal alternative it is pursuing.
Response	The USACE and Massport agree. See general topic response #5 above.
Comment EOEEA-29	EOEEA states that the artificial reef alternative should require continued consultation with the TWG to develop better alternatives for providing fish habitat, and that further planning for the reef include defining the loss of soft bottom habitat and related impacts, and include a monitoring program to document colonization rates and other indicators of habitat creation.
Response	The USACE and Massport agree to conduct such investigations during the Design Phase of the project. See general topic response #4 above.
Comment EOEEA-30	EOEEA notes that US EPA and MA CZM support use of parent material to cap the IWS in Massachusetts Bay, and states that the results of the preliminary capping demonstration should be reviewed by the TWG and included in the Final EIR.
Response	Please see general topic response #6 above. The capping demonstration results were favorable and are currently in report preparation. The report will

	be reviewed with the TWG and serve as a basis for designing the capping project for the IWS if a decision is made to proceed.
Comment EOEEA-31	EOEEA states that the Final EIR should address whether any of the material that will be dredged is appropriate for placement on Winthrop Beach for its beach nourishment program, and should assess the compatibility of material with Winthrop Beach using the additional geotechnical investigations that will be conducted, and should consult with the DCR and the Town of Winthrop.
Response	Please see the response to comment EOEEA #06 above on this topic. The USACE will make the results of its Design Phase investigations of dredged material types, quantities and locations available to all interested parties for their consideration of uses for that material and will work with any party expressing an interest in taking such material.
Comment EOEEA-32	EOEEA states that the TWG should participate in the development of the Final EIR, the Design Phase, and development of monitoring and mitigation requirements. EOEEA also states that the TWG should be convened during construction to assess the success of control measures and review project progress.
Response	Please see general topic response #2 above.
Comment EOEEA-33	EOEEA notes that MA CZM suggested that the project employ a third-party contractor as an independent facilitator for the TWG to manage "unforeseen developments as they arise during the construction phase of the project," and to coordinate with the independent fisheries observer during dredging operations to provide a rapid, coordinated response from agency and community representatives.
Response	The USACE and Massport agree that the independent observer played a beneficial role in the BHNIP (1998-2001). However, the need for an independent observer for the Deep Draft Project is not evident at this point.
Comment EOEEA-34	EOEEA noted that MA DEP and US EPA requested that additional air quality mitigation strategies be explored, including the use of emission reduction credits to offset project related emissions. EOEEA also urged a project commitment to the purchase of emission reduction credits.
Response	See general topic response #9. No actual purchase commitment can be made until Congress authorizes and funds the project.
Comment EOEEA-35	EOEEA states that the MHC indicates that it anticipates continued consultation with ACOE regarding the methodology and results of its cultural resource surveys (for the Chelsea River), and that the MA BUAR indicates that it has been satisfied with findings and recommendations of archaeological surveys conducted to date and concurs with the recommendation that a remote sensing archaeological survey should be conducted for the areas of potential affect in the Mystic River and Chelsea River channels.

Response	See response to comment EOEEA #12 above. In its 4 December 2012 letter to BUAR, the USACE stated that the plan of improvement includes deepening an area of the existing 35-foot Mystic River Channel to 40 feet. This area accesses Massport's Medford Street Terminal in Charlestown. Massport has already deepened its berth at this terminal to 40 feet. As this area was deepened in the past to reach the current 35-foot depth and sampling shows the improvement material to be Boston blue clay, no plans for further investigations are necessary.
Comment EOEEA-36	EOEEA repeats a statement from the MWRA that the proposed limit of the project may deepen the Reserved Channel at or deeper than the current location of the NSTAR cable supplying Deer Island.
Response	Based on the best information currently available, dredging to 47 feet, with 2 feet of overdepth allowance and 2 feet additional required removal in rock areas would not reach the MWRA cable. Because this work would be sufficiently close to the cable, however, NSTAR has developed a proposed protection scheme that, assuming its feasibility, would allow the Improvement Project to move forward without requiring the much more expensive option of removing and reinstalling the cable. NSTAR has already conducted field data collection to refine the corrective plan, and reported those results to the USACE. The USACE has requested some additional studies and information, and NSTAR is in the process of addressing that request. The USACE anticipates entering into an Agreement with NSTAR and MWRA that will specify timelines and requirements for NSTAR to implement its cable protection scheme.
Comment EOEEA-37	EOEEA notes the MWRA comments that work in Chelsea River be carefully coordinated with the MWRA to avoid impacts to its 36" water main and three wastewater crossings, and that an 8(m) permit may be required.
Response	Massport will coordinate the need for any 8(m) permits with the MWRA. Correspondence from the MWRA indicates the Chelsea utilities are of sufficient depth (50 feet) that they will not be impacted by the proposed deepening of Chelsea River to 40 feet.
Comment EOEEA-38	The FEIR should include an updated mitigation section and draft Section 61 Findings for the 401 WQC.
Response	The mitigation section of the Final SEIS/EIR has been updated. A draft Section 61 Findings is included in the Final SEIS/EIR.
Comment EOEEA-39	Indicate whether compensatory mitigation plans will be developed for direct and indirect mortality of fisheries resources, delayed recovery of habitat and areas of habitat that are permanently lost or altered.
Response	Upon completion of the additional resource characterization to be conducted during the Design Phase, the USACE and Massport will work with the TWG agencies to develop blasting mitigation measures and sequencing plans, best management practices, beneficial use plans, and adaptive management

	procedures that would avoid or minimize significant adverse impacts to the maximum extent practicable. If the habitat enhancement sites are considered a permanent loss of soft-bottom habitat then the rock would be disposed or beneficially used elsewhere. The impacts from delayed recovery or alteration of habitat, and direct and indirect impacts to fisheries resources are expected to be temporary and short-term. Critical resources and special aquatic sites are not expected to be impacted by the channel deepening. Compensatory mitigation is not believed necessary. Should the investigations that will be conducted during the Design Phase lead the USACE to a different conclusion, then appropriate mitigation strategies and measures will be developed.
Comment EOEEA-40	EOEEA noted the Town of Winthrop's concern with the project which cited impacts on fisheries habitat and potential changes to sediment transport patterns. EOEEA expects the USACE to respond to those issues and, in particular, address the potential of the project to affect long-term sediment transport patterns.
Response	Please see responses to the Town of Winthrop's comments below, in particular the response to comment TOW #12.

Massachusetts Office of Coastal Zone Management – 2 June 2008	**Letter at Page A-3-46**
Comment CZM-01	MZ CZM suggests continuation of the TWG during the Design Phase of the project. CZM also suggested establishment of a smaller "sub-committee" facilitated by an "independent third party contractor" to "manage situations as they arise during the construction phase."
Response	The USACE concurs with continuing the involvement of the TWG in this project. Please see general topic #2 above.
Comment CZM-02	MA CZM states that, besides lobster, there was little or dated information on the other potentially impacted natural resources such as shellfish, fish, benthic infauna, and epifauna, and other species of decapod crustaceans.
Response	Based on discussions with the TWG, a conservative approach was determined to be the best method for describing natural resources considered important to the discussion of the Affected Environment and Environmental Impact sections of the SEIS/EIR. This approach assumes that a natural resource is in the area unless the physical environment or other data suggests the habitat is not suitable for a particular species or community. As discussed in general response topic #8 above, additional resources surveys will be conducted during the Design Phase to inform the development of the construction sequencing plan and to serve a baseline for the monitoring surveys measuring habitat recovery post-construction.

Comment CZM-03	The lack of site-specific data for the blast areas is of particular concern due to the potential impacts to the relatively stable exposed bedrock seafloor habitat. The area to be blasted is largely different from the proposed dredging areas. The seafloor in the inner and lower harbor is largely comprised of relatively mobile soft sediments that support dynamic community of benthic infauna and epiufauna typical of highly disturbed environments. The area in the outer harbor to be blasted is an area of hard bottom (bedrock and boulders) that is presumably very stable and not highly disturbed, potentially supporting a stable community.
Response	Benthic resource characterization was investigated through sampling and analysis in the project area (including the blast areas) and is described in the Final SEIS/EIR. All areas proposed for dredging and rock removal, with very limited exceptions where the entrance bend at Finns Ledge and the turning area off the Army Base pier will be widened, are within the existing channel and subjected to periodic maintenance dredging. In fact, maintenance of the 40-foot lane of the north entrance channel was accomplished in 2004-2005. Most areas of rock removal will need to be dredged first to remove overlying unconsolidated substrate, before drilling can occur. Only a small portion of the ledge areas are exposed bedrock.
Comment CZM-04	MA CZM suggested that a pre- and post blasting/dredging monitoring program of the impacted areas, particularly the areas to be blasted and outer and lower harbor resources would allow for a sufficient description of the baseline characteristics and potential impacts, while facilitating the monitoring of recovery in the area.
Response	The USACE agrees to perform a pre and post monitoring program to document the recovery of the impacted areas. The details of the monitoring program will be discussed with the TWG. See general topic #8 above for an outline of the monitoring proposed.
Comment CZM-05	A comprehensive blast plan should be developed. An independent third-party observer should be present during the project to ensure the blast plan procedures are followed, or modified on a real time basis with the TWG.
Response	See general topics #2 and 3 above for details on the rock removal blast plan and coordination with the TWG. USACE inspectors and fish observers will be on-site during construction to ensure adherence to the specifications for the project, including the blast mitigation measures.
Comment CZM-06	MA CZM suggested that consideration should be given to harvesting American lobsters and rock crabs from the blast areas as part of the plan to limit the impact to these valuable commercial lobsters. Substantial concentrations of mussels should also be removed and relocated (transported to similar nearby habitat) to minimize impacts to these resources.

Response	Lobsters, mussels and crabs do not have air bladders like many fish that need them for buoyancy. Because of this, they are not usually impacted from the blast shock wave. Divers exploring for unexploded ordnance after each blast event in Boston Harbor fall of 2007, did not note the presence of dead lobsters from blasting. Also, dredging will disturb the area prior to blasting, as unconsolidated overburden must be removed prior to drilling, which may limit the value of this habitat for these resources.
Comment CZM-07	MA CZM suggested that the concentration of total suspended solids in the sediment plume should be modeled. CZM also noted that SSFATE data and maps were not presented in the draft report/SEIS/EIR.
Response	An SSFATE model was used for the Outer Harbor Maintenance Dredging Project, which much of the Deep Draft Project overlaps. Details from plume monitoring of the IHMDP are included in the FSEIS/EIR. Please see general topic #10 above for additional response.
Comment CZM-08	Project sequencing should be addressed to avoid or minimize the effects on different species occurring at different times of year.
Response	A project sequencing plan will be developed as more specific data is collected during the Design Phase. Please see general topic #7 above for additional details on this commitment.
Comment CZM-09	The creation of the proposed rock reef may not be warranted. A better understanding is required to make a judgment on this proposal. The use of rock for shore protection and upland uses should be further evaluated.
Response	See general topics #4 and 5 above for response to these topics.
Comment CZM-10	CZM supports the plan to use parent material (clay) to cap the IWS. Results of the capping demonstration planned for the MBDS should be reviewed by the TWG and used to design the capping project.
Response	The USACE concurs with CZM's statements. Please see general topic #6 above for response to these comments.
Comment CZM-11	The project is subject to Federal consistency review and must be found consistent with CZM's enforceable policies.
Response	The USACE concurs. A CZM Consistency Determination was provided to the Massachusetts Office of Coastal Zone Management on October 16, 2012, followed by a conference a call on October 24, 2012 and then another letter on October 26, 2012. CZM Consistency Determination concurrence was received on November 29, 2012.

Massachusetts Department of Environmental Protection – Letter to MAEOEEA – 2 June 2008	**Letter at Page A-3-50**
Comment DEP-01	The Department notes that a Section 401 Water Quality Certification will be required for the project.
Response	The USACE concurs that a WQC will be required for any disposal of dredged material or fill in State waters.
Comment DEP-02	The Department stated that "the proponents should perform a community outreach effort to provide coastal communities with an opportunity to use the material for projects addressing shoreline erosion, beach renourishment, and other needs."
Response	Please see general topic responses #4, 5 and 6. The USACE and Massport are working with MACZM to identify additional potential uses for rock and other hard materials. There is unlikely to be any significant sandy materials practical for use as traditional beach nourishment. Should Design Phase subsurface investigations determine such materials are present in sufficient localized quantities to make the additional cost of segregating those materials practicable and identifiable, then the State and other interested parties will be canvassed to determine their willingness to receive any such materials as their cost.
Comment DEP-03	The Department stated that "as sequencing allows, clean material may function as a suitable cap over material to be disposed of in a confined aquatic disposal (CAD) cell."
Response	As all improvement dredging materials are clean and have been found suitable for unconfined ocean disposal at the Massachusetts Bay Disposal Site, no CAD cells are proposed for the improvement project. If CAD cells are required for any concurrent maintenance dredging activities yielding materials unsuitable for ocean disposal, the use of clean improvement materials for capping CAD cells will be considered, as the Department suggests.
Comment DEP-04	The Department stated that "rocky materials may provide suitable habitat in some instances" and recommended consultation with the agencies to develop a suitable habitat enhancement plan.
Response	Please see general topic response #4.
Comment DEP-05	The Department stated that a sequencing plan be developed, in particular for blasting activities.
Response	Please see general topic responses #3 and #7.
Comment DEP-06	MA DEP recommends that the most contaminated dredged material be placed at the bottom of a CAD cell to maximize the separation of such materials from aquatic habitats.
Response	The material to be removed by the improvement project is all parent material, all of which has been found suitable for ocean placement at the MBDS. No

	CAD cells are anticipated for this project. If CAD cells are required for any concurrent maintenance dredging activities yielding materials unsuitable for ocean disposal, then sequencing of disposal into any cells will be examined as the Department suggests.
Comment DEP-07	The Department stated its belief that the Technical Working Group's involvement in the project be continued. The TWG's ability to provide input on minimizing impacts, and for communicating unexpected occurrences were cited. The Department also stated that the proponent should provide a third-party contractor to facilitate and report to the TWG.
Response	Please see general topic response #2. The USACE and Massport are committed to continuing the role of the TWG through the design and construction phases of the project. There will be USACE inspectors on the project to ensure the Contractor(s)' compliance with the requirements of the project's Plans and Specifications. Use of a facilitator proved helpful during the Navigation Improvement Project of 1998-2001. However, the need for a facilitator for the Deep Draft Project is not evident at this time.
Comment DEP-08	MA DEP suggests that the enforcement of the emission reduction strategy be described, that additional engine retrofit opportunities be explored, as well as the use of emission credits. More detailed information on the dredging schedule within each year including targeting dredging operations in the pre- and post-ozone season.
Response	Please refer to general topic #9 for a response to the above comments. The USACE will work with U.S. EPA, MA DEP, and interested TWG members with expertise in air quality issues during the Design Phase to develop an appropriate strategy for any required mitigation of air quality impacts.

Massachusetts Bureau of Underwater Archaeological Resources – Letter to NAE – 2 June 2008	**Letter at Page A-3-54**
Comment BUAR-01	The Board has concurred with the findings and recommendations of the surveys conducted to date for the Main Ship Channel, Reserved Channel and its Turning Area, President Roads Channel Reach and Anchorage and the North Entrance Channel from Broad Sound.
Response	Noted. No further cultural resource surveys are required in these areas.
Comment BUAR-02	The Board concurs in the recommendation that a remote archaeological survey of potential effect areas in the Mystic and Chelsea Rivers should be conducted and will work with the USACE to develop a survey strategy.
Response	As stated in the draft Feasibility Report/SEIS/EIR, the USACE has included surveys of the widened channel areas in the Chelsea River in the design phase scope.

Massachusetts Historical Commission, SHPO – Letter to NAE – 5 May 2008	**Letter at Page A-3-55**
Comment MHC-01	The MHC looks forward to reviewing the scope of the proposed additional cultural resource surveys as stated in the USACE letter of 4 October 2007.
Response	The surveys proposed are for the channel widening areas along the Chelsea River. As described above in response to the BUAR letter, these surveys are included in the Design Phase scope, and input will be sought from the MHC and the BUAR at that time.

Massachusetts Water Resources Authority – Letter to NAE – 2 June 2008	**Letter at Page A-3-56**
Comment MWRA-01	The project would bring the Reserved Channel to a finished depth of not less than -52 feet MLLW.
Response	In areas of ordinary material a 2-foot overdepth is allowed, not required. In areas of rock, there is a two foot overdepth required and an additional 2 foot of overdepth allowed. For a channel to be dredged to -47 feet in rock, the contractor is required to remove material to -49 feet and can remove material to -51 feet. However, the comment that the finished depth would be not less than -52 feet is incorrect. That is the maximum depth that would be allowed, not the minimum.
Comment MWRA-02	NSTAR's documents indicate that this cable was installed at approximately -50 feet with variations higher and lower along its course …
Response	The as-built drawings submitted to the USACE of Engineers and the MWRA do not support the statement that the cable was installed at a depth of -50 feet. The permit issued to the MWRA and the NSTAR required the cable to be installed to a minimum of -60 feet MLLW. As-built drawings appear to show that the minimum elevation of the cable is -54 feet MLLW.
Comment MWRA-03	The permit required the cable to reach a depth of -60 MLLW which, based upon the "as-built" data of NSTAR's contractor, was not achieved.
Response	We concur with your comment that the permit issued to NSTAR and the MWRA for the installation of the cable required the cable to be buried to a minimum depth of -60 feet and that the as-built drawings clearly indicate that that minimum depth was not achieved.
Comment MWRA-04	MWRA staff has attended meetings with the USACE, NSTAR and the U.S. Justice Department over the past several years … in response to the USACE insistence that corrective action be taken to bring the cable's location into compliance with [the] permit. … No concrete progress has been made toward

	finding a solution that will assure that the cable could survive the channel deepening process.
Response	When it became apparent that the cable was not installed to the minimum depth required under the USACE permit, the USACE initiated discussions with NSTAR and the MWRA. After the initial discussions between the USACE, NSTAR, and MWRA in 2003-2004, this matter was referred to the U.S. Attorney's Office for the District of Massachusetts, and since then the parties have engaged in productive settlement discussions. These discussions have resulted in a plan developed by NSTAR for protection of the cable. This commitment led NSTAR to develop a proposed protection scheme that, precludes the need of requiring the much more expensive option of removing and reinstalling the cable. NSTAR has already conducted field data collection to refine the corrective plan, and reported those results to the USACE. The USACE has requested some additional studies and information, and NSTAR is in the process of addressing that request. The USACE anticipates entering into an Agreement with the MWRA and NSTAR that will specify timelines and requirements to allow for a timely, effective resolution of the cable matter.
Comment MWRA-05	NSTAR's preferred option of placing protective mats over the cable cannot be expected to work if the cable's current location is already at or above -52 MLLW.
Response	See response to Comment 4.
Comment MWRA-06	It appears that the proposed dredging may impact MWRA's Section 38, a 36 inch water main that crosses the Chelsea River. ... Section 38 is located at approximately -44 feet, so that any dredging or blasting should be carefully coordinated with MWRA.
Response	A new Section 38 line was installed near the Chelsea Street Bridge. Since there is no additional widening proposed for this area, the line should not be impacted.
Comment MWRA-07	There are three wastewater crossings of the Chelsea River, an abandoned siphon (Section 10), an active deep tunnel (Section 101), and an active siphon (Section 37.5).
Response	In an email dated 22 May 2008 which was provided to the USACE, Mr. Terrence Flynn of the MWRA indicated that the wastewater siphons in the Chelsea River are at an elevation of approximately -50 feet mean low water. This is approximately 10 feet below the required depth being proposed in the Chelsea River.
Comment MWRA-08	An MWRA 8(m) permit will be required.
Response	The project's non-Federal sponsor, Massachusetts Port Authority, is responsible for acquiring any MWRA 8(m) permit, should one be required for

	the project. Massport will discuss and coordinate with MWRA on any needed approvals.
Comment MWRA-09	MWRA understand that the Chelsea River deepening assumes that the Chelsea Street Bridge and the Keyspan gas siphon would be replaced.
Response	This comment is correct. The Chelsea Street Bridge has been replaced in 2012. The pipeline was relocated in 2007. Neither the bridge or pipeline pose a restriction to deepening the Chelsea River.

Massachusetts Division of Marine Fisheries – Letter to MA EOEEA – 2 June 2008	**Letter at Page A-3-60**
Comment DMF-01	This project constitutes work begun in 1995 … and continued through 2007. … work has proceeded for nearly this entire period.
Response	These statements are incorrect. Work for the last improvement project began in August 1998 and continued through December 2001. Work for the outer harbor maintenance was accomplished from August 2004 to May 2005. The inner harbor ledge removal work was completed in two phases; 2008 and 2012. Work of this nature and frequency is common for a major regional commercial industrial port like Boston Harbor. One of the factors contributing to the improvement in water quality in the port is the removal by dredging of silty shoal material a portion of which includes contaminants of sufficient elevation to require confined disposal. The USACE concurs that harbor deepening activities should be sequenced, if possible, to avoid critical fish spawning and passage at various times of year in various areas of the harbor. Please see general topic #7 and 8 above for discussion of the proposed construction sequencing plan and resource monitoring.
Comment DMF-02	The Division stated that virtually every estuarine waterway in Massachusetts is impacted by dredging. There is considerable concern regarding cumulative impacts on the overall ecosystem. With continuous dredging these projects change from an acute short-term impact to a chronic impact.
Response	The cumulative impact section of the DSEIS/EIR discusses cumulative impacts. The combined subtidal impact from all projects in Boston Harbor is less than 20% (approximately 18%), with the majority of impacts attributable to the Boston Harbor dredging projects and the Hubline. However, the areas proposed for dredging within Boston Harbor associated with this project are contained within existing previously impacted navigation channels. Table 1-2 shows the years dredging has occurred in Boston Harbor. Dredging has not been continuous over this period allowing impacted areas to recolonize and recover and would therefore not be considered a chronic condition. In addition, past dredging has targeted different areas of the harbor allowing areas to recover over varying extended periods. Construction of the Deep Draft Project will, however, impact some of the same previously dredged areas. The

	shoaling rates within Boston Harbor are low. Maintenance dredging is not needed more than once every 16 to 40 years, dependent on the channel segment, thereby allowing ample time for recovery.
Comment DMF-03	The DEIR relies heavily on information collected and examined for previous efforts. The proponents have not conducted a sufficient impact assessment.
Response	The DEIS/EIR is a supplement to the EIR/S prepared for the previous Boston Harbor Navigation Improvement Project (BNHIP). The Supplemental EIS/DEIR builds on the lessons learned from the BHNIP. The BHNIP and maintenance dredging projects used the same channels now proposed for the Deep Draft Project. The data and investigations used for those prior projects, and used for the Deep Draft Project, were deemed relevant and sufficient to evaluate the proposed navigation project.
Comment DMF-04	Many decisions are being left to the discretion of the TWG during the Design Phase. Given the experience and significant resources of the USACE and impacts from current activities … a more concerted effort could have been made to examine potential impacts …
Response	To clarify, it is the USACE and Massport, not the TWG, who make decisions regarding this project. Our analysis has examined impacts based on the best available information. If the USACE is authorized to proceed to the Design Phase of the project, the investigative efforts associated with that work will result in additional information that will be used to further analyze potential impacts of the project. The TWG will be engaged to provide technical input and review of the various work plans and management techniques to be developed in the Design Phase and followed during construction.
Comment DMF-05	Fish kills during blasting events this past year in Boston Harbor were not addressed in the DEIR.
Response	The DSEIS/EIR did address the four fish kill events in Boston Harbor in the fall of 2007 in Section 4.13. As stated in the DSEIS/EIR, an After-Action Report was prepared to provide information on those blast events. This report was shared with the TWG and included in the Final SEIS/EIR. An interagency subgroup of the TWG will be developing blasting mitigation measures using information developed over the next several years. See general topic #3. Also, as noted previously, during the most recent rock blasting in September of 2012, there were no fish kills. In addition, lessons learned from the previous blasting in Boston Harbor will be incorporated, where appropriate into the blasting mitigation plan. Some of these lessons include the development or a communication plan between the fish observer and the contractor, and the location of the fish startle system that will be deployed on an alternate vessel instead of the blast barge.
Comment DMF-06	A sequencing plan should be generated based on biological surveys (ideally three years) to assess resources, trends and their use.

Response	A project construction sequencing plan will be developed (see general topic #7), and limited additional resource surveys will be accomplished (see general topic #8) during the Design Phase of the project. The TWG will be invited to participate in the development of these plans. The USACE had previously proposed and contracted for additional resource surveys during the Feasibility phase. However, requirements by MA DMF that 1) USACE secure State permits from that agency before conducting any resource sampling in support of the USACE navigation mission, 2) two years of multi-seasonal data must be collected, and 3) statements by MA DMF counsel to the USACE that its contractor personnel would be arrested by the State Environmental Police if found conducting such sampling in the harbor without MA DMF approval and permits, led the USACE to suspend further resource characterization efforts during the feasibility study. Accordingly, prior sampling efforts and State data were relied on for the feasibility study. These issues will need to be addressed by State officials and resolved to the USACE satisfaction before further resource sampling efforts are undertaken.
Comment DMF-07	Development of a blasting mitigation plan is recommended. Sample plans and standards have already been provided to the proponent but were not in the DEIR.
Response	A blasting mitigation plan will be developed in coordination with the TWG (see general topic #3 above). We are unable to locate the sample plans referred to above and do not recall their submittal by DMF.
Comment DMF-08	Early benthic phase lobster (EBP) are present year-round in hard bottom habitat. DMF recommends that the extent of hard bottom habitat to be impacted, removed and created within the project site be clarified. Also states that the proposal to use blasted rock to create new hard bottom habitat not be included in the assessment.
Response	Appendix Q to the Feasibility Report/SEIS/EIR contains mapping prepared to show the harbor bottom types under the existing condition, with deepening for a 45-foot channel (to -47 feet) and with deepening for a -48 foot channel (to -50 feet). In general the area of hard bottom, including exposed bedrock, will increase with channel depth, particularly in the main ship channel above Spectacle Island, where ledge is shallow and widespread. More areas of till and cobble would be exposed in the lower harbor and entrance channel with greater depth. These areas and comparisons will be further detailed once the subsurface exploration program is completed as an early step in the Design Phase.
Comment DMF-09	DMF recommends a specific examination of the recovery time of hard bottom habitats that includes sampling of EBP lobsters.
Response	The USACE proposes to conduct pre- and post-construction monitoring of the benthic habitat. This may include sampling for EBP lobster based on further consultations with the TWG.

Comment DMF-10	The DEIR notes that softshell clam habitat will be impacted by potential work in the Chelsea River (p. 3-23).
Response	The DSEIS/EIR noted that softshell clam habitat is present along the banks of the Chelsea River. The population was determined to be negligible as softshell clam was noted in only one grab sample collected in the area of this identified habitat.
Comment DMF-11	Recommends that upland disposal options be revisited.
Response	The 1995 EIS on which this SEIS is based included an extensive evaluation of non-in-water disposal options. That evaluation concluded that no practicable upland options sufficient to accommodate that project's 2 to 4 million cubic yards of dredged material were available. The USACE is working with MA CZM to identify additional upland uses for rock to be removed from the project, including state shore protection projects and making this material available to the construction industry to avoid the cost of hauling that material to the ocean disposal site. See general topic #5 above for additional response. If such investigations identify practicable options, the USACE and Massport will work with the State to determine if such options can be included in the project plan. The proponents of any such use will be responsible for any additional investigations, regulatory requirements, and costs associated with such options. No additional evaluation of upland options for non-rock material is planned.
Comment DMF-12	Recommends that the site selection model for rock reef habitat enhancement be revisited in conjunction with the TWG.
Response	Please see general topic #2 and 4 above for response to this comment.
Comment DMF-13	Recommends identifying measures to prevent the spread of invasive species, such as by contractor barges coming to Boston from foreign harbors or those known to have species invasive to New England.
Response	The USACE will develop, with input from the TWG, requirements for inspection of contractor equipment for invasive species if that equipment is coming to Boston from origins of concern, including submittal of certification that inspections have been performed by qualified inspectors and the vessels found free of such species. These requirements would be included in the construction specifications for the project.
Comment DMF-14	Improvement dredging, by its very definition, is designed to alter the environment as permanently as possible. It is also inaccurate to identify impacts from maintenance dredging as temporary since they are chronic in nature and will result in permanent functional changes of the habitat.
Response	Not all improvement dredging alters the environment in a significant manner that result in permanent adverse functional changes. Areas can recover and be recolonized by benthic organisms from adjacent areas when the resulting

	substrate has not been altered. The changes in depth of up to seven feet (up to eleven feet in the entrance channel) in Boston Harbor as a result of the dredging would not be expected to significantly alter the benthic community when substrates largely similar to pre-dredge conditions remain. Areas where the resulting substrate has been altered may result in permanent changes to habitat and its overall value to the system. However, recovery of these areas would be expected to occur by species suited to the existing habitat. A pre- and post construction monitoring plan will assist in determining what changes have occurred after deepening Boston Harbor. See general topic #8. As mentioned in comment DMF-02, the shoaling rate in Boston Harbor is low. Maintenance dredging is not expected to be needed for at least 16 to 40 years, allowing ample time for a stabilized benthic recovery to occur and not an impact that would be considered a chronic condition.
Comment DMF-15	DMF recommends an environmental monitoring system designed to evaluate the recovery period of impacted areas.
Response	The USACE proposes a pre- and post monitoring plan for the Deep Draft Project be developed and implemented. See general topic #8.
Comment DMF-16	Requests a delineation of areas where habitat conversion will take place due to dredging and blasting activities.
Response	See response to comment DMF-08 above.
Comment DMF-17	DMF requests an estimate of the time needed for recovery of all impacted habitats.
Response	Recovery time of the benthic community directly impacted by dredging could take a few months to years, depending on the time of year the dredging takes place and the resulting underlying substrate that becomes available for recolonization. Recovery could take a few years if Boston blue clay is exposed. In these cases benthic recolonization would occur when the clay has been weathered or a layer of silt is deposited (re-deposition) over the affected area(s). The exposure of glacial till and rock could be expected to begin to be recolonized within months (based on experience with DMF's own Hubline mitigation rock reef creation project) depending on seasonal conditions at the time of dredging (i.e., more rapid during the warmer months when benthic organisms are spawning).
Comment DMF-18	DMF recommends development of compensatory mitigation plans for direct and indirect mortality of fisheries resources, delayed recovery of habitat, and areas of habitat that are permanently lost or altered.
Response	The USACE has developed an appropriate mitigation plan for impacts as currently identified in the Feasibility Phase. See Section 4.13 in the FSEIS/EIR. The improvement dredging is confined to existing navigation channel limits which are subject to periodic maintenance dredging except for minor areas where the channel bends and turning areas would be widened

	(Finns Ledge in BSNEC, Reserved Channel Turning Area expansion, Chelsea River bend widening at two locations). Additional mitigation measures may be included for the project once supplemental Design Phase investigations are completed. See Responses to the General Topics above.

City of Boston, Environment Department – Letter to NAE and MA EOEEA – 2 June 2008	**Letter at Page A-3-65**
Comment BED-01	The proponents should also continue to work with state and local resource conservation agencies …
Response	The USACE and Massport are committed to continuing involvement of the Boston Harbor TWG through design and construction of the project. See general topic #2 for further response.
Comment BED-02	Beneficial uses of dredged rock may include hard bottom habitat .. armoring shore areas …
Response	The USACE will investigate alternative beneficial uses for the rock removed from the project beyond the rock reefs or the base plan (placement of the rock at the MBDS). These options will be investigated in consultation with the State and other TWG participants. See general topic #4 and 5 above.
Comment BED-03	The blasting of rock is of particular concern … A complete review of blasting mitigation measures should be addressed…and reviewed prior to the development of a blasting plan.
Response	Please see general topic #3 above for response.
Comment BED-04	The findings of [the IWS demo] study should be provided and utilized to inform the deep draft project final design.
Response	Please see general topic #6 above for response.
Comment BED-05	If unsuitable silt material needs to be disposed of into CAD cells within the harbor, then disposal activities should not delay the capping of cells utilized for the Inner Harbor Maintenance Dredging Project.
Response	As all the improvement material from the deep draft project is parent material, no CAD cells are needed for this project. However maintenance dredging of some harbor areas may occur at the same time. Should any of that maintenance material come from channel areas already determined unsuitable for ocean disposal, then new CAD cells would need to be opened from among the population of CAD Cell sites included in prior NEPA documents for either the 1998-2001 work or the inner harbor maintenance work.

Comment BED-06	The rational for not selecting the Magnolia site as a preferred enhancement location should be substantiated. The final design should be coordinated with state and federal resource agencies…
Response	The ranking of the enhancement sites was modified as the Magnolia site was too shallow at one end, rock ledge at the site is exposed, and the site is the farthest distance from the project area of the five sites. The USACE proposes to continue its investigations into the suitability and practicability of the enhancement sites and design with input from the TWG. See general topic #5
Comment BED-07	Use of removed rock for shore protection should be discussed further.
Response	Please see general topic #5 above for response and discussion of limitations on application due to the nature of the blasted rock as removed and delivered by scow. The USACE will be working with the State and other TWG participants to examine other beneficial uses for the rock including shore protection. If the City has specific information on sites around the harbor and islands where a potential public sponsor has a need for shore protection material we would appreciate receiving information.
Comment BED-08	The Environmental Consequence section should include a discussion of possible impacts of dredge material transport and disposal at the IWS and MBDS upon the adjacent Stellwagen Bank National Marine Sanctuary.
Response	Decades of research at the MBDS by the USACE DAMOS program has not revealed any impacts to the Stellwagen Bank National Marine Sanctuary.
Comment BED-09	A discussion on operational techniques and parameters such as dredge cycle-time, and practices such as scow washing, will be managed to limit turbidity. In addition, the use of a Cable Arm bucket or environmental dredge buckets during the project to minimize water quality impacts should be employed.
Response	No scow washing is proposed for this project. The parent material to be dredged is Boston blue clay and glacial till material. Consequently, turbidity generated during the improvement dredging should be less than that generated (and monitored) when silty material was removed during the BHNIP and subsequent maintenance dredging actions. The physical properties of the parent material to be removed (Boston blue clay and rock) will not allow the use of an environmental bucket. In addition, it would not be an effective management tool for controlling turbidity given the nature of the material.
Comment BED-10	Turbidity is problematic for eelgrass beds which provide important habitat for finfish and shellfish. The Final SEIS/EIR should update the section to include eelgrass beds located along the northwest shoreline of Long Island which have been established as part of the MA DMF eelgrass restoration project.
Response	Eelgrass restoration sites were selected for the State's restoration effort after discussion with USACE on the potential impact from dredging in the Federal channels. Based on water quality monitoring performed as part of the BHNIP

	and IHMDP, which determined that the turbidity plume generally stayed confined to the navigation channel although occasionally a low concentration filament of plume moved a short distance from the channel. Overall, it was difficult to discern a plume more than 600 feet down current and it was determined that eelgrass beds located at distances greater than 1,000 feet from the Federal navigation channel would not be impacted by dredging. The beds established along the shoreline of Long Island are located further than 1,000 feet from the Federal channels to be dredged under this project. The Final SEIS/EIR has been updated to include reference to the eelgrass beds located along the northwest shoreline of Long Island.
Comment BED-11	Given the scope of impacts the project will have on benthic habitat, the lack of specific study information on Boston Harbor benthic communities and uncertainty over such communities' ability to reestablish, a biological monitoring program should be developed…
Response	Refer to Sections 3.3.2 and 3.3.3 in the SEIS/EIR for specific information on benthic and shellfish communities for the project area. A pre- and post construction monitoring program will be developed in coordination with the TWG. See general topic #8.
Comment BED-12	Work areas and barge routes should be coordinated with the Boston Harbor Lobstermen's Cooperative and the Massachusetts Lobstermen's Assoc'n.
Response	The USACE will publish a public notice that identifies the work areas and the proposed scow route. See Section 4.13 in the SEIS/EIR.
Comment BED-13	As NOx and VOCs are pre-cursors to ozone, an air pollutant most problematic during the summer months, the proponents should provide more detail as to why dredging is not occurring during the winter months.
Response	The current plan for air quality compliance is 6-month construction shutdowns every other winter to limit work to 9 months in any one calendar year. With the winter shutdown period a single shutdown will accommodate two years of work, cutting demobilization-remobilization costs in half for the shutdowns. This will save $4 to $6 million in shutdown costs for each year. Please see general topic #9 for additional response on the air quality compliance strategy.
Comment BED-14	Ensure that the TWG continued to meet regularly throughout the duration of the dredged project …
Response	Please see general topic #2 for additional response on the USACE and Massport's commitment to continue involvement of the TWG.

Town of Winthrop, Town Council – Letter to NAE Forwarding Comments – 30 May 2008	**Letter at Page A-3-69**
Comment TOW-01	The Town of Winthrop is extremely concerned that the Army Corps of Engineers inappropriately denied the long anticipated and critically necessary shore protection on Winthrop Shore Drive. If the rationale utilized in its Winthrop Beach decision is consistently applied, then the Boston Harbor project should also be denied.
Response	The Town goes to great lengths to rationalize similarities between the State and Town proposal for offshore mining of sand and cobble deposits from never-before impacted areas and the dredging of the port's North Entrance Channel. Boston Harbor is the region's largest most active commercial industrial port. Large cargo vessels transit the entrance channel several times daily. The channel is already subject to periodic dredging to maintain its controlling depth. The two situations are dissimilar. If the port is to be deepened, then the channel must be deepened. There is no practicable alternative for harbor access. There are practicable alternatives for the source material for Winthrop Beach as discussed in the USACE permit decision. It may be possible that course grained material generated through deepening of the North Channel could be suitable for beneficial use on the Winthrop Shores project. If subsurface explorations to be undertaken during the Design Phase show that to be the case, the USACE will discuss whether that material can be made available to the State for processing for such use. Responses to the Town's letter address only those concerns specific to the Boston Harbor Deep Draft Navigation Improvement Project. These responses will not address Town concerns for the Winthrop Shores project or any comparison between the two projects. The USACE documents concerning the Winthrop Shore permit have adequately addressed that project's issues.
Comment TOW-02	A large portion of the Broad Sound and the North Channel areas are designated Essential Fish Habitat (EFH) for cod and American lobster.
Response	The American lobster is not listed as an EFH species for the Broad Sound North Channel. In any case, lobster and cod could be found inhabiting the Broad Sound North Channel area, although it would not be expected to be significant habitat for cod due to the shallow depths adjacent to the channel. Nonetheless this area will be temporarily disturbed while the benthic habitat recovers post-construction. It is expected that the habitat will recover in a few months to a few years. The exposed substrate is expected to be similar after dredging (a mixture of bedrock, till, sand and clay), so no permanent alteration in functional value over the long term would be expected. A pre- and post-construction monitoring plan will be developed, with input from the TWG, and implemented.

Comment TOW-03	NMFS will be required to determine that the seaward portion of the proposed Boston Harbor Deep Draft Navigation Improvement Project is an Aquatic Resource of National Importance (ARNI) to be consistent with their conservation recommendations for identical bottom type and EFH concerns at the proposed NOMES Site I borrow site (8 miles offshore of Boston Harbor).
Response	The Broad Sound North Channel is a previously impacted Federal Navigation Channel authorized by Congress as a shipping channel. As such, the North Channel is not likely to qualify as an ARNI.
Comment TOW-04	The proposed project will cause a change in the bottom substrate, resulting in a permanent impact to EFH …
Response	Bottom type change maps for the harbor channels were included in the Feasibility Report/SEIS/EIR in Appendix Q. These maps show little change in the North Channel between existing conditions and dredging to either 45+2 feet or 48+2 feet. Other depths are expected to show a similar lack of overall change in bottom classification. With increased channel depths the exposed surface area of both bedrock and glacial till are likely to increase somewhat, but not significantly so. Additional explorations in the Design Phase will allow more detailed determinations of expected change.
Comment TOW-05	The DEIR lacks the level of geotechnical investigation appropriate for a project of this magnitude.
Response	Given the size of this project, some 1200 acres of bottom area to be dredged, the USACE used a combination of past subsurface exploration data for these channels from throughout the 1900s, acoustic data (sub-bottom profiling and side scan sonar), and a ground truth program of borings and probes to adjust the assumed acoustic basement, to establish elevations of ledge and till for purposes of a Feasibility Phase estimate of costs and habitat classification. During the project's Design Phase, an extensive program of subsurface explorations (borings and probes) would be conducted to more accurately define the strata at depth and the pre and post construction bottom classifications. Please see general topic #3 for additional response on the Design Phase subsurface explorations.
Comment TOW-06	Since the proposed dredging activities will have a substantial spatial and water quality (turbidity) impact on the "Cod Conservation Zone," the FEIR, Feasibility Report, and FEIS should provide a full assessment of these impacts.
Response	Prior water quality monitoring for the BHNIP did not document any water quality violations, therefore no substantial long-term water quality impacts to the "Cod Conservation Zone" are expected. See general topic #10. The impacts of the BHNIP on fisheries and cod are discussed in the FEIS/EIR at Section 3.3.5, 4.2, and 5.3. The Cod Conservation Zone was designated by Massachusetts DMF to shut down fishing for cod in specified areas of Massachusetts Bay during winter months to protect aggregations of cod

	engaged in spawning, and as currently envisioned the project will not be active during winter months due to Clean Air Act conformity issues and winter weather safety restriction on rock removal and dredging activities in the entrance channels. Due to this timing of the shutdowns, it is not expected that aggregations of spawning cod will be impacted. Moreover, as discussed in Section 5.3 of the FEIS/EIR, cod are not expected to be found in the dredging areas. To the extent that the winter shutdown schedule changes or that aggregating spawning cod are expected to be found in the project area and are expected to be affected by dredging operations, this can be taken into account in determining how the project is sequenced, as we do for other species.
Comment TOW-07	The FEIR and FEIS needs to show how the proposed dredging activities as well as any disposal activities, will not degrade the waters of the U.S. in a similar fashion, especially considering that many of the dredge-related activities will be performed within areas with the same EFH concerns and the disposal areas will create suspended sediment that will directly impact or migrate into areas of gravel and cobble bottom that have been designated as ARNI by the NMFS.
Response	See response to TOW-03. The base plan for disposal is the MBDS. The MBDS is an U.S. EPA designated dredged material disposal site, and impacts of disposal were considered by EPA in its site designation EIS and site management plans. Disposal of parent material from the Deep Draft Project at the MBDS has been approved by the U.S. EPA.
Comment TOW-08	The FEIR should clearly delineate areas that have previously been dredged versus areas of proposed new dredging/mining (including increased channel area associated with side slopes).
Response	See Table 58 in the Feasibility Report.
Comment TOW-09	For clarity, it would be more appropriate to evaluate the "soft bottom" and "hard bottom" benthic communities and fisheries resources in separate sections. For example cod is an important species of concern for the "hard bottom" associated with the outer harbor channel; however, the Feasibility Study does not even mention the species as a primary interest.
Response	The Final SEIS/EIR (Sections 3.3.2, 3.3.3, and 3.3.5) discusses the benthic and shellfish communities, and fish resources by areas of the harbor: Mystic River, Chelsea River, Inner Harbor, Lower Harbor, and Outer Harbor.
Comment TOW-10	The DMF and the NMFS required an intensive one-year fish trawl and benthic survey to evaluate the resources at...Since Figure 3-33 clearly indicates that no fisheries data exist within the project area, the fisheries analysis contained within the DSEIS and DEIR is incomplete.
Response	The discussion of fish in the project area is based on the life-history characteristics and requirements of the species and the physical environment present in the project area. This could be considered a conservative estimate as species are assumed to be present unless data suggests otherwise. See Section 3.3.5 of the Final SEIS/EIR.

Comment TOW-11	The DEIR and DSEIS aeknowledge that early benthic phase lobsters presently are (a) prevalent in the project area, primarily adjacent to the existing channel, and (b) would lose substantial habitat if the outer channel footprint is increased as proposed. Unlike the recently denied Winthrop Beach project, it is highly unlikely that this area of "hard bottom" will recover, since it will be within the channel footprint and, therefore maintenance dredging will be allowed to continuously damage the habitat.
Response	The Deep Draft Project is likely to uncover more hard bottom habitat suitable for recolonization. See Appendix Q. The detailed boring program to be conducted during the Design Phase of the project will provide more accurate information on the type and amount of material expected to be encountered once construction is complete. Also, periodic maintenance dredging of these channels is already required to maintain the navigability of the port, and occurred recently in the Outer Harbor in 2004 to 2005 and in the inner harbor in 2008.
Comment TOW-12	The Town expressed concerned about the deepening of the North Channel relative to potential changes in wave energy or wave direction that could impact the shoreline and its beaches. The Town requested an evaluation of the long-term impacts of the present North Channel on coastal sediment transport patterns relative to pre-channel conditions and proposed channel improvements.
Response	The Broad Sound North Entrance Channel was originally constructed between 1903 and 1910. The channel is located about 1.8 nautical miles offshore of Winthrop Head. Extensive shallows exist in the waters between the Winthrop Beaches and the North Channel, and between the channel and the outer harbor islands located further east and southeast. The channel has a very low maintenance frequency, on the order of 36 years, indicating that it is not a sediment trap and that erosion of the adjacent shallow flats is not occurring. Wave attack from the northeast reaches the Winthrop shore without crossing the channel. Seas from the east must cross the channel before reaching the southern shores of the Town, but must also still cross the 1.8 miles of shallows between the channel and beaches. Seas from the southeast are interrupted by the harbor islands before even reaching the channel. It is highly unlikely that the channel has any impact on the frequency or severity of seas reaching the Winthrop shoreline from any direction. Deepening the channel by 11 feet over a 900-foot width within the existing channel limits will not impact the elevations of the adjacent shallows any more than the existing 40-foot channel has not impacted those areas. The bottom in these areas is largely rocky and well scoured by waves. If sediment movement were occurring the channel would be shoaling at a far higher rate.
Comment TOW-13	The Town states that the USACE has a "conflict of interest in this situation," presumably referring to its attempt to compare the Winthrop Shores permit decision with the dredging of the port's entrance channel. The Town requested the USACE fund an independent technical review by consultants selected by the Town. The Town further states it will "seek damages" from the USACE in

	the form of beach nourishment or structural improvements as compensatory mitigation if the historic or proposed navigation channels cause any alteration in nearshore wave climate to the Winthrop shore.
Response	As to a perceived "conflict of interest" by the USACE as a regulatory agency and as a civil works construction agency, these are roles that Congress has assigned to the USACE by various statutes. Thus, acting in both capacities does not represent a "conflict of interest," but rather is the fulfillment of the will of Congress. Given the level of review this project has received and the unlikelihood of any changes to wave energy from the project (as discussed in response to TOW-12 above), the USACE does not intend to fund a consultant for the Town to review the project. As to the Town's statement that it will "seek damages" from the USACE, the Town is free to pursue whatever legal theories it deems appropriate, but at this time the USACE does not find it plausible that the Improvement Project will have any impact whatsoever on wave energy affecting Winthrop.

The Boston Marine Society – Letter to NAE – 1 June 2008	**Letter at Page A-3-76**
Comment BMS-01	The Society stated that it recognizes the importance of the President Roads Anchorage; that deepening the channel necessitates deepening the anchorage; that the anchorage is needed for vessels waiting for favorable transit conditions, for US Coast Guard security and inspection checks, and for safe haven for mechanical repairs.
Response	The Corps concurs with the Society's statements. They support the views expressed by the Coast Guard and harbor pilots.

The Boston Harbor Association – Letter to NAE – 2 June 2008	**Letter at Page A-3-78**
Comment BHA-01	The Association stated that the FEIS should detail an evaluation and monitoring program to determine how successful the habitat creation and colonization efforts are at the hard-bottom reef creation sites.
Response	Please see general topic response #4.
Comment BHA-02	The Association stated that it strongly supports the proposed capping demonstration project for the IWS, "with care taken to ensure that ambient sediment does not become re-suspended during the disposal process."
Response	We welcome the Association's support and continued involvement in the process. Please see general topic response #6 and the results of the IWS pilot capping project in this FSEIS/EIR.

Comment BHA-03	The Association asked that a communication system be established with fishermen and lobstermen to avoid impacts to lobster gear, or a monetary fund be established to compensate for the loss of gear located outside the Federal channel.
Response	As with the past and current dredging projects, the USACE will require its contractors to issue a public notice outling the dredging areas and scow routes. All floating plant (dredges, barges, tugs and scows) will be equipped with real-time GPS tracking (silent inspector system) to monitor their movements. The lobstermen should be aware that it is illegal to place gear in the Federal channel, and to the extent that gear is damaged due to its presence in the dredge area when dredging occurs the USACE will not entertain any claims for reimbursement.
Comment BHA-04	The Association noted the fish kills that occurred in 2007 during the blasting for the rock pinnacle removal project and expressed their concern with fish mortality and urged stricter requirements to prevent fish kills.
Response	Please see general topic response #3 for discussion of the blasting mitigation measures.
Comment BHA-05	The Association noted that past private projects in the harbor area have been required by State permits to make "contributions" to harbor interests. The Association suggests that the State require a similar "contribution" from the Federal Navigation Project to support "water transportation in Boston Harbor and Massachusetts Bay if water transportation service is impacted from construction activities .."
Response	The USACE does not expect the Deep Draft Project to result in any adverse impacts on Boston Harbor water transportation services, and the USACE does not intend to provide funds for such water transportation services.
Comment BHA-06	The Association asked that the Technical Working Group continue to meet "to review progress of the project, any monitoring data with the project's independent environmental observer, and discuss prevention measures."
Response	We concur. Please see general topic response #2 for discussion of TWG.

Boston Harbor Pilots Association – Letter to NAE – 2 June 2008	**Letter at Page A-3-85**
Comment BHP-01	The Pilots stated their concern with retaining the deepening of the President Roads Anchorage in the proposed project as important to the continued safe flow of commerce, the USCG options for Maritime Domain Awareness, safe emergency use for deep draft vessels, repairs, protected safe boarding for law enforcement, improved harbor efficiency, lightering of petroleum and bulk cargoes, and bunkering of deep-draft vessels."

Response	We note the Pilot's concerns. Deepening of the President Roads Anchorage to the same depth as the improved inner channels is included in the project being recommended.
Comment BHP-02	The Pilots stated that 70 percent of the regions petroleum needs originate through the Chelsea River, and that modern tankers have a 106-foot beam, and that the Chelsea Street Bridge with its 90-foot beam restriction is a navigation hazard.
Response	The Chelsea Street Bridge has been replaced and the navigation channel widened to 175 feet.
Comment BHP-03	The Pilots "urge the acceptance and prioritization of this project to the regions interest …"
Response	Comment noted.

Save the Harbor Save the Bay – Letter to NAE – 2 June 2008	**Letter at Page A-3-87**
Comment STH/B-01	The organization noted its concern with air quality. The organization stated that they viewed the proposal to impose construction shutdowns as 'gaming the numbers', and 'working dirty for nine months … then averaging the numbers to artificially meet annual air quality standards.'
Response	Air emissions thresholds are measured on an annual basis. Projects that fall under those thresholds are not required to undergo conformity analysis. Construction shutdowns entail a significant cost ($4 to $6 million per occurrence) to avoid exceeding the annual emissions thresholds. See general topic response #9.
Comment STH/B-02	The organization expressed its concern about the impact of the extensive blasting with the project.
Response	Please see general topic response #3 for development of the blasting mitigation measures, particularly those that proved successful in eliminating fish kills during the 2012 blasting events.

PART 1

FINAL FEASIBILITY REPORT AND FINAL SEIS/EIR TRANSMITTAL DOCUMENTS

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE, BLDG 301
BROOKLYN, NY 11252

REPLY TO

CENAD-PD-CS

MAR 0 6 2013

MEMORANDUM FOR Commander, Headquarters, US Army Corps of Engineers, (CECW-NAD/Mr. Luisa), 441 G Street, NW, Washington DC 20314

SUBJECT: Boston Harbor Navigation Improvement Project, Massachusetts

I hereby submit the Boston Harbor Navigation Improvement Project, Final Feasibility report and EIS. Further, I concur with the findings and recommendations of the New England District Commander, COL Charles P. Samaris. In addition, I confirm that the report complies with all applicable policy and laws in place at the time of its completion.

KENT D. SAVRE
Colonel, EN
Commanding

3 Encls
1. Subject main report (14 copies)
2. Appendices (2 copies)
3. HQUSACE submittal package

CF: CENAE-DE

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

CENAE-EP-PN

6 March 2013

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Joseph Forcina), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Boston Harbor, Massachusetts Navigation Improvement Study, Final Feasibility Report and Supplemental Environmental Impact Statement, Submission Package, PWI #013654

REFERENCE: Appendix H, Amendment #1, or ER 1105-2-100, Policy Compliance Review and Approval of Decision Documents, dated 20 November 2007

1. In accordance with the referenced guidance, and vertical team conferences with Division and HQUSACE staff, the New England District is submitting copies of the subject report for review, approval and submittal to HQUSACE. The final report submittal package includes the items on the attached list.

2. The hard copies of the Final Feasibility Report and FSEIS were shipped earlier separately to NAD (6 copies) and HQUSACE (14 copies).

3. Items #17 District Slide Presentation, #18 Draft CWRB Project Abstract, and #19 Draft IEPR Response Document are being transmitted electronically.

3. The project is scheduled for presentation to the Civil Works Review Board at its 26 April 2013 meeting. Based on weekly in-progress review discussion between the New England District, North Atlantic Division and HQUSACE, the District requests that the report and submittal package documents be transmitted for receipt by HQUSACE before 15 March 2013.

5. If further information is needed, please contact NAE Planning Branch Chief, Mr. John Kennelly at (978) 318-8505, the study manager, Mr. Mark Habel at (978) 318-8871, or the project manager, Mr. Michael Keegan at (978) 318-8087.

Encl

CHARLES P. SAMARIS
COL, EN
COMMANDING

Printed on Recycled Paper

CF:
Joseph Forcina, NAD
Joseph Vietri, NAD
Naomi Fraenkel, NAD
Michael Keegan, NAE PPM

Documents Submitted by NAE for Boston Harbor CWRB Transmittal					
Item Number	Document	Hard Copy Enclosed	Electronic Copy Provided Separately on CD	Hard Copy Provided Separately	Document (Electronic) to be Provided Separately
01	Final Feasibility Report and FSEIS		X	X	
02	Report Summary	X	X		
03	Draft Record of Decision	X	X		
04	Report Mailing List	X	X		
05	Project Study Issue Checklist	X	X		
06	Documentation and Certification of Independent External Peer Review	X	X		
07	Documentation and Certification of Agency Technical Review (ATR)	X	X		
08	Certification of Legal Review	X	X		
09	Policy Compliance Review and PGM Compliance Memoranda	X			
10	Sponsor's Signed Letter of Support	X	X		
11	Sponsor's Signed Self-Certification of Financial Capability	X	X		
12	Draft Proposed Report of the Chief of Engineers	X	X		
13	Economic Model Certification - CECW-P	X	X		
14	Value Engineering Deferral Justification	X	X		
15	Total Project Cost Summary with NWW Certification	X	X		
16	Project Maps	X	X		
17	District Commander's Briefing Slides				X
18	Draft CWRB Project Abstract				X
19	Draft IEPR Response Document				X
20	PED Phase Review Plan	X	X		
21	Risk Management Plan	X	X		
22	Project Schedule	X	X		

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

CENAE-EP-PN 5 March 2013

MEMORANDUM THRU Commander, North Atlantic Division, U.S. Army Corps of Engineers CENAD-PD-CID-P (Attn: Mr. Joseph Forcina), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, New York 11251-6700

FOR Director of Civil Works, U.S. Army Corps of Engineers, ATTN: NAD Regional Integration Team (Mr. Peter Louisa), 441 G Street, N.W., Washington, DC 20314-1000

SUBJECT: Boston Harbor Navigation Improvement Feasibility Study, PWI #013654 - District Response to HQUSACE Planning Guidance Memorandum

1. Reference the following documents (enclosed):

a. CEMP-NAD Memorandum to NAD, 26 September 2012, attaching CECW-PC Memorandum providing HQUSACE policy comments on the May 2012 Boston-Harbor Additional Economic Analysis

b. CENAE Memorandum to NAD, 22 January 2012, responses to HQUSACE 29 November 2011 Memorandum

c. CECW-PC Memorandum, 29 November 2011, comments on the Boston Harbor Containerized Benefits Appendix

d. CENAE Responses, 1 October 2010, to HQUSACE comments of 10 September 2010 container benefits landside analysis.

e. Framework for Additional Economic Analysis, Boston Harbor, final approved version 6 August 2009, with CEMP-NAD Memorandum for the Record, 4 August 2009 on IWR IPR and final scope of study

f. CENAE Memorandum for NAD, 25 July 2008, CWRB Submittal enclosing NAE responses to OWPR comments on Draft Feasibility Report and AFB

g. CEMP-NAD Memorandum, 17 July 2008, enclosing CECW-PC 16 July 2008 comments on Draft Feasibility Report and SEIS

h. CENAE 3 April 2008 Responses to (included) 7 December 2007 AFB Comments

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CENAE-EP-PN
SUBJECT: Boston Harbor Navigation Improvement Feasibility Study. PWI #013654-District Response to HQUSACE Planning Guidance Memorandum

2. NAE submits the subject responses to the Policy Compliance Review comments as provided in reference 1, and requests concurrence in the submittal of the Final Feasibility Report and FSEIS to the Civil Works Review Board and HQUSACE support for release of the final report for public and agency review.

3. The Final Feasibility Report and FSEIS, with all supporting technical appendices have been previously provided electronically and hard copy. All remaining comments have been addressed in the Final documents.

4. Specific Responses: The issues raised in the 12 September 2012 policy compliance memorandum of CECW-PC are as follows:

Issue: Plans D and E – Dry Bulk Cargo Channel Segments - Main Ship Channel extension to the Massport Marine Terminal and the Mystic River access to Massport's Medford Street Terminal

OWPR Statement: The CWRB concurred that the recommendations for the Main Ship Channel extension to the MASSPORT Marine Terminal and the Mystic River access to MASSPORT's Medford Street Terminal would be contingent on further analysis and preparation of a Limited Re-evaluation Report during the design phase, as neither of these two terminals was yet occupied.

District Response: The District continues to concur with this approach. There are varying degrees of speculation with respect to the target imports and exports from the two Massport dry bulk facilities that are the subject of improvements to these two project segments. Limited Re-evaluation Reports will be prepared during the design phase on each.

Issue: Plan ABC – Main Channels Improvements for Container Cargo Benefits

OWPR Statement: The HQUSACE policy review team raised three basic issues with the economic analysis for the access to the Conley Terminal: 1) the landside analysis of transportation costs and determination of the portion of land transported cargo that could shift to ship transport to Boston; 2) waterside analysis of the vessels that might carry those shifting boxes at various depths with or without deepening; and 3) the analysis of vessel loading and sailing drafts used.

The reanalysis and supporting assumptions submitted by the New England District evaluated the economic effects of channel depths ranging from 46-49 feet MLL W for the Main Ship Channel to the Conley Terminal. Assumptions were made regarding vessel loading, trade routes, and other factors such as tidal delays. The results indicate that net benefits increase significantly with each additional foot of depth to a depth of 47 feet MLLW. Net benefits experience only a minimum increase between 47 and 48 feet MLLW, which is the depth where the maximum net benefits are realized. ER 1105-2-100 requires that where two cost-effective plans produce no significantly different levels of net benefits, the less costly plan is to be the

CENAE-EP-PN
SUBJECT: Boston Harbor Navigation Improvement Feasibility Study. PWI #013654-District Response to HQUSACE Planning Guidance Memorandum

NED plan, even though levels of outputs may be less. Based on the reanalysis submitted by the New England District, the HQUSACE policy review team concurs that the policy compliant NED plan consists of a 47-foot channel for the segment of the project that includes the Main Ship Channel to the Conley Terminal. Where appropriate, qualitative outputs such as the beneficial use of dredged material and reduced truck traffic and air quality impacts should be described to further support the recommended plan.

District Response: The District's revised Feasibility Report concludes that a 47-foot project depth for the inner harbor portions of the project reasonably maximizes net annual benefits in keeping with the requirements of ER 1105-2-100 (Appendix G) , Exhibit G-1, General Evaluation Guidelines. Since the increase of net benefits between the 47 foot plan and the 48 foot plan was only $500,000 per year, resulting in a flattening of the net benefits curve between those depth increments, then based on the guidelines the 47 foot plan becomes the recommended plan.

Issue: Additional Entrance Channel Depth Required for Entrance Channel

OWPR Statement: In accordance with ER 1110-2-1404, the depth of the entrance channel will reflect this 47-foot depth adjusted to address squat, sinkage in fresh water, the effect of wind and wave action, and safety and efficiency clearance. Should the non-Federal sponsor desire a Locally Preferred Plan (LPP) with deeper depths in either the main ship channel or in the entrance channel, a waiver from ASA(CW) is required.

District Response: The District has re-evaluated the entrance channel depth correction for vessel movement consistent with current engineering guidance. Agency Technical Review staff and the Boston Harbor Pilots were involved with the development of the criteria applied and in review of the technical evaluation and recommendation (see second part of Design Appendix D1). Recent specific Corps guidance was followed, as opposed to the more generic under keel PIANC guidance used in the 2008 report, and with reference to recent entrance channel analysis conducted by ERDC for New York Harbor. For a 47-foot project the recommended increase in entrance channel depth for vessel motion in the exposed conditions of Massachusetts Bay is 4 feet. The analysis concludes, and the Boston Harbor Pilots have confirmed, that a 48-foot draft containership will be able to safely transit the harbor using the top third of the tide with a 51-foot MLLW entrance channel and 47-foot MLLW main channel under wind and wave conditions present about 96 percent of the time.

CENAE-EP-PN
SUBJECT: Boston Harbor Navigation Improvement Feasibility Study. PWI #013654-District Response to HQUSACE Planning Guidance Memorandum

7. If further information is needed, please contact NAE Planning Branch Chief, Mr. John Kennelly at (978) 318-8505, the study manager, Mr. Mark Habel at (978) 318-8871, or the Boston Harbor project manager, Mr. Michael Keegan at (978) 318-8087.

Encls

Anthony T. Mackos, P.E.
Chief, Engineering/Planning Division

CF:
Joseph Forcina, NAD (DST)
Joseph Vietri, NAD
Naomi Fraenkel, NAD

Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909
Telephone (617) 568-5000
www.massport.com

February 27, 2013

Colonel Charles P. Samaris
District Engineer
New England District
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: Boston Harbor Deep Draft Navigation Improvement Project

Dear Colonel Samaris:

The Massachusetts Port Authority ("Massport") and the U.S. Army Corps of Engineers ("the Corps") New England District have had a long and productive history of working together to deepen and maintain the Port of Boston's navigation channels and we look forward to continuing this partnership under your leadership. We greatly appreciate the ongoing hard work of your staff on the Boston Inner Harbor Maintenance Dredging Project (BIHMDP), which is currently underway in the harbor, as well as on the Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP), for which the Final Feasibility Report/Supplemental Environmental Impact Statement/Environmental Impact Report ("Final FR/SEIS/EIR") will be submitted for public review in the coming weeks.

Massport has reviewed the Final FR/SEIS/EIR for the BHDDNIP. We concur with the report's conclusions and support the Recommended Plan of Improvement. Specifically, the following four improvements to Boston Harbor's system of General Navigation Features are proposed:

1. Deepen the federal navigation channels from Massachusetts Bay to Massport's Conley Container Terminal in South Boston to enable deeper draft containerships to access the Port. A depth of -51 feet at mean lower low water (MLLW) would be provided in the Broad Sound North Entrance Channel, and -47 feet in the Main Ship Channel between the Outer Confluence and the Reserved Channel, the President Roads Anchorage, the lower Reserved Channel, and the Reserved Channel Turning Area. The Main Ship Channel above the Roads would be widened to 900 feet below Castle Island and 800 feet above Castle Island, with additional width provided in the bends of the Main Ship and North Entrance Channels. Massport would deepen the two active berths at Conley Terminal to a depth of at least three feet greater than that provided in the improved channel.

2. Extend the deepening of the Main Ship Channel above the Reserved Channel Turning Area to the Massport Marine Terminal, at a depth of -45 feet MLLW and width of 600 feet. Massport or our tenant at this facility would provide a depth of at least -45 feet MLLW in the berth at the Marine Terminal. We understand this recommended

improvement is contingent on development of an active bulk cargo operation requiring the deeper channel prior to initiation of construction for the deeper channel.

3. Deepen an approximately 9-acre area of the 35-foot lane of the Mystic River Channel to -40 MLLW feet to improve access to Massport's Medford Street Terminal in Charlestown. Massport has already deepened the berth at this terminal to -40 feet MLLW and would maintain that depth in the future. We understand this recommended improvement is also contingent on development of an active bulk cargo operation requiring the deeper channel prior to initiation of construction for the deeper channel.

4. Deepen the existing 38-foot Chelsea River Channel to -40 feet MLLW. The channel would be widened by about 50 feet along the East Boston shore in the bend immediately upstream of the McArdle Bridge and in the bend downstream of the Chelsea Street Bridge. The channel would also be widened through the new navigation opening of the Chelsea Street Bridge. We understand this recommended improvement is contingent on replacement of the Chelsea Street Bridge by the Commonwealth of Massachusetts and the City of Boston, and the agreement of the five principal Chelsea River marine terminals to deepen their berths to at least -40 feet MLLW.

All of these improvements are integral to ensuring the future competitiveness, safety and security of the Port of Boston. The Port of Boston is New England's only full service port, providing infrastructure and value-added services to enhance the competitiveness of New England trade-dependent companies, and ultimately benefitting New England residents and consumers. The Port generates an estimated 34,000 total jobs and $2.4 billion annual economic impact to the Commonwealth of Massachusetts and the New England region, and provides significant environmental benefits by reducing the number of trucks and related air emissions on the region's roadways. Key port cargos include containerized cargo, petroleum products, and dry bulk cargo (automobiles, cement, road salt, gypsum and scrap metal) – most of which will benefit from the proposed improvements.

Of particular importance to Massport is the channel deepening to Conley Terminal. Container volumes at Conley have increased significantly since 1995 and we expect annual volumes to more than double over the coming decades to exceed 500,000 TEUs. The shipping lines calling Conley continually seek to bring larger ships into their east coast rotation and this pressure will increase once the Panama Canal expansion is completed. If the Port of Boston cannot accommodate the deeper draft vessels, the shipping lines will not call Boston and the cargo will need to be trucked into the region from other ports resulting in significant economic and environmental impacts.

Massport is actively working to increase our terminal capacity, efficiency and minimize our environmental impact to allow us to accommodate our projected future growth. Specifically, we recently completed the following projects:

- a $25 million repaving and equipment purchasing project to increase Conley Terminal capacity by 50 percent;
- Implementation of a terminal productivity improvement program and an upgraded terminal operating system;
- Increased the container handling footprint of Conley Terminal and purchased three additional dockside cranes and more yard equipment to support the increased vessel activity;
- Purchased the former Coastal Oil Terminal abutting Conley to preserve our future terminal expansion options;
- Implemented a comprehensive ISO 14001 Certified Environmental Management System;
- Retrofitted our existing yard equipment and purchase new "greener" equipment to reduce air emissions; and
- Converted all of our yard equipment to Ultra Low Sulfur Diesel to reduce air emissions.

In addition we are designing and planning to construct a dedicated freight corridor to Conley Terminal and Phase I of the expansion of container operations onto the former Coaster Oil property to accommodate further growth.

Contingent on the approval of Massport's Board and appropriation of the needed funding by our Board, the Commonwealth of Massachusetts or other funding sources, Massport intends to enter into a Design Phase agreement to share the cost of project design with the Corps. Design Phase activities are expected to commence as early as 2013 and be completed in two years. We understand the Design Phase cost for the Federal project features is estimated at $6,584,000, with Massport responsible for an initial 25 percent, or $1,646,000 plus an additional 10% or $658,000 prior to or after construction for a total design non-Federal cost share of $2,304,000.

We further understand that the Construction Phase costs for the Federal project features is estimated at $309,001,000 with the non-Federal sponsor responsible for an initial cost share of $94,389,000 based on: (1) division of cost-sharing between the cost of deepening the channels to 45 feet requiring a 25 percent cost share and the cost of deepening the channels beyond 45 feet requiring a 50 percent cost share; plus (2) the remaining non-Federal share of Design Phase costs allocated to deepening beyond 45 feet. The non-Federal sponsor will also provide an additional ten percent of the total design and construction costs at the completion of construction, currently estimated at $30,900,000, for a total non-Federal cost share of $125,289,000 in addition to approximately $5 million for berth dredging and other non-federal costs. We understand that construction commencement by the Corps is contingent on Congressional authorization of the project and appropriation of Federal funds. Construction is estimated to take approximately three years to complete. Massport intends to actively pursue funding for the non-Federal project costs, and to serve as the non-Federal sponsor, contingent on approval by our Board and appropriation of adequate funds.

Subject to the approval of Massport's Board and provision of the needed funding by our Board or other funding sources, Massport also intends to fully fund any work performed by

the Corps for design and construction activities associated with berth dredging, and will provide all lands, easements, rights of way and relocations (LERR) required for construction and future maintenance of the project. We further understand that any LERR costs incurred by Massport for construction of the project, currently estimated at $165,000, will be credited against the 10 percent post-construction share of project costs.

Massport is a legislatively-chartered independent State authority. Massport owns and operates Logan International Airport, the Conley Container Terminal, the Black Falcon Cruise Terminal, and several bulk cargo terminals. Massport has the statutory authority to set and collect fees for the use of its facilities, enter agreements for lease and operation of facilities, and issue bonds to raise funds for capital improvements of its facilities.

Massport is the non-Federal Sponsor for the BHDDNIP Feasibility Study, the 1990-authorized deepening of the harbor's major tributary channels constructed in 1998-2001 (the Boston Harbor Navigation Improvement Project), and construction of the confined disposal cells being constructed in the harbor for the ongoing BIHMDP. Massport has reviewed the cost-sharing and other responsibilities of the Sponsor as detailed in the Feasibility Report. Massport intends to work with the Commonwealth and other potential funding sources to provide the non-Federal share of design and construction of the improvements recommended in the Feasibility Report. The completed "Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents" is attached to this letter, as requested by the Corps.

We look forward to continuing to work with you and your staff on this exciting and critical project for the Port of Boston.

Sincerely,

Deborah A. Hadden
Acting Port Director

Enclosure: Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents

cc: Thomas Glynn, Massport CEO and Executive Director

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
SOUTH ATLANTIC DIVISION
60 FORSYTH STREET SW, ROOM 10M15
ATLANTA, GA 30303-8801

CESAM-PD-D (1105-2-40a) 21 February 2013

MEMORANDUM FOR MR. MICHAEL KEEGAN, PROJECT MANAGER, (CENAE-PP-P), USACE, NEW ENGLAND DISTRICT, 696 VIRGINIA ROAD, CONCORD, MA 01742-2751

SUBJECT: Certification and Completion of Agency Technical Review, Final Feasibility Report and Final Supplemental Environmental Impact Report for Deep Draft Navigation Improvement, Boston Harbor, Boston, Chelsea and Revere Massachusetts

1. References:

a. EC 1165-2-214, Civil Works Review, 15 December 2012

b. EC 1105-2-412, Assuring Quality of Planning Models, 31 March 2011

c. Memorandum, CECW-CP, 30 March 2007, Subject: Peer Review Process

d. Supplemental information for the "Peer Review Process" Memo, dated March 2007

2. In accordance with EC 1165-2-214, "Civil Works Review," dated 15 December 2012, Agency Technical Review (ATR) of the Final Feasibility Report and Final Supplemental Environmental Impact Report for Deep Draft Navigation Improvement of Boston Harbor, Boston, Chelsea and Revere Massachusetts has successfully been coordinated with and executed through the Deep Draft Navigation Planning Center of Expertise (DDNPCX).

3. We certify that ATR of the study documents has been completed and satisfies peer review policy requirements outlined in Engineering Circular (EC) 1165-2-214, Civil Works Review, dated 15 December 2012. All outstanding issues have been addressed and satisfied. The ATR Completion Report and the DrChecks Report are enclosed. The review Team Leader is Ms. Candida Bronson, CESAJ-PD-PN and the DDNPCX point of contact is Mr. Johnny L. Grandison, CESAM-PD-D, (251) 694-3804.

Johnny L. Grandison

Encls JOHNNY L. GRANDISON
Review Manager, DDNPCX

CF:
CESAJ-PD-PN/BRONSON
CESAD-PD-S/PAYNE
CESAD-PD-/SMALL
CESAD-PD-S/STRATTON

COMPLETION OF AGENCY TECHNICAL REVIEW
FINAL FEASIBILITY REPORT and FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT/ MASSACHUSETTS FINAL ENVIRONMENTAL IMPACT REPORT for DEEP DRAFT NAVIGATION IMPROVEMENT

BOSTON HARBOR, BOSTON, CHELSEA AND REVERE MASSACHUSETS

March 2013

The Agency Technical Review (ATR) has been completed for the Boston Harbor, Deep-Draft Navigation Final Feasibility Report and Final Supplemental Environmental Impact Statement. The ATR was conducted as defined in the project's Review Plan to comply with the requirements of EC 1165-2-214.

A panel of five reviewers was established by the Deep Draft Navigation Planning Center of Expertise (DDNPCX), the Review Management Organization (RMO) that managed the conduct of this review. The ATR was initiated on 2 January 2013 and was completed on 7 February 2013.

During the ATR, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions, methods, procedures, and material used in analyses, alternatives evaluated, the appropriateness of data used and level obtained, and reasonableness of the results, including whether the product meets the customer's needs consistent with law and existing U.S. Army Corps of Engineers (Corps) policy. The ATR also assessed the District Quality Control (DQC) documentation and made the determination that the DQC activities employed appear to be appropriate and effective. All comments resulting from the ATR have been resolved and the comments have been closed in DrChecks. A complete copy of the final ATR report from DrChecks is enclosed.

We certify that the ATR of the Boston Harbor, Deep-Draft Navigation Final Feasibility Report and Final Supplemental Environmental Impact Statement was performed as required by EC 1165-2-214.

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12 Feb 2013

Candida K. Bronson
ATR Team Lead
CESAJ-PD-PN

Date

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12 Feb 2013

Michael F. Keegan
Project Manager
CENAE-PP-P

Date

21 Feb 2013

Johnny Grandison
Review Management Organization
Representative DDNPCX

Date

CERTIFICATION OF AGENCY TECHNICAL REVIEW

FINAL FEASIBILITY REPORT and FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT/ MASSACHUSETTS FINAL ENVIRONMENTAL IMPACT REPORT for DEEP DRAFT NAVIGATION IMPROVEMENT

BOSTON HARBOR, BOSTON, CHELSEA AND REVERE MASSACHUSETS

March 2013

There are no remaining open comments, and all concerns resulting from the ATR of the project have been fully resolved.

22 Feb 2013

John R. Kennelly
Chief, Planning Branch
New England District

Date

Anthony T. Mackos, P.E.
Chief, Engineering/Planning Division
New England District

Date

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

REPLY TO
ATTENTION OF

CECW-P

12 April 2012

MEMORANDUM FOR Director, National Deep Draft Navigation Planning Center of Expertise (DDN-PCX)

SUBJECT: Boston Harbor Deep Draft Navigation Improvement Project Feasibility Study, Economic Spreadsheet Model Approval

The economic spreadsheet model for estimating transportation cost savings and tide delay benefits for the Boston Harbor Deep Draft Navigation Improvement Project is approved for use. Adequate technical reviews have been accomplished and the model meets the certification criteria contained in EC 1105-2-412. Documentation of the model and its use must be included in the feasibility report for the study. This approval for use is based on the decision of the HQUSACE Model Certification Panel which considered the DDN-PCX assessment of the model. There are no unresolved issues at this time.

APPLICABILITY: This approval for use is limited to the subject feasibility study.

HARRY E. KITCH, P.E.
Deputy Chief, Planning and Policy Division
Directorate of Civil Works

PART 2

CORRESPONDENCE DURING RE-COORDINATION AND PREPARATION OF THE FINAL FEASIBILITY REPORT AND FINAL SUPPLEMENTAL EIS/EIR

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/newengland

Re: Update of Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project

January 11, 2013

Mr. John Kennelly
Chief of Planning
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

This letter is in response to your letter dated October 11, 2012, and the U.S. Fish and Wildlife Service's New England Field Office (NEFO) past review of the Draft Environmental Report/Draft Supplemental Environmental Impact Statement (DEIR/DSEIS) for the Boston Harbor Deep Draft Navigation Improvement Project, located in Boston, Massachusetts. NEFO appreciates the opportunity to review the updated FR and the FSEIS/FEIR and to provide comments on the reduced scope of improvements being proposed for Boston Harbor.

As stated in your letter, NEFO previously provided several items of correspondence for this project and a synthesis of past letters follows: 1) in correspondence dated June 2, 2008, NEFO submitted comments along with other Department of Interior bureaus regarding our NEPA review of the DEIR/DSEIS; 2) in correspondence dated May 29, 2007, NEFO provided comments pertaining to our Fish and Wildlife Coordination Act 2b report pursuant to the Fish and Wildlife Coordination Act of 1956 (16 U.S.C. 742a, *et seq.*); and 3) in correspondence dated May 14, 2008, NEFO provided information pursuant to the Endangered Species Act (ESA) (87 Stat. 884, as amended; 16 U.S.C. 1531, *et seq.*).

As outlined in your most recent letter, you have requested a determination whether NEFO's previous comments summarized above in numbers 1) and 2) are still applicable. We have reviewed the information you recently provided and based on the proposed modification to the project description have determined that our original comments remain applicable.

Almost five years have passed since the original request for information on the presence of federally listed or proposed, threatened or endangered species was received. Therefore, we have reviewed information currently available to us, and have determined that no federally listed or proposed, threatened or endangered species or critical habitat under jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area. No further ESA coordination is

necessary for a period of one year from the date of this letter, unless project plans change or if additional information on listed and proposed species becomes available.

Furthermore, to alleviate the need to annually contact NEFO in the future for updated lists of federally listed or proposed, threatened or endangered species and critical habitats, please visit the Endangered Species Consultation page on the NEFO website:

www.fws.gov/newengland/endangeredspec-consultation.htm (accessed January 2013)

We appreciate the opportunity to provide more current information relative to our trust resources and wildlife issues. If you have any questions regarding this letter, please contact Maria Tur of my office at (603) 223-2541.

Sincerely yours,

Thomas R. Chapman
Supervisor
New England Field Office

BOSTON HARBOR PILOT ASSOCIATION, LLC, 256 Marginal Street, Building 11, East Boston, MA 02128

21 December 2012

Mike Keegan, P.E.; L.C.S.
Project Manager
Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Keegan:

Thank you for soliciting our input regarding the current operating guidelines on Boston Harbor and how the pilots would operate if the Boston Broad Sound North Channel and Boston Main Ship Channel were deepened.

Since the last improvement in 2001, we have been safely bringing in 42 foot draft containerships near the top of the tide. Originally after the 2001 improvement we had a controlling depth of 39.4 feet in the North Channel. Subsequent maintenance has restored that channel to its authorized depth of 40 feet. We also operated with a controlling depth of 38.1 feet in the Main Ship Channel. Additional maintenance efforts have also removed this shoaling and restored the channel to its authorized depth.

In our discussions you indicated that the Corps has recommended an improvement to deepen the Main Ship Channel to 47 feet. We also understand that your office has taken into account various factors such as vessel squat, roll, pitch, wind and wave action in determining the proposed depth of 51 feet in the Broad Sound North Channel. With a 51 foot channel depth in the North Channel we would expect to be able to safely transit t containerships having a draft of 48 feet or greater.

Pilots make the decision when (or if) a ship will enter the various channels en route to the berth. The decision is most often based upon the tide, and sometimes, the tide and the weather. To explain our procedures, when a deep-draft containership is scheduled to call the Port of Boston, the ship's local agent will fax a request for "tide windows" days, or perhaps a week, prior to the ship's arrival in Boston. The expected draft of the ship is provided to us in the fax request. The request is often for a three or four day ETA period asking us which hours the ship can and cannot enter the channel due to the ship's draft with respect to the predicted tide. Using the information provided by the pilots, the agent then weighs schedule and labor considerations, and then places an order for a pilot for a specific time. If, on the day of arrival (or departure), the wind and sea conditions are not suitable to transit the channels, the pilot assigned to the ship would postpone the transit for a later time.

A typical inbound transit from the pilot station takes approximately one hour to the Main Ship Channel Buoys "1" and "2" near Spectacle Island. This is the point where the ship will have reduced its speed to about 6 or 7 knots to meet its tug boats. The pilot will adjust the ship's speed to arrive at the ordered time, so, often ship speeds are low during the transit to meet the tug at the required time. If the pilot boards at a later time, the average speeds would be greater.

With the current channel depths at Boston Harbor a typical transit for a 41' draft containership on a day with a 9.1' tide may look like this:

From:	To:	Distance (miles)	Time (minutes)	Av. Speed (knots)	Tide (feet)	Controlling Depth (ft.)	UKC (feet)
Pilot Station	BG	1.00	7	8.6	5.6		
"BG"	"NC"	2.27	21	6.5	6.4		
"NC"	North Channel "3"	1.04	9	6.9	7.1		
North Channel "3"	SW of "PR"	1.73	15	6.9	7.4	40	4.39
SW of "PR"	Long Is. Head	0.81	6	8.1	7.8		
Long Is. Head	Main Ship "2:	1.05	8	7.9	8		
Main Ship "2:	Main Ship "4"	0.38	4	5.7	8.2		
Main Ship "4"	Main Ship "6"	0.42	5	5.0	8.3	40	4.82
Main Ship "6"	Main Ship "10"	0.79	10	4.7	8.45		
		9.49	**85**	**6.7**			

The same transit with a 48' draft, fully loaded 8000 TEU container ship with the proposed improvements in Boston Harbor, may look like this:

From:	To:	Distance (miles)	Time (minutes)	Av. Speed (knots)	Tide (feet)	Controlling Depth (ft.)	UKC (feet)
Pilot Station	BG	1.00	7	8.6	5.6		
"BG"	"NC"	2.27	21	6.5	6.4		
"NC"	North Channel "3"	1.04	9	6.9	7.1		
North Channel "3"	SW of "PR"	1.73	15	6.9	7.4	51	8.08

SW of "PR"	Long Is. Head	0.81	6	8.1	7.8		
Long Is. Head	Main Ship "2:	1.05	8	7.9	8		
Main Ship "2:	Main Ship "4"	0.38	4	5.7	8.2		
Main Ship "4"	Main Ship "6"	0.42	5	5.0	8.3	47	6.73
Main Ship "6"	Main Ship "10"	0.79	10	4.7	8.45		
		9.49	**85**	**6.7**			

The 8000 TEU ship would be able to maintain sufficient under keel clearance up to a speed of about 13.75 knots, in an improved North Channel.

Although the above examples are for a day with a 9.1 foot high tide, Boston Harbor's *median* high tide is 10.1 feet. This compares to approximately only 5.0 feet in New York Harbor, and 2.6 feet in Hampton Roads, Virginia.

Because of the rapid rate of rise of the tide, and the relatively short run, using the rising top one-third of the tide (or later) is standard safe practice in Boston on containership calls. Similar practice is found with other deep draft ships (e.g., tankers bound for Chelsea River) to obtain sufficient under keel clearance, but with their lighter drafts, this practice can be achieved on the top half of the tide, or earlier.

Currently, during any transit, even with 35' tankers entering the North Channel, when wave and wind conditions result in significant pitch or roll, entry of ship is delayed until the conditions subside and the tide allows.

Thank you again for allowing us to provide input for this crucial project.

Sincerely,

Andy Hammond
Executive Director

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT GOVERNOR

Richard K. Sullivan, Jr.
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

December 12, 2012

Stewart Dalzell, Deputy Director
Environmental Planning and Permitting
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909

Re: Request for Advisory Opinion
EEA #12958 Boston Harbor Deep Draft Navigation Improvement Project

Dear Mr. Dalzell:

I am writing in response to your letter of November 20, 2012 in which you requested an advisory opinion as to whether changes to the above-referenced project require revisions to the Scope of the Final EIR. A Certificate on the Draft Environmental Impact Report (DEIR) was issued on June 13, 2008 and included the Scope of the Final EIR.

According to your letter and attachment (Executive Summary Figure), the project change consists of a one-foot reduction in project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal. Project depth will be reduced from 48 feet to 47 feet at mean lower low water (MLLW). This change was proposed in response to additional economic studies conducted by the U.S. Army Corps of Engineers (ACOE). No other changes are proposed to project elements that were described and analyzed in the DEIR.

Based on the review of the information you presented, I concur that the project changes do not warrant filing of a Notice of Project Change (NPC) or revisions to the Scope for the FEIR. Please contact Deirdre Buckley, MEPA Analyst, at (617) 626-1040 if you have any questions concerning this matter.

Comment MEPA #1

Sincerely,

Maeve Vallely-Bartlett
Assistant Secretary

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

December 10, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Louis A. Chiarella
Assistant Regional Administrator for Habitat Conservation
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Mr. Chiarella:

This letter is written in response to your Magnuson-Stevens Fishery Conservation and Management Act (MSA) Essential Fish Habitat (EFH) conservation recommendations dated November 26, 2012 for the Boston Harbor Deep Draft Improvement Project (Deep Draft Project) Feasibility Report and Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR). The MSA requires Federal agencies to provide a written response to the National Marine Fisheries Service (NMFS) within 30 days after receiving EFH conservation recommendations. In the case of a response that is inconsistent with NMFS' conservation recommendations, we must explain our reasons for not following the recommendations, including the scientific justification for any disagreements with NMFS over the anticipated effects of the action or the measures needed to avoid, minimize, mitigate, or offset such effects.

As described in your letter, the following EFH conservation recommendations were provided to us. It is acknowledged that your agency took a risk-averse approach to the issuance of the EFH conservation recommendations in light of your determination that the Deep Draft Project lacks site-specific details at this time. The EFH conservation recommendations are as follows:

1. To avoid impacts to winter flounder spawning, egg, larvae, and juvenile development habitat, no dredging or underwater blasting should be conducted between February 1 to June 15 of any year in any areas of the Mystic River and Chelsea River, and the Reserved Channel, and the Main Ship Channel and Turning Basin landward of the Conley Terminal.
2. In order to protect EFH forage species, no dredging or underwater blasting should be conducted between March 1 to June 30 of any year in any areas of the Mystic River and Chelsea River channels and private terminal berths, the Reserved Channel and terminal berths at Massport facilities, the Main Ship Channel and terminal berths, and the Turning Basin west of the Conley Terminal to avoid adverse impacts on upstream spawning migrations of alewife, blueback herring, rainbow smelt.

3. For the remaining sections of the BHDDNIP (i.e., Main Ship Channel east of the Conley Terminal, President Roads Anchorage, Broad Sound North Entrance Channel, maintenance of the 35-foot deep lane of the North Entrance Channel, 30-foot deep Broad Sound South Entrance Channel, 15-foot deep Nubble Channel and 35-foot deep MLLW Barge Anchorage), an underwater blasting plan should be developed during the Planning, Engineering, and Design phase of the proposed project. The underwater blasting plan should be directed and developed on an underwater blasting technical working group, which should be convened as soon as possible to begin evaluating data from the proposed Boston Harbor Main Ship Channel rock removal project, as well as gathering information from other past underwater blasting projects in this and other regions. This technical working group should identify and evaluate the most current knowledge on the science and management of underwater blasting and monitoring needs that can be directly related to the proposed BHDDNIP. Recommendations of this Technical Working Group should be incorporated into the FSEIS/FEIR.
4. Alternate beneficial reuse of rock material that avoid and minimize adverse impacts on biologically productive soft bottom habitats should be evaluated more fully within the FSEIS/FEIR, including using the rock for upland construction purposes and the use for ongoing shore protection projects.
5. The results of the demonstration capping project within the IWS (Industrial Waste Site) should be evaluated within the FSEIS/FEIR in order to determine the efficacy of using the dredged material from the proposed BHDDNIP to cap the IWS and to assess potential impacts to biological communities within the MBDS (Massachusetts Bay Disposal Site).

We will respond to your EFH conservation recommendations in the order presented above.

EFH Conservation Recommendation 1: In your first conservation recommendation, it was suggested by your agency that no dredging or underwater blasting occur in any areas of the Mystic River and Chelsea River, and the Reserved Channel, and the Main Ship Channel and Turning Basin landward of the Conley Terminal between February 1 and June 15 to protect winter flounder spawning, egg, larvae, and juvenile development habitat. We assume that "landward of the Conley Terminal" means up-river of the turning basin in the Main Ship Channel.

Only a small portion of the Mystic River navigation channel located opposite the Medford Street Terminal is proposed to be deepened; no underwater blasting is proposed for this area. The proposed area to be dredged is relatively small, especially when compared to the total amount of available area in the Mystic River for winter flounder habitat; therefore no significant impact to overall winter flounder habitat from dredging impacts is expected in the Mystic River.

In the Chelsea River, the current 38-foot channel would be deepened to 40 feet. The only blasting that would occur is in the turning basin located at the head of the navigation channel. In the Main Ship Channel, all dredging and blasting associated with the Deep Draft Project would occur downstream of the I-90 tunnel in navigation channels already -35 feet deep MLLW or deeper, except for minor widening of the turning basin.

Winter flounder spawn in shallow waters less than six meters (<20 feet) deep (EFH, 1999). The navigation channels proposed to be deepened in Boston Harbor are -35 feet MLLW or more. Thus, the navigation channels would not be considered prime winter flounder spawning habitat.

Plume monitoring was conducted between 1998 and 2000 for the Boston Harbor Navigation Improvement Project (BHNIP). Monitoring was conducted when both navigation channels were dredged and during disposal into Boston Harbor CAD cells. Plume monitoring was also conducted for the Inner Harbor Maintenance Dredging Project (IHMDP) in 2008 (Battelle, 2009). This monitoring showed that the plume stayed confined to the navigation channel. The only exception was the area just south of Castle Island where variable currents carried a filament of the plume out of the channel as far as 650 feet, away from the potential winter flounder spawning area near Governors Island. Maximum turbidity levels within the plume were low (~12 NTU above background).

Therefore, while we disagree with this EFH conservation recommendation for the above areas proposed for navigation channel deepening, we will seek to accommodate the February 1 to June 15 environmental window to avoid dredging in the most sensitive areas for winter flounder to the extent practicable. We will coordinate with the Technical Working Group (TWG) to help determine the extent of sensitive areas and period of concern for the various areas of the harbor during that timeframe. This restriction, however, will need to be evaluated during the Planning, Engineering and Design Phase (Design Phase) once the overall project sequencing plans are developed and taking into account potential blasting and air quality emission impacts.

EFH Conservation Recommendation 2: The second EFH conservation recommended that no dredging or underwater blasting be conducted between March 1 to June 30 in any area of the Mystic River and Chelsea River channels and private terminal berths, the Reserved Channel and terminal berths at Massport facilities, the Main Ship Channel and terminal berths, and the Turning Basin west of the Conley Terminal to avoid adverse impacts on upstream spawning migrations of alewife, blueback herring, rainbow smelt.

As mentioned above, both the BHNIP and the IHMDP plume monitoring showed that, except for the area just south of Castle Island, the plume stays confined to the navigation channel.

The proposed deepening of the Chelsea River would increase the depth of the entire navigation channel by an additional two feet. Dredging, and potential underwater blasting, would affect a large portion of the Chelsea River. Based on the above plume monitoring results, and the large areas of the harbor not impacted by a dredge plume, no impedance to upstream spawning migrations of alewife, blueback herring, and rainbow smelt is expected during dredging. However, given its confined nature, dredging in the Chelsea River could potentially impede upstream migration of fish species that may be present. We will coordinate with the TWG to determine what species are present at what time of year and then determine the appropriate means to minimize impacts, if necessary.

Underwater blasting could occur in various areas of the harbor during the course of the project. The U.S. Army Corps of Engineers (USACE) is committed to reducing blasting impacts to all fish species in the harbor by instituting protective measures as developed from previous lessons learned in prior dredging projects, and through coordination with affected agencies in the development of an overall blasting approach. Measures taken to reduce these blasting impacts will likely include: stemming, blast delays, use of fish observers, sonar monitoring, and a fish startle system to deter fish. It may also include sequencing of the work effort at various portions of the harbor as well. Lessons learned from the Boston Harbor rock removal project conducted in 2007 and 2008, which were instituted for the 2012 rock removal effort, will be incorporated into blast mitigation measures for the project. These measures proved effective in that no fish kills were observed during this project (rock removal in 2012 from Boston Harbor). An underwater blasting TWG will be formed during the Design Phase to explore the practicality and feasibility of any potential mitigative measures (including project sequencing). Recommendations agreed to by the TWG and the USACE to reduce potential blast impacts will be incorporated into the design specifications for the Deep Draft Project.

This EFH conservation recommendation also noted that a TWG should identify and evaluate the most current knowledge on the science and management of underwater blasting and monitoring needs that can be directly related to the proposed Deep Draft Project. Recommendations of this Technical Working Group should be incorporated into the FSEIS/FEIR.

It should be noted that funding will not become available for use in the development of the underwater TWG and the subsequent development of blasting mitigation measures until the project enters the Design Phase. Therefore, any recommendations of this TWG cannot be incorporated into the FSEIS/FEIR.

Conservation Recommendation 3: The third conservation recommendation requested that a plan incorporating blasting mitigation measures be developed during the Design Phase of the proposed project. We agree with this conservation recommendation to extent that we will work with the Technical Working Group to develop a rock removal approach that seeks to minimize impacts to critical resources during sensitive time periods in the various areas of the harbor.

The Design Phase of the project includes an extensive program of borings and probes to supplement and refine the results of the acoustic surveys and historic boring data that the Feasibility Report relied on for its estimates. This work is scheduled to be accomplished during the first year of the Design Phase. Once the subsurface exploration program is completed, we will have determined where in the channel rock is located and the characteristics of that rock. In the Feasibility Report, all potential hard material identified by the acoustic surveys was classified as rock requiring blasting for removal. This is assumed to be a worst case scenario as prior work in Boston and other New England harbors in recent years have shown that acoustic surveys overestimate the volume of bedrock.

We will then determine where blasting may be required and the appropriate rock removal method from each project segment. Using this information, the USACE and Massachusetts Port

Authority (Massport) will work with interested TWG agencies to refine approaches for the range of possible rock removal methods that may be used for the project. These approaches will be developed in concert with the larger construction sequencing plan for the entire project.

EFH Conservation Recommendation 4: The fourth EFH conservation recommended that alternate beneficial reuse of rock material should be evaluated more fully within the FSEIS/FEIR, including using the rock for upland construction purposes and the use for ongoing shore protection projects. We agree with this EFH conservation recommendation that the beneficial reuse of rock be discussed in the FSEIS/FEIR, but given the fact that this alternative has not yet been defined for the reasons identified below it can only be discussed in a general manner.

As a matter of USACE policy, rock and other dredged material should always be considered first as a public resource. Many environmental resource agencies raised concerns about the potential loss of hard bottom habitat when dredging hard bottom is proposed at any project in New England. Accordingly, our first consideration was to reuse any rock material removed to create new hard bottom habitat. However, some resource agencies believe that creation of additional hard bottom habitat in Massachusetts Bay at the expense of covering existing soft-bottom habitat may not be desirable.

In order for the USACE to recommend including a beneficial use component in the project, it must either (1) entail no or minimal additional cost to the Government, (2) have any additional cost paid for by non-Federal interests, or (3) involve a use where the benefits outweigh the additional cost, and have any additional cost to the project cost-shared between the USACE and a non-Federal public agency. Accordingly, a zone of feasibility for reef creation siting was established whereby the reduced hauling costs to the more distant MBDS would be offset by any additional project costs for beneficial use site investigations, controlled dumping practices, and monitoring of site recovery and recolonization.

In addition to reef habitat creation, some or all of the removed rock could prove suitable for other beneficial uses such as making the rock available to industry for processing as aggregate or for other construction purposes. Making the rock available to State agencies or area municipalities for use in public projects, particularly shore protection, was considered during preparation of the Draft Feasibility Report, but no parties interested in receiving the rock at their cost were identified. Therefore, the Federal base plan for rock disposal as laid out in the Feasibility Report and FSEIS/FEIR is placement at the MBDS. The Design Phase of this project will include additional consultation and collaboration with interested agencies and others to determine what, if any, economically practical beneficial use options for this material may exist at the time of construction and what parties are interested in receiving that material for their own uses. At this time however, without interested parties and uses identified, there are no quantifiable beneficial uses to evaluate.

EFH Conservation Recommendation 5: The last EFH conservation recommendation suggested that the results of the demonstration capping project within the IWS (Industrial Waste Site) be evaluated within the FSEIS/FEIR in order to determine the efficacy of dredged material to cap the IWS and to assess potential impacts to biological communities within the MBDS (Massachusetts Bay Disposal Site). We agree with this EFH conservation recommendation.

Results of the pilot project to demonstrate the efficacy of using the dredged material to cap barrels at the IWS will be summarized in the FSEIS/FEIR with reference to a detailed report to be published in the spring of 2013. The results of this pilot project showed that the potential to cap barrels at the IWS should be successful.

Our DAMOS Program has monitored the benthic community at MBDS for several decades. The results of this monitoring are also summarized in the FSEIS/FEIR and clearly show that the benthic community recovers after placement of dredged material at the disposal site.

In summary, the USACE, in partnership with the Massport, is committed to continuing coordination with the Boston Harbor Technical Working Group throughout the Design and Construction Phases of the project. Sub-groups of the TWG will be convened as needed to address specific issues, including those mentioned by your office. In particular, the sub-groups could help develop and comment on construction sequencing plans including rock removal, and consideration of beneficial use options for the rock and other dredged material.

We look forward to working with your office in continuing to refine how we address potential project impacts during the Design and Construction Phases and to bring this project to a successful completion. In the event that you have any questions or comments about the above proposals, please contact Ms. Catherine Rogers at (978) 318-8231 or via email at catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:

Stewart Dalzell, Deputy Director
Environmental Planning and Permitting
Massachusetts Port Authority
One Harborside Drive
Boston, Massachusetts 02128

References

Battelle. 2009. Final Summary Report Plume Monitoring Boston Harbor Inner Harbor Maintenance Dredging Project. Submitted to: U.S. Army Corps of Engineers, New England District. Contract Number: DACW33-03-D-0004, Delivery Order Number:44.

EFH. 1999. Essential Fish Habitat Designations within the Northeast Region (Maine to Virginia), Working Copy. NOAA/National Marine Fisheries Service, Gloucester, MA.

FEIR/FEIS. 1995. Boston Harbor, Massachusetts Navigation Improvement Project and Berth Dredging Project Final Environmental Impact Report and Final Environmental Impact Statement. Prepared by the U.S. Army Corps of Engineers, New England Division and the Massachusetts Port Authority.

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE, BLDG 301
BROOKLYN, NY 11252

REPLY TO

CENAD-PD-CS

7 December 2012

MEMORANDUM FOR Commander, Headquarters, US Army Corps of Engineers, (CECW-NAD/Mr. Luisa), 441 G Street, NW, Washington DC 20314

SUBJECT: Boston Harbor, MA – CWIS 013654; P2: #109034

1. References:

a. Memorandum, CENAE-PP-P, 23 Nov 12, subject: Boston Harbor Deep Draft Navigation Improvement Study, Draft Feasibility Report and Supplemental Environmental Impact Statement, PWI#013654

b. Memorandum, CEMP-NAD, 26 Sep 12, subject: Boston Harbor Navigation Improvements Study – Additional Economic analyses to respond to HQUSACE Policy Comments on the Final Feasibility report and Supplemental Environmental Impact Statement (SEIS).

2. The Division has reviewed the enclosed District response (Reference 1a) to HQUSACE guidance (Reference 1b) concerning the recommended plan, and we concur with the technical path forward, as laid out by the District. The District has committed to providing the revised feasibility report and all requisite items, in accord with the requirements of Engineer Regulation (ER) 1105-2-100, to HQUSACE by 20 February 2013 (CW 160 Final Report Submission to HQUSACE - P2 milestone date). Additional commitments locked into P2 by the District include: the CW 170 Report approval milestone on 28 March 2013 and the CW 270 Chief's Report milestone on 22 July 2013.

3. Bringing the feasibility study to closure from this point forward will require a fully integrated team effort in order to secure a Chief's Report in 2013. In order to facilitate this process, we request your assistance to ensure HQUSACE corporate agreement. If there are any concerns with the approach laid out by the District, we request that you advise us as soon as possible in order to avoid delays in report completion and approval.

4. The point of contact for this action is Mr. Joseph Vietri. Mr. Vietri may be reached at (347) 370-4570.

Encls.

LINDA MONTE
Acting Chief, Civil Works Integration Division

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

December 4, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Victor Mastone, Director
Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2136

Dear Mr. Mastone:

The U.S. Army Corps of Engineers, New England District (USACE) has been in contact with your office concerning the recent change in scope for the Boston Harbor Deep Draft Navigation Improvement Project. We appreciate your prompt reply and concurrence that you have no additional comments based on the change in project scope.

For clarification purposes, we would like to reiterate the original recommendations for additional archaeological investigations to be conducted as part of this project:

Chelsea River Channel Deepening: This plan consists of deepening the Chelsea River Channel from its currently authorized depth of -38 feet mean lower low water (MLLW) to a depth of -40 feet MLLW. The work involves dredging to deepen the channel within the existing channel limits, except for two small bends in the Chelsea River Channel that must be widened to accommodate larger vessels. An area immediately upstream of the A.P. McArdle Bridge, and an area of the bend between the bridges just downstream of the Sunoco Logistics Terminal, both along the East Boston side of the channel, would be widened by no more than 50 feet. A third area around the Chelsea Street Bridge has already been widened in a previous Corps dredging effort that was coordinated with your office and is no longer part of the current project.

A remote sensing archaeological survey of the two sections to be widened is recommended in order to identify the possible presence of submerged archaeological resources including shipwrecks in these areas. The original remote sensing survey of the Federal navigation channel (Mulholland et al. 2003) did not include the Chelsea River. Borings of the Chelsea River Channel are also proposed for the project's design phase to confirm material types and examine the areas of channel widening for the presence of buried land surfaces and pre-Contact archaeological sites.

Mystic River – Medford Street Terminal Access Deepening: Your letter also mentions investigation of the Mystic River Channel. The plan of improvement includes deepening an area of the existing 35-foot channel to 40 feet. This area accesses Massport's Medford Street

Terminal in Charlestown. Massport has already deepened its berth at this terminal to -40 feet. As this area was deepened in the past to reach the current -35-foot depth and sampling shows the improvement material to be blue clay, no plans for further investigation were included in our 2008 plan.

Disposal of Dredged Material under all Channel Improvement Plans: The Massachusetts Bay Disposal Site (MBDS) is the Federal base plan for disposal of all dredged material from the deep draft navigation improvement project, including rock. The MBDS was designated by the US EPA for disposal of dredged material in 1992 after preparation of an Environmental Impact Statement. The former Industrial Waste Site (IWS) is located north of and overlaps the northern portion of the MBDS. The IWS was used from the 1940s to 1970s for disposal of chemical, medical and low level radiological waste. The site was also used for general disposal of dredged material, construction debris, and other materials before and during that time. Remains of waste barrels are located throughout the IWS and most are concentrated in several areas. The Corps and US EPA are investigating the potential to use the improvement project's millions of cubic yards of unconsolidated dredged materials to form a cap over these barrel "fields". A side scan sonar survey of the IWS and portions of the MBDS was conducted by US EPA Region I in July 2006. A number of shipwrecks were identified within the IWS and the MBDS in the area where those two sites overlap.

The MBDS and IWS are located seaward of the territorial sea (three-mile limit) in Federally regulated waters. If the IWS is ultimately recommended for capping via beneficial use of the dredged material from the improvement project, further data on the significance of the wrecks may be required if the capping plan was determined to have an impact on those resources. If impacts are unavoidable, a Phase II site examination level survey of the wrecks may be needed to determine the boundaries of these potentially significant resources and determine whether any are eligible for listing on the National Register of Historic Places. The scope of any studies and results would be coordinated with EPA. However, given the large area available for disposal and capping at these sites, unavoidable impacts are unlikely. Disposal activities, including any capping of areas of the IWS would be designed to avoid any shipwrecks determined to be significant.

Disposal of Rock: Rock removed from the project has been proposed for beneficial use by the State and other parties. Most proposals involve the rock being delivered ashore for others to transport for use on projects not involving the Corps. However, one proposal for use of the rock would involve the creation of reef habitat in Massachusetts Bay including Broad Sound. Any areas identified for rock reef creation would require coordination and potentially investigation to determine if cultural resources of significance could be impacted, and plans modified to avoid such impacts.

If you have any questions or concerns regarding these recommendations, please contact Mr. Marc Paiva of the Evaluation Branch at 978-318-8796.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:
Ms. Brona Simon, Executive Director and SHPO
Massachusetts Historical Commission
The Massachusetts State Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

December 4, 2012

Engineering/Planning Division
Evaluation Branch

Mr. Timothy L. Timmermann, Associate Director
Office of Environmental Review
U.S. Environmental Protection Agency, Region 1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Dear Mr. Timmermann:

We are writing in response to your comments in a letter dated November 9, 2012 regarding updates we provided to you in order to finalize the Boston Harbor Deep Draft Improvement Project Feasibility Report and Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR). Your office provided comments to assist us in finalizing the FSEIS/EIR on air issues and marine issues. This letter is being written in response to marine issues only; in particular, proposed blasting activities and rock reef creation. Responses related to air issues and comments will be incorporated into the FSEIS/EIR.

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is committed to continuing coordination with the Boston Harbor Dredging Technical Working Group (TWG) throughout the Design and Construction Phases of the project. Sub-groups of the TWG will be convened as needed to address specific issues, including those mentioned by your office. In particular, the sub-groups could help develop and comment on construction sequencing plans including rock removal, air quality conformity (if mitigation is found necessary), and consideration of beneficial use options for the rock and other dredged material. Additional information regarding proposed rock removal activities and rock reef creation are provided in more detail below.

Proposed Blasting Activities - The Design Phase of the project includes an extensive program of borings and probes to supplement and refine the results of the acoustic surveys and historic boring data that the Feasibility Report relied on for its estimates. This work is scheduled to be accomplished during the first year of the Design Phase. Once the subsurface exploration program is completed, we will have determined where in the channel rock is located and the characteristics of that rock. In the Feasibility Report, all potential hard material identified by the acoustic surveys was classified as rock requiring blasting for removal. This is assumed to be a worst case scenario as prior work in Boston and other New England harbors in recent years have shown that acoustic surveys overestimate the volume of bedrock.

Once the subsurface design effort is completed, the USACE will determine if blasting is required for all or part of the rock to be removed from each project segment. Using this information, the USACE and Massport will work with interested TWG agencies to refine plans for the range of possible rock removal methods that may be used for the project. These plans will be developed in concert with the larger construction sequencing plan (discussed separately) for the entire project.

The subsurface effort may show areas where rock can be removed economically by means other than drilling and blasting. During construction of the last Boston Harbor Navigation Improvement Project between 1998 and 2001, areas of rock in the Reserved Channel Turning Area and in the Inner Confluence at the head of the Main Ship Channel were removed by ripping the ledge with a large toothed bucket. The cut into the ledge in those areas was shallow; approximately two feet, and those outcrops at that shallow depth were sufficiently weathered and fractured to permit this method of removal. Some strata, while not sufficiently fractured to permit bucket ripping, may prove removable by other mechanical means, such as a hydraulic hammer, as has been used in the deepening of the Elizabeth River Channel in New Jersey. A hydraulic hammer was used in the spring 2008 removal of several small rock pinnacle areas in the Broad Sound North Entrance Channel. Some rock areas for the Boston Harbor Deep Draft Improvement Project may lend themselves to similar methods of removal without drilling and blasting. The boring program in the Design Phase will provide the information on the appropriate rock removal method.

However, some level of caution is in order. The depth of the rock cut at Boston is up to eight to fifteen feet in many areas, as the Main Ship Channel is being deepened from -40 feet at mean lower low water (MLLW) down to -47 feet MLLW. The Broad Sound North Entrance Channel will be deepened to a controlling depth of -51 feet MLLW. In all channels where rock is encountered the required depth of the channel will be increased two feet as a safety measure. For all channels a two-foot allowable overdepth in all materials is possible. Rock at that depth is less likely to be weathered or fractured sufficiently to avoid a need for blasting. Removal by a hydraulic hammer typically takes a longer time than blasting. The blasting estimates for the Boston Harbor Deep Draft Improvement Project currently call for two drill barges, each with a three-gang drill rig, with one blast daily for each. A hydraulic hammer would work around the clock, except when it moves between areas to allow a dredge to remove what has been fractured.

At this time, a few predictions as to likely components of a rock removal plan can be made. For project construction to proceed on schedule, with minimal interruption and minimal excess mobilization-demobilization costs, drilling and blasting operations will need to be underway in some area(s) of the harbor as needed. Due to weather and sea state concerns, drilling and blasting in the Broad Sound North Entrance Channel will not likely occur in periods when heavy winter storms are expected. Fisheries observers and marine mammal observers would be present during blasting operations. Fish detection and fish startle systems would be employed.

The blasting efforts conducted for the ledge pinnacle removal project in 2007-2008 employed several means of avoiding and minimizing fish kills, including use of the fish observer and a fish startle system, and blast hole stemming. Even so, four of the blast events in November and December of 2007 resulted in fish kills of varying size. An After Action Report prepared by the USACE determined that the placement of the fish startle system and side scan sonar on the blast barge may not be as effective as employing these systems on a separate vessel. This alternate method was employed in the most recent rock removal project in 2012 and no fish kills were experienced with this new method.

In response to comments from NMFS and others, the potential for noise in the water generated by blasting to impact whales and other marine mammals, sea turtles, and fish (specifically sturgeon) was also investigated. Based on sound data collected from blasting during the most recent 2012 rock removal project, it was determined that a safety zone of 1,500 feet would be protective of the three animal types listed above, with allowance for an additional 50-foot observation zone outside the calculated safety zone. The nearest concentrations of whales in the Bay are located several miles seaward around Stellwagen Bank.

Rock Reef Creation - The USACE and Massport would prefer to find an acceptable beneficial use for the up to one million± cubic yards of rock that could be generated by the improvement project, rather than merely disposing it in 300 feet of water at the designated Massachusetts Bay Disposal Site (MBDS); the current base plan. Rock and other dredged material should always first be considered as a public resource. Many environmental resource agencies have raised concerns about the potential loss of hard bottom habitat when dredging of hard bottom is proposed at any project in New England. Accordingly, our first consideration was to reuse this blasted rock material to create new hard bottom habitat. However, some resource agencies believe that creation of additional hard bottom habitat in Massachusetts Bay at the expense of covering existing soft-bottom habitat may not be desirable.

In order for the USACE to recommend including such a beneficial use component in the project it must either (1) entail no or minimal additional cost to the Government, (2) have any additional cost paid for by non-Federal interests, or (3) involve a use where the benefits outweigh the additional cost, and have any additional cost to the project cost-shared between the USACE and a non-Federal public agency. Accordingly, a zone of feasibility for reef creation siting was established whereby the reduced hauling costs to the more distant MBDS would be offset by any additional project costs for beneficial use site investigations, controlled dumping practices, and monitoring of site recovery and recolonization.

The intent of the reef creation option was to create hard-bottom habitat, not merely for adult lobster, but also other species that prefer this type of habitat. Five candidate reef creation sites were selected with input from local lobstermen and the State marine fisheries staff at a meeting held on August 3, 2004. The goal was to identify large areas where existing rocky habitat was less represented than sandy or softer substrates. The analysis to date as presented in the Feasibility documents was limited to bottom types, bathymetry, Essential Fish Habitat, and benthic resource characterization. As no real consensus developed among the Federal and State

agencies during the Feasibility study as to the desirability of reef creation in Massachusetts Bay, additional examination was deferred until the Design Phase, when more specific information on the quantities and types of rock and other hard materials to be generated by the project would become known and more detailed data requested by the agencies is available. Other reviewing agencies also identified concerns about replacing soft-bottom habitat with rock reefs that may take years to colonize, and would supplant the functions and value of the existing soft-bottom habitat at these sites.

In response to Federal and State agency concerns expressed during meetings of the project's Technical Working Group, the District has committed to working with these agencies during the Design Phase to examine these issues, define the exact type and quantity of materials available for such use, and examine the candidate sites in greater detail to determine the value of the existing habitat relative to the anticipated value of the reefs. Should reef creation proceed forward, technical design issues such as mound width and elevation, mound spacing, setbacks from existing hard bottom areas, cultural resource presence and protection, and targeted species will all require further evaluation. A plan for monitoring recovery and recolonization of any constructed reef site will also be developed. Some State agencies have suggested that only a portion of the rock removed should be made available for reef creation, and using the remainder available for other uses if found feasible.

If it is determined that rock reef creation is desirable and feasible, and included in the final design of the Federal Navigation Deep Draft Project, then the results of the additional investigations, reef design, and habitat recovery monitoring plans may be published in an additional NEPA/MEPA document, if necessary.

Beneficial Uses for Rock - In addition to reef habitat creation, some or all of the removed rock could prove suitable for other beneficial uses. Making the rock available to industry for processing as aggregate or for other construction purposes has been mentioned. Making the rock available to State agencies or area municipalities for use in public projects, particularly shore protection, has also been mentioned. The Design Phase of this project will include consultation and collaboration with these agencies and others to determine what economically practical beneficial options may exist.

Air Quality Considerations - The Corps and Massport are currently re-examining the expected air quality impacts of the project with reference to the revised air quality determinations mentioned in your November 9, 2012 letter. The results of that examination will be discussed with the TWG when they become available.

We look forward to working with your office in continuing to refine how we address potential project impacts during the Design and Construction Phases and bring this project to a successful completion. In the event that you have any questions or comments about the above proposals, please contact Ms. Catherine Rogers at (978) 318-8231 or via email at catherine.j.rogers@usace.army.mil.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:
Stewart Dalzell, Deputy Director
Environmental Planning and Permitting
Massachusetts Port Authority
One Harborside Drive
Boston, Massachusetts 02128

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

November 29, 2012

Mr. John R. Kennelly
Chief of Planning
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: CZM Federal Consistency Review Boston Harbor Deep Draft Navigation Improvement Project – DEIR/DEIS; Boston.

Dear Mr. Kennelly:

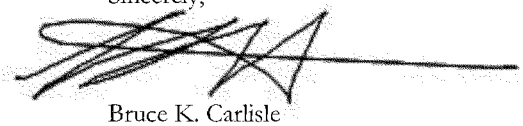
The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the Draft Environmental Impact Report/Draft Environmental Impact Statement (DEIR/DEIS) for the proposed port improvements in the City of Boston. The project includes improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin, and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). The Massachusetts Port Authority (MassPort) would also deepen the berths in the Conley Terminal to at least -50 feet MLLW. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW, access to MassPort's Medford Street Terminal on the Mystic River would be improved by deepening to -40 feet MLLW, and the existing -38 foot channel in the Chelsea River would be deepened to -40 feet MLLW.

Based upon our review of applicable information, we concur with your certification and find that the activity's effects on resources and uses in Massachusetts coastal zone as proposed in the DEIR/DEIS are consistent with the CZM enforceable program policies. We look forward to reviewing the Final Feasibility Report and the joint Final Supplemental Environmental Impact Statement/Final Environmental Impact Report for consistency with CZM's enforceable program policies, when released in 2013.

If the above-referenced project is modified in any manner, including any changes resulting from permit, license or certification revisions, including those ensuing from an appeal, or the project is noted to be having effects on coastal resources or uses that are different than originally proposed, it is incumbent upon the proponent to notify CZM, submit an explanation of the nature of the change pursuant to 15 CFR 930, and submit any modified state permits, licenses, or certifications. CZM will use this information to determine if further federal consistency review is required.

Thank you for your cooperation with CZM.

Sincerely,



Bruce K. Carlisle
Director

BKC/rlb/vg
CZM# 5376

The COMMONWEALTH OF MASSACHUSETTS
BOARD OF UNDERWATER ARCHAEOLOGICAL RESOURCES
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
251 Causeway Street, Suite 800, Boston, MA 02114-2136
Tel. (617) 626-1200 Fax (617) 626-1240 Web Site: www.mass.gov/czm/buar/index.htm

November 27, 2012

John R. Kennelly
Chief of Planning
New England District
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: *Boston Harbor, Massachusetts Navigation Improvement Project – Update of the Final Feasibility Report and Final Supplemental Environmental Impact Statement/Final Environmental Impact Report*

Dear Mr. Kennelly,

The staff of the Massachusetts Board of Underwater Archaeological Resources has completed its review of your letter of 11 October 2012 and attached chart regarding the final FR and FSIES/FEIR reports for the above referenced report. We offer the following comments.

The Board provided comments on the draft version of the above referenced report in its letter of 2 June 2008. Based on the information provided in your recent letter, the Board's original comments remain appropriate and applicable to the updated plan.

The Board notes the updated plan specifically calls for deepening access to the Chelsea River. This area is considered archaeological sensitive, particularly in relation to the 1775 Battle of Chelsea Creek and the loss of HMS *Diana*. The recommendation that a remote sensing archaeological survey should be conducted for the areas of potential affect in the Mystic River and Chelsea River Channels remains applicable. The Board looks forward to working with the Corps and its consultants in developing a successful surveying strategy for these areas.

Comment BUAR #1

Should you have any questions regarding this letter, please do not hesitate to contact me at the address above, by telephone at (617) 626-1141 or by email at victor.mastone@state.ma.us.

Sincerely,

Victor T. Mastone
Director

Cc: Brona Simon, MHC
Marc Paiva, USACE
Bob Boeri, MCZM
Stewart Dalzell, Massport

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UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
55 Great Republic Drive
Gloucester, MA 01930-2276

NOV 27 2012

John R. Kennelly
Deputy Chief, Engineering/Planning Division
Department of the Army, Corps of Engineers
New England District
696 Virginia Road
Concord, MA

RE: Boston Harbor Deep Draft Navigation Improvement Project

Dear Mr. Kennelly:

Your November 7, 2012, letter, requests consultation pursuant to section 7 of the Endangered Species Act (ESA) of 1973, as amended regarding the U.S. Army Corps of Engineer's proposed Boston Harbor Deep Draft Navigation Improvement Project. You have made the determination that the proposed action is not likely to adversely affect any species listed by NOAA's National Marine Fisheries Service (NMFS) under the ESA and have requested our concurrence with this determination. We agree that as all effects to listed species will be insignificant and discountable, the proposed action is not likely to adversely affect any NMFS listed species. The justification for our determination is provided below.

Proposed Project
The project will involve dredging approximately 10 to 11 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. All dredging will be with a mechanical dredge. In addition, you will remove up to about 1 million cubic yards of rock from the harbor, some of which may require blasting to allow removal with a dredge. In association with this improvement work, you will remove about 150,000 cubic yards of material to deepen some terminal berths, and about 500,000 cubic yards for maintenance of the improved and adjacent Federal channels. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site (MBDS), which is located about 18 miles seaward of the harbor. The project would take about three years to complete. You are currently planning to dispose all material, including rock, at MBDS; unconsolidated material may be disposed of at the former Industrial Waste Site (IWS) which is adjacent to the MBDS.

Specific project activities include:

- Deepening the harbor's 40-foot deep MLLW channels, turning basin and anchorage to a depth of -47 feet MLLW to provide container ships access to the Conley Terminal, with an additional two to five feet of depth in the Broad Sound North

Entrance Channel (up to -52 feet MLLW) to accommodate exposure of vessels to increased seas. The final depth selected for the entrance channel accounts for the range in quantities given above;

- Deepening the 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel to -45 feet MLLW, to improve access to Massport's Marine Terminal in South Boston;

- Deepening the existing 35-foot lane of the lower Mystic River Channel to -40 feet MLLW to improve access to Massport's Medford Street Terminal; and

- Deepening the existing 38-foot channel in the Chelsea River to -40 feet MLLW to improve access to its petroleum terminals.

- In addition, terminal berths at Massport facilities on the Reserved, Main Ship and Mystic River channels, as well as private terminal berths on the Chelsea River would be deepened commensurate with the deepening of the Federal channels.

- Any required maintenance of the Federal navigation channels being improved would be carried out concurrently, as would maintenance of adjacent Federal channels needed to route shipping traffic around the deepening operation, including maintenance of the 35-foot deep lane of the North Entrance Channel, 30-foot deep Broad Sound South Entrance Channel, 15-foot deep Nubble Channel and 35-foot deep MLLW Barge Anchorage.

Rock removal by blasting will occur over approximately 26 months, with the required times approximately broken down as follows (work in some areas will be simultaneous with work in other areas): 16 months in the Broad Sound North Entrance Channel; two months in the President Roads Anchorage; two months in the lower Main Ship Channel; three months in the Main Ship Channel extension area below the Ted Williams Tunnel; five months in the Reserved Channel and its Turning Area; and one month in the upper Chelsea River. The precise rock areas and construction times would be further refined after design phase subsurface explorations are completed.

The USACE will implement several special conditions during dredging, blasting and dredged material disposal, those include:

- USACE will develop a monitoring plan for blasting that will be submitted to NMFS for review and comment.
- One or more NMFS-approved endangered species observers will be present at each blast site. The number of observers will depend on the number that is necessary to observe the entire safety zone. No blasting will occur until the safety zone is free from any observations of whales or sea turtles for 60 minutes.
- The Right Whale Sightings Advisory System will be monitored as well as other communication media (i.e., NOAA weather radio, U.S. Coast Guard NAVTEX

broadcasts, Notices to Mariners, and U.S. Coast Pilots) for general information regarding North Atlantic Right Whale sighting locations. In addition, the Contractor will be required to monitor the Right Whale Listening Network for information on Right Whales detected near the shipping lanes.

- No blasting will occur if any whales or sea turtles are present within the safety zone of the blast area.
- In the unlikely event that any whales or sea turtles are observed within the safety zone during a blast event, all reasonable attempts to monitor the condition and behavior of the animal will be undertaken. These incidences will be reported immediately to NMFS to determine whether the incident would require reinitiating Section 7 Consultation.
- All blasting will be conducted using inserted delays of a fraction of a second per borehole as well as the use of stemming, which will be placed into the top of the borehole to deaden the shock wave reaching the water column.
- No blasting will occur when schools of fish are observed in the area (assuming that safety is not jeopardized). A fish observer will use hydro-acoustic monitoring (i.e. side-scan sonar) prior to any blasting event to determine that schools of fish are not located within or transiting the blast zone area (including any listed Atlantic sturgeon). In addition to the sidescan sonar, a fish startle system will be employed to deter fish. Existing startle systems are most effective with species from the Clupeid family. The startle system uses high amplitude sound at specific frequencies. Lessons learned from the previous blasting in Boston Harbor will be incorporated where appropriate into the Contractor's blasting plan. Some of these lessons include the development of a communication plan between the fish observer and the Contractor and the location of the fish startle system that will be deployed on an alternate vessel instead of the blast barge.
- All project vessels will comply with voluntary speed restrictions (10 knots or less) to minimize the risk of ship strikes as implemented in Dynamic Management Areas (DMAs) that may be established by NOAA Fisheries Service. NOAA Fisheries Service will announce DMAs to mariners through its customary maritime communication.
- All previously established permit conditions for use of the MBDS and IWS, including use of lookouts for whales and sea turtles and vessel speed restrictions, will be required, including:

    - Use NMFS guidelines to minimize interaction with and harassment of marine mammals during transit (i.e., tugs/scows will not approach within 100 feet of threatened or endangered species of whales (http://www.nero.noaa.gov/prot_res/mmv/approach.html) or within 500 yards of a right whale 50 CFR§224.103 (c)). Any vessel finding itself within the 500 yard buffer zone around a right whale must depart the area immediately at a safe, slow speed, unless one of the exceptions applies (see 50 CFR§224.103 (c));

    - When sea turtles are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible;

- Report all sightings of right whales to NMFS as soon as possible (978-585-8473); and, Report within 24 hours any interactions with listed species to NMFS (1-866-755-NOAA and incidental.take@noaa.gov). This includes any reports of injuries or mortalities.

NMFS Listed Species in the Action Area
The action area is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR§402.02). For this project, the action area includes the project footprint as well as the underwater area where effects of dredging (i.e., increase in suspended sediment) and blasting (i.e., increase in underwater noise and pressure) will be experienced. The action area also includes the disposal sites and the vessel transit routes.

Whales
Federally endangered North Atlantic right whales (*Eubalaena glacialis*), Fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), and humpback whales (*Megaptera novaeangliae*) are found seasonally in Massachusetts waters. North Atlantic right whales have been documented in the nearshore waters of Massachusetts from December through June. Humpback whales feed during the spring, summer, and fall over a range that encompasses the eastern coast of the United States. Fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*) and sperm (*Physter macrocephalus*) whales are also seasonally present in New England waters but are typically found in deeper offshore waters.

Sei whales occur in deep water throughout their range, typically over the continental slope or in basins situated between banks (NMFS 2011). Sperm whales occur on the continental shelf edge, over the continental slope, and into mid-ocean regions. Based on the known habitats of these two species which do not overlap with the action area, we do not expect sei or sperm whales to occur in any portion of the action area.

Sightings and satellite tracking data along the East Coast indicate that endangered large whales rarely venture into bays, harbors, or inlets (70 FR 35849, June 25, 2005, NMFS 2007, 72 FR 57104, October 5, 2007). Right whale sightings from May 1997 to the present have been mapped (see http://www.nefsc.noaa.gov/psb/surveys/SASInteractive2.html). There are no recorded right whale sightings in Boston Harbor. The nearest sighting is a sighting listed as "probable" from April 7, 2012, approximately 4 miles offshore of Deer Island. The seasonal presence of right whales in Massachusetts waters is thought to be closely associated to the seasonal presence of dense patches of their preferred copepod prey (primarily *Calanus finmarchus* but also *Pseudocalanus* spp. and *Centropages* spp.; Pace and Merrick 2008). Dense concentrations of copepods are not known to occur in Boston Harbor. While small numbers of humpback whales may be present in Massachusetts waters year round, sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffreys Ledge (CETAP 1982) and peak in May and August (Waring *et al.*, 2010). We have records of only one humpback whale occurring in Boston Harbor (2001) and consider this incident to be an outlier. There are no records of fin whales in Boston Harbor. Based on the best available information, it is extremely unlikely that any right, humpback or fin whales will occur in the channels where

blasting and dredging will occur. These species, may however be present at MBDS and IWS and along the transit route.

Sea Turtles

Four species of federally threatened or endangered sea turtles under our jurisdiction may be found seasonally in the coastal waters of Massachusetts, typically when water temperatures are higher than 15°C. The highest concentrations of sea turtles are normally present from June – October. The sea turtles in northeastern nearshore waters are typically small juveniles with the most abundant being the federally threatened Northwest Atlantic Ocean Distinct Population Segment (DPS) of loggerhead (*Caretta caretta*) followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*) sea turtle. While green sea turtles *(Chelonia mydas)* may also occur sporadically in New England waters, any occurrence in Massachusetts waters is rare. Federally endangered leatherback sea turtles (*Dermochelys coriacea*) may be found in Massachusetts waters during the warmer months as well.

Suitable forage and habitat exists for sea turtles in small localized areas around the Boston Harbor area (e.g., Hull and Hingham Bay; shores of Long Island Spectacle Island, and Thompson Island, MA; Town River Bay; and Rock Island Cove). The harbor is not known to be a high use area for sea turtles and presence is likely limited to occasional transient sea turtles. In the channels where dredging and blasting will occur, limited forage for sea turtles exists (e.g., no submerged aquatic vegetation (SAV), limited benthic invertebrates) and as such, this site is not expected to serve as foraging area for sea turtles. Based on this information, it is extremely unlikely that sea turtles will occur within the channel where dredging and blasting will occur. However, sea turtles may be present at MBDS and IWS and along the transit routes.

Atlantic Sturgeon

Five DPSs of Atlantic sturgeon are listed; the Gulf of Maine DPS is threatened and the New York Bight, Chesapeake Bay, South Atlantic and Carolina DPSs are endangered (77 FR 5880; 77 FR 5914; February 6, 2012). The marine range of all five DPSs extends along the Atlantic coast from Canada to Cape Canaveral, Florida.

Atlantic sturgeon spawn in their natal river. The Kennebec (Maine) and Hudson (New York) Rivers are the nearest rivers to the action area that are known to currently support spawning populations. Sturgeon remain in the river/estuary for two to five years until 50-75 cm in length. After emigration from the natal river/estuary, subadults and adult Atlantic sturgeon travel within the marine environment, typically in waters less than 50 meters, using coastal bays, sounds, and ocean waters.

There is limited information on Atlantic sturgeon in Boston Harbor. In February 2012, an Atlantic sturgeon was documented in the Charles River. In the summer of 2012, a dead Atlantic sturgeon was found floating in the North River, Massachusetts. These represent the first reported occurrences of Atlantic sturgeon in this area. No tributary of Boston Harbor has been identified as a historic spawning river for this species. Due to the limited presence of suitable forage, the presence of Atlantic sturgeon in Boston Harbor in general is considered to be limited to occasional transient subadults or adults. Atlantic sturgeon are most likely to be present in the channels where dredging and blasting will occur if suitable forage is present. Based on the best

available information, only occasional transient subadult or adult Atlantic sturgeon are likely to be present in the channels where dredging and blasting will occur.

Effects of the Action

Below, we consider the effects of dredging, disposal of dredged material, blasting, and disposal of rock on listed species. This analysis relies on the full implementation of all special conditions listed above; we consider these to be part of the proposed action. It is important to note that project plans may be refined in the future. Prior to the USACE entering into any contracts or carrying out any dredging or blasting, updated project plans and special conditions will be provided to us. At that time we will determine if there are likely to be any effects that we did not consider here and, if there are, reinitiation of this consultation will be necessary.

Comment NMFS #1

Dredging

A clamshell bucket dredge will be used to remove sediments and to remove loose rock after blasting. As explained above, whales are extremely unlikely to occur in the areas where dredging will occur. As such, they will not be exposed to any effects of dredging. Occasional transient sea turtles and Atlantic sturgeon may be present in the channels where dredging will occur, particularly in areas where benthic invertebrates are present. Here, we consider the potential for individuals to be captured in the dredge bucket and effects of increased turbidity/suspended sediment and loss of benthic resources/forage opportunities.

Capture in the Dredge Bucket

Bucket dredges are relatively stationary. Bucket dredging entails lowering the open bucket through the water column, closing the bucket after impact on the bottom, lifting the bucket up through the water column, and emptying the bucket into a barge. Aquatic species can be captured in dredge buckets and may be injured or killed from entrapment in the bucket or burial in sediment during dredging and/or when sediment is deposited into the dredge scow.

No sea turtles have been captured in mechanical dredges operating in the action area. The USACE has no records of any sea turtles being captured in mechanical dredges anywhere. As such, we do not anticipate any capture of sea turtles during any mechanical dredging considered here.

In rare occurrences, sturgeon have been captured in dredge buckets and placed in the scow. The USACE has reported four incidences of sturgeon captured in dredge buckets along the U.S. East Coast since 1990. One of these was in the Cape Fear River and the other three were at the Bath Iron Works facility in the Kennebec River, Maine. No sturgeon have ever been observed during dredging operations in the action area. Based on all available evidence, the risk of capture in a mechanical dredge is low due to the slow speed at which the bucket moves and the relatively small area of the bottom it interacts with at any one time. Atlantic sturgeon are highly mobile and it is anticipated that they will be able to avoid the dredge bucket in nearly all instances. The potential for a capture is further reduced by the small number of Atlantic sturgeon in the action area and the transient use of the area by these fish. Given the relatively low level of risk that an individual Atlantic sturgeon would be captured in a slow moving dredge bucket and the low likelihood that Atlantic sturgeon will be present in the channels where dredging will occur, it is

extremely unlikely that any Atlantic sturgeon will be captured, injured or killed during dredging activities.

Turbidity Associated with Mechanical Dredging
The proposed dredging will cause a temporary increase in the amount of turbidity in the action area; however, suspended sediment is expected to settle out of the water column within a few hours and any increase in turbidity will be short term. The size of a sediment plume is influenced by many factors. The turbidity plume associated with a typical mechanical dredging operation extends approximately 1,000 feet at the surface and 1600 feet near the bottom (ACOE 1983). The maximum distance reported in the literature is 1,500 meters (4,921 feet), which occurred in an area with very strong tidal currents (ACOE 2007). Several studies have monitored sediment plumes associated with dredging projects along the Atlantic coast. Turbidity levels associated with these sediment plumes typically range from 26-350mg/L (ACOE 2007, Anchor Environmental 2003) with the highest levels detected adjacent to the dredge bucket and concentrations decreasing with greater distance from the dredge (see ACOE 2007).

No information is available on the effects of turbidity or suspended sediment (TSS) on juvenile and adult sea turtles. Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). TSS is most likely to affect sea turtles if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle prey. As sea turtles are highly mobile they are likely to be able to avoid any sediment plume and any effect on sea turtle movements is likely to be insignificant. Additionally, the TSS levels expected (26-350mg/L) are below those shown to have an adverse effect on fish (580mg/L for the most sensitive species, with 1,000mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (390mg/L (EPA 1986) upon which turtles depend. Based on this information, the effects of suspended sediment resulting from dredging operations on sea turtles will be insignificant.

Fish eggs and larvae can be buried or smothered as suspended solids settle out of the water column. Because no early life stages of Atlantic sturgeon occur in the action area, none will be exposed to any increase in TSS. TSS is most likely to affect subadult or adult Atlantic sturgeon if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting their benthic prey. As Atlantic sturgeon are highly mobile they are likely to be able to avoid any sediment plume and any effect on their movements or behavior is likely to be insignificant. Additionally, the TSS levels expected (26-350 mg/L depending on site specific conditions during dredging and up to 500.0 mg/L for disposal) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (590.0 mg/L (EPA 1986)); therefore, effects to benthic resources that sturgeon may eat are extremely unlikely. Based on this information, it is likely that both the effect of the suspension of sediment resulting from dredging operations and the effects of the discharge of sediments at the disposal site will be insignificant.

Effects on Prey
As noted above, sea turtles and Atlantic sturgeon are rare in Boston Harbor; however, they are most likely to occur where suitable forage (benthic invertebrates or SAV) are present. Dredging can affect sea turtles and sturgeon by reducing prey species through the alteration of the existing biotic assemblages. Some reduction in the amount of potential prey in the area to be dredged is likely; however, these areas are not thought to be used by foraging sturgeon or sea turtles. Regardless, the action will not result in the permanent removal of forage items, as prey species will continually recolonize the area following a disturbance. In summary, as (1) the area affected by dredging is not known to support significant amounts of benthic resources which Atlantic sturgeon and sea turtles forage on; and, (2) recolonization of the benthic community will be rapid (weeks to months), we have determined that any effects of dredging and disposal to foraging Atlantic sturgeon and sea turtles will be insignificant.

Blasting
Sound waves generated by blasting are known as "transient" or short, powerful pulses of noise. Peak pressure, measured in Pascals (Pa) or pounds per square inch (psi), and impulse, measured in Pascal seconds (Pa.sec), are the units used to describe severity of blast transients. Impulse is defined as the average pressure level of the wave acting over a given time.

Sound in water follows the same physical principles as sound in air. The major difference is that due to the density of water, sound in water travels about 4.5 times faster than in air (approx. 4900 ft./s vs. 1100 ft./s), and attenuates much less rapidly than in air. As a result of the greater speed, the wavelength of a particular sound frequency is about 4.5 times longer in water than in air (Rogers and Cox 1988; Bass and Clarke 2003). The term decibel (dB) is most often used to compare the level, or intensity of a sound, but the reference medium must be stated so that the reader understands whether in-air or underwater acoustics are being used. In water, acousticians use the standard reference sound pressure of 1 micropascal, abbreviated **re 1 µPa** (the in-air reference is 20 µPa).

Whales, sea turtles and sturgeon have differing levels of tolerance to underwater noise. Below, we present the underwater noise and pressure levels that are likely to result in mortality, injury and behavioral disturbance of these species.

Table 1. Effects, Criteria, and Thresholds (for Marine Mammals) for Impulsive Sounds from Underwater Detonation (provided by NMFS Headquarters)

Effect	Criteria	Metric	Threshold	Effect
Mortality	Onset of Extensive Lung Injury	Goertner modified positive impulse	indexed to 30.5 psi-msec (assumes 100 percent small animal at 26.9 lbs)	Mortality
Injurious Physiological	50% Tympanic Membrane Rupture	Energy flux density	1.17 in-lb/in^2 (about 205 dB re 1 microPa^2-sec)	Level A

Injurious Physiological	Onset Slight Lung Injury	Goertner modified positive impulse	indexed to 13 psi-msec (assumes 100 percent small animal at 26.9 lbs)	Level A
Non-injurious Physiological	TTS[1]	Greatest energy flux density level in any 1/3-octave band (> 100 Hz for toothed whales and > 10 Hz for baleen whales) - for total energy over all exposures	182 dB re 1 microPa^2-sec	Level B
Non-injurious Physiological	TTS	Peak pressure over all exposures	23 psi	Level B
Non-injurious Behavioral	Multiple Explosions Without TTS	Greatest energy flux density level in any 1/3-octave (> 100 Hz for toothed whales and > 10 Hz for baleen whales) - for total energy over all exposures (multiple explosions only)	177 dB re 1 microPa^2-sec	Level B

Sea Turtles
Pressure oscillations created by blasting cause a rapid contraction and over- extension of gas filled cavities (e.g., swim bladders, lungs, blood vessels) as pressure gradients change resulting in internal damage and/or mortality to aquatic species. For sea turtles, tissues that could be affected by detonations are mainly those at the air-fluid interface (e.g., ear cavities, lungs, gastrointestinal tract; Koschinski 2011).

Several studies have been undertaken that have demonstrated that explosions can injure and kill sea turtles (Duronslet *et al.* 1986; Gitschlag 1990; Gitschlag and Herczeg 1994; Kilma *et al.* 1988; O'Keefe and Young 1984); however, these studies have been based on the removal of large oil platforms, which involved the use of large, undelayed charges (i.e., 50 to 1,200 pounds per detonation) that were detonated in the open water (i.e., unconfined), whichwill produce greater levels of underwater noise and pressure levels.[2] In general, most sea turtles assessed in these studies suffered internal injuries (e.g., dilation of blood vessels, unconsciousness); only those exposed to the 1,200 pound charge within 656 feet of the blast succumbed to death. Although NMFS has not yet developed acoustic criteria for blasting activities, based on studies done by Yelverton and Richmond (1981), Finneran *et al.* 2002, and Southall *et al.* 2007, we believe that for sea turtles, blasting levels:

[1] TTS-Temporary, fully recoverable reduction in hearing sensitivity caused by exposure to sound.
[2] Information on the associated underwater noise and pressure levels (i.e., psi) were not available for these studies.

- ≥46 psi, 230_{peak} dB re 1 µPa or 198 dB re 1 μPa^2-s (SEL) will cause injury or mortality[3];
- ≥23 psi, 224_{peak} dB re 1 µPa or 183 dB μPa^2-s will cause harassment, via temporary threshold shifts (TTS); and,
- levels at or above 166 dB_{RMS} re 1µPa will cause behavioral modification (Baker, 2008).[4]

Atlantic sturgeon

There have been numerous studies that have assessed the direct impact of underwater blasting on fish (e.g., Teleki and Chamberlain 1978; Wiley *et al.* 1981; Burton 1994; Moser 1999). While none of the studies have focused on Atlantic sturgeon, the results demonstrate that blasting can have an adverse impact on fish. Teleki and Chamberlain (1978) found that several physical and biological variables were the principal components in determining the magnitude of the blasting effect on fish. Physieal components include detonation velocity, density of material to be blasted, and charge weight; while the biological variables are fish shape and size, location of fish in the water column, and swim bladder development. Composition of the explosive, water depth, and bottom composition also interact to determine the characteristics of the explosion pressure wave and the extent of any resultant fish kill. Furthermore, the more rapid the detonation velocity, the more abrupt the resultant hydraulic pressure gradient, and thus, the more difficulty fish have in adjusting to the pressure changes. That is, it is the pressure oscillations created by the detontation that cause a rapid contraction and over-extension of the swim bladder as pressure gradients change; this results in internal damage and/or mortality to species of fish (Wiley *et al.* 1981). If blasting detonations are undertaken at one time (i.e., not set up to be delayed), fish cannot recover from these pressure oscillations, resulting in internal injuries (e.g., swim bladder ruptures) that may result in death.

Currently, NMFS has no acoustic guidelines or criteria for effects of blasting on listed species of fish. However, lethal threshold peak pressure levels for a variety of marine fish species exposed to open water (unconfined) dynamite blasts have been suggested by Hubbs and Rechnitzer (1952). These thresholds varied from 40 pounds per square inch (psi) to 70 psi, the former being the more conservative in estimating mortality in fishes (Hempen *et al.* 2007; Kevin 1995; ACOE 2004) since this waveform of mortality for this value was established from an open-water testing program and not from confined shots, which are known to reduce the pressure waves of detonations[5]. Keevin (1995) found no mortality or internal damage to bluegill exposed to a high explosive at pressures at or below 60 psi. Similarly, Yelverton *et al.* (1975) measured the impulse pressures resulting in 1%, 50%, and 99% mortality in large carp. The result of this study showed 1%, 50%, and 99% mortality at 35.1 pounds per square inch-milliseconds (psi-ms), 49.5

[3] Sound Exposure Level (SEL) is defined as that level which, lasting for one second, has the same acoustic energy as the transient sound and is expressed as dB re: 1μPa^2•sec.

[4] Root Mean Square (RMS) pressure is the square root of the time average of the squared pressure and is expressed as dB re: 1 µPa.

[5] The 40 psi criterion suggested by Hubbs and Rechnitzer (1952) is an estimate of 50 % mortality, rather than the onset of mortality (i.e., 1 % mortality) or threshold where no mortality is observed (Baker 2008).

psi-ms, and 69.7 psi-ms. Although this criteria is generally conservative for many non-listed species under the ESA, based on these studies, NMFS believes that the 40 psi threshold may not avoid mortality or serious injury for small size classes of listed fish species, especially eggs, fry, and juveniles that are vulnerable at much lower thresholds of injury than adults, but may overestimate ranges for larger individuals.

Although effects of blasting on Atlantic sturgeon have never been studied, effects of blasting on shortnose sturgeon have been examined and will serve as the best available information on potential effects of blasting on Atlantic sturgeon. Test blasting was conducted in Wilmington Harbor, North Carolina, in December 1998 and January 1999 in order to adequately assess the impacts of blasting on shortnose sturgeon and the size of the LDI area (the lethal distance from the blast where 1% of the fish died). As explained in Moser (1999), the test blasting consisted of 32-33 blasts (3 rows of 10 to 11 blast holes per row with each hole and row 10 feet apart), about 24 to 28 kg of explosives per hole, stemming each hole with angular rock, and an approximate 25 msec delay after each blast. During test blasting, 50 hatchery reared juvenile striped bass and shortnose sturgeon were placed in 0.25" plastic mesh cylinder cages (2 feet in diameter by 3 feet long) 3 feet from the bottom (worst case scenario for blast pressure as confirmed by test blast pressure results) at 35, 70, 140, 280, and 560 feet upstream and downstream of the blast location.

Results of the study indicated that there was a low survival rate for both species of fish located 35 feet from the detonation site; however, at distances of 70 feet, caged fish showed no sign of hemorrhage or swim bladder damage, although two fish exhibited extended intestines, which may have been caused by the blast. At distances at, and beyond 140 feet, there was no difference in survival or impulse pressure. In addition, necropsy results indicated that shortnose sturgeon juveniles were less seriously impacted by test blasting than were the juvenile striped bass. It is believed, therefore, that survival rates for shortnose sturgeon would have been higher than striped bass following blasting treatments, even within the 35-foot distance of the blast area (i.e., 88% of shortnose sturgeon would have survived versus 34 % of the striped bass; Moser 1999)[6]. Moser (1999) stipulated that shortnose sturgeon may be less susceptible and less sensitive to blasting effects due to the fact that the swim bladder in shortnose sturgeon is connected to the esophagus, allowing gas to be expelled rapidly without damage to the swimbladder (i.e., physostomus).

Based on the Moser (1999) studies, peak pressure levels at, or below, 75.6 psi, and peak impulse levels at or below18.4 psi-msec, will cause no injury or mortality to species of sturgeon, including Atlantic sturgeon.

It should be noted that for both marine mammals and turtles, injury and behavioral effects are only expected when these animals are exposed to peak pressure levels above 23 psi. Therefore, levels below 23 psi would be expected to be non-injurious to both seas turtles and marine mammals. Also peak pressures below 75.6 psi would not be expected to cause injury or mortality to sturgeon. Therefore, peak pressures below 23 psi would be expected to be protective of marine mammals, sea turtles and Atlantic sturgeon (i.e., not result in any injury, mortality or harassment).

[6] After 24 hrs of the blast treaments, fish were necropsied.

Expected Noise and Pressure Associated with Boston Harbor Blasting

When the blast is detonated, shock waves are diminished as they spread outward from the blast according to the cube root of the charge weight. As the wave travels further through the water away from the detonation point, it reflects repeatedly from the surface and seabed and loses energy. This reduction, referred to as "cube root scaling", was utilized by Cole (1948) in conjunction with small land animals and humans, to construct an open-water (detonations set without stemming) mortality radius (MR_{OW}) (i.e., the distance from the detonation where mortality would be experienced) for single, open-water shots according to the following formula:

$$\mathbf{MR_{OW} = 260 \times W_{OW}^{1/3}} \quad \textbf{(Equation 1)}$$

where W_{OW} = the maximum charge weight (in pounds.) per delay of a single, open-water blast (i.e., the amount of explosive set in a single un-stemmed location).

Based on this equation, the mortality radius for a single, confined shot (MRc) was defined by the following formula: $MRc=56\ wc^{1/3}$ (Equation 2) where wc= the maximum charge weight (in pounds) per delay of a single confined blast (Hempen et al. 2005; Hempen et al. 2007).

Given the blast attenuation facilitated by confined borehole charges and the ability of marine animals to withstand pressure levels higher than land-based test subjects (small land animals and humans), the above equations provides a conservative calculation of safety ranges around a blasting project. This approach is further supported by Young (1991) who suggested that "cube root scaling may be used to provide an upper limit in the absence of data for a specific effect."

USACE Blasting in Boston Harbor September 2012

Blasting was conducted in Boston Harbor for the Boston Rock Removal Project from September 6 – September 2, 2012. For the three blasts[7] that occurred on September 6, 8 and 10, underwater sound monitoring was conducted to determine sound pressure levels at specific distances from the blast relative to protective criteria for marine mammals. Based on these data, protective zones were adjusted to ensure that they would be beyond the behavioral (Level B) threshold for marine mammals. The total weights of explosives per blast were 314 pounds for blast 1 (12 delays), 407 pounds for blast 2 (15 delays) and 554 pounds for blast 3 (17 delays). For blasts 1-3, calculated distances (based on the sound measurements) where sound pressure had attenuated to below Level B harassment thresholds for marine mammals were 773 feet, 783 feet, and 930 feet, respectively y. As expected, the area where injury, mortality or harassment would be experienced increases with the total weight of explosives per blast.

When using Equation 2 (above) to calculate the protective radii for confined blasting, the protective radius does not change regardless of the weight of the total charge. This is because the equation calculates the mortality radius using the weight of a single charge per delay only, rather than the total blast weight. When comparing the calculated protective distances (using Cole's equation) to the observations based on sound measurements in September 2012, it appears that the radius calculated on the single delay underestimates the distance where effects may be

[7] Each blast consists of a series of delays, or individual detonations of explosives, set inside the rocks, that are set off within milliseconds of each other.

experienced. For example, during blast 1 in September 2012, the total weight of explosives was 314 pounds, for 12 delays. Based on the blast reports, the maximum weight of charge per delay was 32 pounds. Therefore, using equation 2 above, the zone where there would be mortality would be 178 feet (MR_C(feet) = $56(32)^{1/3}$ = 178 feet).

The USACE determined based on the sound measurements made during the September 2012 blasting that the distances provided by Cole's equation were not sufficiently protective of listed species as they were likely to underestimate the size of the area where adverse effects could be experienced. They found that doubling the mortality zone results in the distance that would be protective (i.e., below Level B harassment thresholds) and then added fifty feet for an additional margin of safety. This additional calculation suggests that an area 406 feet beyond the blast site would have been below the Level B harassment thresholds. However, based on the measured sound data (i.e. Tech Environmental report), the calculated distance to protect from Level B harassment was 783 feet. Similarly for Blast 2, (total weight of explosives was 407) the maximum charge per delay was 33.5 pounds. The mortality zone for this single charge would be 181 feet, and doubling it and adding 50 feet would be 412 feet. However the calculated distance based on the measured sound data to protect from Level B harassment was 830 feet. Also for Blast 3, using 38.8 pounds per charge (total of 554 pounds of explosives) the protective zone based on Cole's equation 2 is 429 feet, but the calculated zone based on the sound data was 920 feet (see Appendix A in USACE BA for copy of Tech Environmental report). In addition, since Cole's equation 2 is calculated on the weight of the charge per single delay, and not on the total weight of explosives per blast, the exclusion zones will not change regardless of the total weight of explosives per blast event. However, the data collected from the September 2012 blasting events suggests attenuation distance does increase with an increase in the total weight of explosives per blast event. These data are summarized in Table 2 below.

Table 2. Comparison of Calculated Blast Safety Distances using Cole's Equation with those Measured from Tech Environmental for Boston Harbor Blasts 1-3, September 2012

Blast #	Number of Holes	Charge/ Hole (lbs)	Total lbs/ Blast	Calculated Mortality Zone (feet) (Coles) (D)	Safety Zone Dx2 +50	Safety Zone (Feet) (from Tech Envir. data) (ft)	Cole's Calculated on Total Wt x2 (ft) (Protective Radius)
1	12	32	314	178	408	773	761
2	15	33.5	407	181	411	783	830
3	17	38.8	554	190	429	930	920

If Cole's equation 2 is used on the total amount of explosives per blast event and then multiplied by 2, then the estimated distances to protect animals from Level B harassment approximate those calculated from the actual measured data (Table 2, last two columns). Therefore, when using Cole's equation 2 to calculate distances where Level B harassment could be experienced, one can use the total weight of explosives used in each blast and then double it to calculate the safety zone (i.e., the area outside of which Level B harassment would not occur). This is the method that USACE used to estimate the safety zones for the proposed blasting. Because this method is based on established calculations and actual monitoring in Boston Harbor, it is a reasonable way to estimate the areas where noise will be higher than 177 dB re 1uPa and peak pressure will be higher than 23 psi.

Calculation of Boston Harbor Deep Draft Blasting Safety Zones
Table 3 below provides the range in feet from the blast for the mortality and safety zones calculated by USACE on both the weight of charge per delay (i.e. individual borehole) and total estimated charge per blast (using 60 holes and a maximum charge of 40 pounds/hole) and multiplied by 2, in order to approximate the zones calculated by actual sound measurements (noted above). This is done for both the approximate mean weight of explosives expected to be used per charge (28.5 pounds), and the expected maximum weight of explosives to be used per blast/hole (40 pounds). Note that a total charge weight per blast using 60 holes and 40 pounds of explosives per hole would be 2,400 pounds. Based on the calculations used to protect species for the recent September 2012 Boston Harbor Rock Removal, it is presumed that the safety zone which is calculated on the single charges per delay, doubled with 50 feet added to it (column 5), would be sufficient to protect the listed species (i.e., it would provide the distance outside of which noise would be less than 177 dB re 1uPa and pressure would be less than 23 psi). However given the actual sound measurement from Boston Harbor blasting in September 2012, the safety zone calculated based on the total charge per blast and then doubled (last column) would be expected to be completely protective of marine mammals, sea turtles and Atlantic sturgeon; that is where no behavioral effects would be incurred at all (Level B Harassment).

Table 3. Estimated Safety Zones for Blasting in Boston Harbor

Number of Holes and/or Delays	Charge per Hole/Delay (lbs)	Total Charge per Blast (lbs)	Mortality Zone Based on Charge/Delay (feet)	Safety Zone Based on Charge/Delay x 2 + 50'	Mortality Zone Based on Total Charge/Blast (feet)	Safety Zone Based on Total Charge/Blast x2 (feet)
60	28.5	1995	171	392	705	1410
60	40	2400	192	433	750	1500

Therefore based on the above calculations it would be expected that a safety zone radius of 1,500 feet (based on the estimated maximum total charge of 2,400 pounds) would be completely protective of marine mammals, sea turtles and Atlantic sturgeon for the Boston Harbor blasting. That is, outside of this "danger zone" noise would less than 177 dB re 1uPa and peak pressure would be below 23 psi.

Effects of Blasting on Listed Species
Up to two blast rigs may be working during the project. These blast sites will be separated by at least one mile. Each rig will detonate no more than one blast each day. All blasting will occur between sunrise and sunset. The USACE has determined that at distances of more than 1,500 feet from the blast site, peak pressures will be below 23 psi and underwater noise levels will be less than 177 dB re 1uPa.

As explained above, whales are extremely unlikely to occur in the channels where blasting will occur. There are no historical records or sightings of any whales in these areas with the exception of one transient humpback in 2002. The area where pressure may be greater than 23 psi and noise may be louder than 177 dB re 1uPa will be monitored by an endangered species observer. No blasting will occur if a whale is sighted in the safety zone and blasting will not

occur until the area is free of whales for at least 60 minutes. Each blast will last less than seven seconds. Because no blasting will occur if a whale is present within the danger zone, we do not anticipate that any whales will be exposed to underwater noise or pressure that could result in death, injury or behavioral disturbance.

Similarly, the danger zone will be monitored for sea turtles. No blasting will occur until the danger zone is clear of sea turtles for at least 60 minutes. Sea turtles are generally not expected to occur near the blast sites; it is extremely unlikely that a sea turtle will be present in the danger zone, (i.e., within a radius of 1,500 feet from theblasting site) during the seven seconds twice each day when the detonations will occur. An observer is expected to be able to detect sea turtles in the danger zone as sea turtles must come up for air at least every 45 minutes. No blasting will occur if sea turtles are present in the danger zone. Because of this, we do not anticipate that any sea turtles will be exposed to underwater noise or pressure that could result in death or injury. Sea turtles may exhibit behavioral avoidance when exposed to underwater noise of 166 dB re 1uPa. The area where this noise level will be experienced is just outside the danger zone. If a sea turtle was exposed to noise louder than 166 dB but less than 177 dB, we expect that behavior would result in swimming away from the sound source. Given the extremely short duration of the increase in underwater noise (seven seconds), and that this increase in noise will be experienced no more than twice per day, we do not expect this avoidance to result in any impacts to the sea turtles ability to carry out normal behaviors such as migration or foraging. The energy expenditure would be so small it would be undetectable; there would be no impact to fitness. In summary, we do not anticipate any sea turtles to be injured or killed and any behavioral effects will be extremely minor and limited to avoidance behavior for several seconds; these effects will be insignificant.

Atlantic sturgeon

Because Atlantic sturgeon surface only occasionally, it is unlikely that an observer monitoring the water's surface will be able to detect the presence of Atlantic sturgeon in the danger zone. Also, while sonar will be used to monitor the area prior to blasting and no blasting will occur if schools of fish are in the area, the monitor is not likely to be able to identify detected fish to species. In order for a sturgeon to be affected by the blasting, it would need to be within the danger zone when the detonation occurred. While detonations will occur once or twice per day for up to 26 months, each will last only seven seconds. The area where pressure and noise could cause negative effects to Atlantic sturgeon will be within 1,500 feet of the detonation. As established above, only occasional transient Atlantic sturgeon are likely to be present in Boston Harbor. These individuals are most likely to occur in areas where suitable forage is present. The rocky areas where blasting will occur are not known to support benthic resources that Atlantic sturgeon may forage on. Based on the rarity of Atlantic sturgeon in the blasting area, the small size affected by each blast (1,500 foot radius), the very short duration of the blast (seven seconds) and the lack of forage resources which could serve to attract sturgeon to the blasting areas, it is extremely unlikely that any Atlantic sturgeon will be present in the danger zone during blasting. Therefore, we do not expect any Atlantic sturgeon to be injured or killed. Any Atlantic sturgeon that are nearby may avoid the blasting area; however, because the increase in underwater noise and pressure will last for only a few seconds, we expect any behavioral effects to be extremely minor and limited to avoidance behavior for no more than a few seconds a day. These effects will be insignificant.

Effect of Fish Startle System on Listed Species
We have considered whether the use of the fish startle system would affect any listed species. The system emits high frequency noise (110-140 kHz or 110,000-140,000 Hz). The operating frequency is above hearing threshold of any species of sea turtle, Atlantic sturgeon or large whale (Ketten and Bartol 2005; Lovell *et al.* 2005; Meyer *et al.* 2010; Richardson *et al.* 1995; Ketten 1998). Therefore, these species will not be able to perceive the noise emitted by the system. As such, no listed species will be exposed to any increased underwater noise resulting from the fish startle system.

Disposal of Dredged Material and Rock
All material removed from the Boston Harbor channels will be disposed at the MBDS and/or IWA. The MBDS is a circular area two nautical miles (nm) in diameter, located approximately 10 nm south-southeast of Eastern Point in Gloucester, 12 nm southeast from Gales Point in Manchester, Mass. and 18 nm from the entrance to Boston Harbor. The IWS is located adjacent to the MBDS. Material will be loaded onto a barge and towed to the MBDS or IWS with a tug boat.

Vessel Interactions
Collision with vessels remains a source of anthropogenic mortality for sea turtles, Atlantic sturgeon, and whales. The proposed project will lead to a small temporary increase in vessel traffic (i.e., tug and scow) within the action area; however, the increase is not expected to be significant relative to the existing combined vessel traffic in Boston Harbor and Massachusetts Bay (i.e., 4,561 large vessel trips and an additional 54,914 transits from medium-sized cruise ships, ferries, whale watching vessels, commercial fishing vessels, and dredging vessels per year (USCG 2006)). With any increase in vessel traffic, some increased risk of vessel strike to listed species is possible. However, due to the limited information available regarding the incidence of ship strikes and the factors contributing to ship strike events, it is difficult to determine how a particular number of vessel transits or a percentage increase in vessel traffic will translate into a number of likely ship strike events or percentage increase in collision risk. In spite of being one of the primary known sources of direct anthropogenic mortality to whales, and to a lesser degree, sea turtles and Atlantic sturgeon, ship strikes remain relatively rare, stochastic events, and a small, temporary increase in vessel traffic in the action area would not necessarily translate into an increase in ship strike events. The risk of a vessel interaction with listed species in the portion of the action area located in MBDS and IBS is discussed below.

Sea Turtles
Interactions between vessels and sea turtles occur and can result in injury or death. Most forms of vessel interactions result from contact between sea turtles and boat propellers. Information is lacking on the type or speed of vessels involved in turtle vessel strikes. However, there does appear to be a correlation between the number of vessel struck turtles and the level of recreational boat traffic (NRC 1990). Although little is known about a sea turtle's reaction to vessel traffic, it is generally assumed that turtles are more likely to avoid injury from slower-moving vessels since the turtle has more time to maneuver and avoid the vessel. The speed of the tug/scow is not expected to exceed 10 knots while transiting to and from the disposal site. As such, the 10 knot or less speed of the vessels is likely to reduce the chances of collision with a

sea turtle. In addition, the presence of lookouts who can advise the vessel operator to slow the vessel or maneuver safely when sea turtles are spotted will further reduce to a discountable level the potential for interaction with vessels (see mitigation measures above). Based on this and the best available information, we believe the potential interaction of a tug/scow and a sea turtle will be discountable.

Atlantic Sturgeon

The factors relevant to determining the risk to Atlantic sturgeon from vessel strikes are currently unknown, but they may be related to size and speed of the vessels, navigational clearance (i.e., depth of water and draft of the vessel) in the area where the vessel is operating, and the behavior of Atlantic sturgeon in the area (e.g., foraging, migrating, etc.). It is important to note that vessel strikes have only been identified as a significant concern in the Delaware and James Rivers and current thinking suggests that there may be unique geographic features in these riverine areas (e.g., potentially narrow migration corridors combined with shallow/narrow river channels) that increase the risk of interactions between vessels and Atlantic sturgeon. These geographic features are not present in Massachusetts Bay, generally, or in the action area, specifically, and thus, the risk of vessel strikes are not considered to be a significant threat in Massachusetts Bay. In contrast to areas like the Delaware and James Rivers, where several individuals which have been struck by vessels have been identified each year, no Atlantic sturgeon with injuries consistent with vessel strike have been observed in Massachusetts Bay. Given the geographic features of Massachusetts Bay and the action area, the likelihood of a vessel collision with Atlantic sturgeon in the ocean environment is expected to be extremely low. Based on this and the best available information, the potential interaction of a scow/tug and an Atlantic sturgeon is likely to be discountable.

Whales

Large whales, particularly right whales, are vulnerable to injury and mortality from ship strikes. Ship strike injuries to whales take two forms: (1) propeller wounds characterized by external gashes or severed tail stocks; and (2) blunt trauma injuries indicated by fractured skulls, jaws, and vertebrae, and massive bruises that sometimes lack external expression (Laist *et al.* 2001). Collisions with smaller vessels may result in propeller wounds or no apparent injury, depending on the severity of the incident. Laist *et al.* (2001) reports that of 41 ship strike accounts that reported vessel speed, no lethal or severe injuries occurred at speeds below ten knots, and no collisions have been reported for vessels traveling less than six knots. Most ship strikes, however, have occurred at vessel speeds of 13-15 knots or greater (Jensen and Silber 2003; Laist *et al.* 2001). An analysis by Vanderlaan and Taggart (2006) showed that at speeds greater than 15 knots, the probability of a ship strike resulting in death increases asymptotically to 100%. At speeds below 11.8 knots, the probability decreases to less than 50%, and at ten knots or less, the probability is further reduced to approximately 30%. As noted above, under the proposed action, the speed of the dredge is not expected to exceed 10 knots while transiting to and from the disposal sites. Based on this information, and the fact that vessel strike avoidance measures will be in place throughout the proposed action (see mitigation measures above), the potential interaction of a scow/tug and a listed species of whale is discountable.

Habitat Alteration
The MBDS and IWS consist of a low density of benthic organisms, primarily sponges, tunicates, bryozoans, and worms. Due to depths, no SAV is known to grow at the MBDS or IWS. Based on this information, the habitat characteristics of the MBDS and IWS are sub-optimal for sea turtle and sturgeon foraging and as such, Atlantic sturgeon and sea turtles are not expected to be foraging at this site. As such, the alteration of the habitat as a result of the placement of dredged material and rock debris within the existing MBDS and IWS is not expected to remove critical amounts of prey resources for these species. Additionally, disposal operations are not likely to alter the habitat in any way that prevents Atlantic sturgeon, or sea turtles from using this portion of the action area as a migratory pathway to other areas of the Bay that are more suitable for foraging and therefore, there would not be any disruption of essential behaviors such as migrating or foraging. Based on this information, the effects of disposing rock debris at the MBDS and/or IWS on Atlantic sturgeon, or sea turtles migration and foraging are expected to be insignificant and discountable.

Generally speaking, the placement of rock debris has the potential to injure Atlantic sturgeon, sea turtles, or whales by being struck by the debris while it is being placed. However, these species are likely to move from the area upon the arrival of the scow/tug, making it extremely unlikely that any of these species will remain stationary beneath the scow before or during the disposal of rock debris. As noted above, sea turtles and sturgeon are also not expected to be found foraging at the MBDS or IWS, and as such, are not expected to be found within or near the reef benthos for any period of time. In addition, the MBDS has been in use since 1992 and the IWS even longer. Since that time, there have been no reports of injuries to any listed species at this site. In addition, with lookouts present on board the vessels, should an animal be located in the vicinity of the disposal area, disposal operations will be conducted accordingly to avoid injury to the species. Based on this information, we believe that the risk of being struck by rock debris during its placement at the MBDS or IWS on Atlantic sturgeon, whales, or sea turtles is discountable.

Turbidity
Disposal of dredged material and rock debris will cause a temporary increase in suspended sediment. If any sediment plume does occur, it is expected to be small and suspended sediment is expected to settle out of the water column within a few hours. Turbidity levels associated with debris disposal is expected to be only slightly elevated above background levels (average range of 10.0 to 120.0 mg/l) (ACOE 2007, Anchor Environmental 2003).

Studies of the effects of turbid waters on fish suggest that concentrations of suspended solids can reach thousands of milligrams per liter before an acute toxic reaction is expected (Burton 1993). The studies reviewed by Burton demonstrated lethal effects to fish at concentrations of 580.0 mg/L to 700,000.0 mg/L depending on species. Studies with striped bass adults showed that pre-spawners did not avoid concentrations of 954.0 to 1,920.0 mg/L to reach spawning sites (Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993). While there have been no directed studies on the effects of total suspended solids (TSS) on Atlantic sturgeon, Atlantic sturgeon subadults and adults are often documented in turbid water and Dadswell (1984) reports that sturgeon are more active under lowered light conditions, such as those in turbid waters. As such, Atlantic sturgeon are assumed to be as least as tolerant to suspended sediment as other estuarine fish such as striped bass. The TSS levels expected for debris disposal (10.0 to 120.0

mg/L) are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical; see summary of scientific literature in Burton 1993) and benthic communities (390.0 mg/L (EPA 1986)). Based on this information, the effect of suspended sediment resulting from dredging on Atlantic sturgeon will be insignificant.

No information is available on the effects of total suspended solids (TSS) on juvenile and adult sea turtles or whales. TSS is most likely to affect sea turtles or whales if a plume causes a barrier to normal behaviors or if sediment settles on the bottom affecting sea turtle prey. As Atlantic sturgeon, sea turtles and whales are highly mobile they are likely to be able to avoid any sediment plume and any effect on Atlantic sturgeon, sea turtle or whale movements is likely to be insignificant. Additionally, the TSS levels expected are below those shown to have an adverse effect on fish (580.0 mg/L for the most sensitive species, with 1,000.0 mg/L more typical (Breitburg 1988 in Burton 1993; Summerfelt and Moiser 1976 and Combs 1979 in Burton 1993)) and benthic communities (390.0 mg/L (EPA 1986)); therefore, effects to benthic resources that sturgeon and sea turtles may eat are extremely unlikely.

While the increase in suspended sediments may cause Atlantic sturgeon, sea turtles or whales to alter their normal movements, any change in behavior is likely to be insignificant as it will only involve movements to alter their course out of the sediment plume. Based on this information, any increase in suspended sediment is not likely to hinder the movement of Atlantic sturgeon, sea turtles or whales between foraging areas or while migrating or otherwise negatively affect listed species in the action area. Based on this information, we believe that the effects of suspended sediment on sea turtles, whales, and sturgeon, resulting from the disposal of rock debris, will be insignificant.

Conclusion

Based on the analysis that all effects of the proposed project will be insignificant or discountable, we concur with your determination that the proposed Boston Harbor Deep Draft Navigation Improvement Project is not likely to adversely affect any listed species under our jurisdiction. Therefore, no further consultation pursuant to Section 7 of the ESA is required.

Comment NMFS #1

Reinitiation of consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) If a new species is listed or critical habitat designated that may be affected by the identified action. No take is anticipated or exempted. If there is any incidental take of a listed species, reinitiation would be required. As noted above, we expect that you will provide us with refined project plans once they are available. At that time, if we determine the project will cause effects not considered here, reinitiation of this consultation will be necessary. Should you have any questions about this correspondence please contact Julie Crocker at (978) 282-8480 or by e-mail (Julie.Crocker@Noaa.gov).

Coordination between NMFS' Habitat Conservation Division and your office regarding effects of the action on Essential Fish Habitat (EFH) and NOAA Trust Resources considered under the Fish and Wildlife Coordination Act is still ongoing. By completing this ESA consultation, you are not relieved of your obligations to complete consultation and coordination under these other authorities. I look forward to continuing to work with you and your staff as this action moves forward.

Sincerely,

for John K. Bullard
Regional Administrator

EC: Crocker, F/NER3
Chiarella, Johnson – F/NER4
Rogers – ACOE NE

File Code: See 7 USACE NE – Boston Harbor Deep Draft Improvement Project
PCTS NER-2012-9217

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
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NOV 26 2012

John R. Kennelly
Deputy Chief, Engineering/Planning Division
Department of the Army, Corps of Engineers
New England District
696 Virginia Road
Concord, MA

RE: Boston Harbor Deep Draft Navigation Improvement Project

Dear Mr. Kennelly:

We have received your October 24, 2012, letter requesting our Essential Fish Habitat (EFH) conservation recommendations and completion of the EFH consultation pursuant to the Magnuson-Stevens Fishery Conservation and Management Act (MSA) regarding the proposed Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP). A Final Feasibility Report (FR) and a joint Final Supplemental Environmental Impact Statement/Final Environmental Impact Report (FSEIS/FEIR) is being prepared and expected to be released to the public sometime in early 2013. At that time, a Feasibility Report will be released and the US Army Corps of Engineers (USACE) will initiate the Planning, Engineering, and Design phase of the proposed project.

As you know, we reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) and Draft Environmental Impact Report (DEIR) for the proposed project in 2008. An EFH assessment for the project was also received by us at that time. However, we concluded that these documents did not contain sufficient information necessary for us to fully assess the effects of the proposed project on our trust resources. By letter dated June 2, 2008 (see attachment to this letter), we requested additional information regarding aspects of the proposed project, including: 1) development of a dredging sequencing plan, 2) development of a comprehensive blasting plan to be approved by an interagency technical working group, 3) evaluation of alternative beneficial reuses for disposal of rock removed from the dredging project and, 4) a review of the results from a capping demonstration study for the former offshore Industrial Waste Site (IWS) to assess potential impacts associated with disposing of dredged material at the IWS. Since 2008, the proposed project has undergone additional economic studies, resulting in a reduced scope of dredging improvements. However, the additional information requested by us in 2008 has not yet been provided. Although your letter indicates that you will share additional information and details of the project as they are developed during the design phase of this project, it does not specify whether or not the information we requested in our June 2, 2008 letter will be provided. We continue to believe that this previously requested information is critical to fully evaluating the effects of the project on EFH and our other trust resources, and for us to develop specific and effective conservation recommendations for the proposed project.

Comment NMFS #1

Although our need for additional information for this project remain, we are obliged by our regulations at 50 CFR 600.920(i)(5) to provide EFH conservation recommendations using the best scientific information available.

As you are aware, the MSA and the Fish and Wildlife Coordination Act require Federal agencies to consult with one another on projects such as this. Insofar as a project involves EFH, as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. We offer the following comments and recommendations on this project pursuant to the above referenced regulatory processes.

Project Description

Based upon your letter, dated October 24, 2012, as well as additional project information provided to our Protected Resources Division (PRD) on November 7, 2012, the proposed project involves dredging approximately 10 to 11 million cubic yards (cy) of clays, sands, and tills from the harbor bottom using a mechanical dredge. In addition, up to about 1 million cy of rock will be removed, some of which will require blasting. In association with the improvement work, approximately 150,000 cy of material will be removed from some of the terminal berths, and about 500,000 cy will be removed for maintenance of the improved and adjacent Federal channels. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site (MBDS), which is located about 18 miles seaward of the harbor. The Federal base plan for all material includes disposal at the MBDS; however, unconsolidated material may be disposed of at the former IWS, which is adjacent to the MBDS, and the rock may be used to create reef habitat or shoreline restoration projects in Massachusetts Bay. The project would take about three years to construct.

Specific improvements include:

- Deepening the harbor's 40-foot deep MLLW channels, turning basin and anchorage to a depth of -47 feet MLLW to provide container ships access to the Conley Terminal, with an additional two to five feet of depth in the Broad Sound North Entrance Channel (up to -52 feet MLLW) to accommodate exposure of vessels to increased seas. ;

- Deepening the 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel to -45 feet MLLW, to improve access to Massport's Marine Terminal in South Boston;

- Deepening the existing 35-foot lane of the lower Mystic River Channel to -40 feet MLLW to improve access to Massport's Medford Street Terminal; and

- Deepening the existing 38-foot channel in the Chelsea River to -40 feet MLLW to improve access to its petroleum terminals.

- Terminal berths at Massport facilities on the Reserved and Main Ship channels, as well as private terminal berths on the Chelsea River would be deepened commensurate with the deepening of the Federal channels.

- Required maintenance of the Federal navigation channels being improved would be carried out concurrently, as would maintenance of adjacent Federal channels needed to route shipping traffic around the deepening operation, including maintenance of the 35-foot deep lane of the North Entrance Channel, 30-foot deep Broad Sound South Entrance Channel, 15-foot deep Nubble Channel and 35-foot deep MLLW Barge Anchorage.

Rock removal by blasting is anticipated to require approximately 26 months to complete, including: 16 months in the Broad Sound North Entrance Channel; two months in the President Roads Anchorage; two months in the lower Main Ship Channel; three months in the Main Ship Channel extension area below the Ted Williams Tunnel; five months in the Reserved Channel and its Turning Area; and one month in the upper Chelsea River. The rock areas and construction times would be further refined after design phase subsurface explorations are completed.

You propose to implement several conditions during dredging, blasting and dredged material disposal, which include:

- Development of a monitoring plan for blasting that will be submitted to us for review and comment.

- No blasting will occur when schools of fish are observed in the area (assuming that safety is not jeopardized). A fish observer will use hydro-acoustic monitoring (i.e., side-scan sonar) prior to any blasting event to determine that schools of fish are not located within or transiting the blast zone area. In addition to the sidescan sonar, a fish startle system will be employed to deter fish (most effective with species from the clupeid family). Lessons learned from the previous blasting in Boston Harbor will be incorporated where appropriate into the Contractor's blasting plan. Some of these lessons include the development of a communication plan between the fish observer and the Contractor, and the location of the fish startle system on an alternate vessel instead of the blast barge.

Fishery Resources in Boston Harbor

Boston Harbor supports living marine resources that provide for valuable recreational and commercial fisheries, as well as species and habitats that are critical to healthy marine and estuarine ecosystems. As discussed in our June 2, 2008 letter to you, Boston Harbor provides habitats for a number of federally-managed species such as winter flounder, as well as a number of NOAA trust resources such as rainbow smelt, alewife, blueback herring, shellfish, and American lobster.

Inshore spawning winter flounder occur in water depths between 1 and 30 meters over sand, mud, cobble, rock, and boulder substrates (Pereira et al. 1999). Because winter flounder eggs are demersal and adhesive in nature, and larval and young-of-the-year winter flounder prefer shallow

inshore waters (1-30 meters) and similar habitat types, spawning, egg development, and early juvenile development habitat tend to be close together (Pereira et al. 1999). NOAA's Estuarine Living Marine Resources Program has identified winter flounder eggs and larvae as being abundant in Boston Harbor during this portion of the year (US Department of Commerce 1994). The Mystic Power Generating Station 2004-2005 Final Report indicated approximately 16 million winter flounder larvae were entrained into the Everett, Massachusetts power plant facility in a 12-month period (Shaw 2006). While this facility is located upstream of the project footprint, these data strongly suggests that inner portions of Boston Harbor are being utilized for winter flounder spawning and juvenile development. In addition, in May 1995 Normandeau Associates prepared the Finfish Sampling and Description Report for the USACE (Normandeau 1995). This study included trawl sampling at stations in the inner harbor (i.e., Mystic and Chelsea rivers, Inner Confluence) and the outer harbor (i.e., Spectacle Island CAD and Subaqueous E/Outer Harbor). The trawl data identify winter flounder as being the most numerous finfish at each station, and winter flounder catch per unit effort (CPUE) as the highest of all species for all stations combined. The Chelsea River, Outer Harbor, and Mystic River stations had the highest CPUE of all trawl stations sampled. We also note that the trawl stations sampled by Normandeau in the Chelsea River, Mystic River, and the Inner Confluence were all within or at the edges of the Boston Harbor federal channels (Fig. 1, page 24). Based on these reports and other winter flounder literature, we continue to be confident that winter flounder are abundant in both the inner and outer Boston Harbor area. As such, it is anticipated that winter flounder eggs and larvae would be present within Boston Harbor during the winter, spring, and early summer.

In addition to winter flounder, the anadromous rainbow smelt, alewife, and blueback herring currently utilize Boston Harbor, the Mystic River, and the Chelsea River as a migratory pathway between upstream spawning locations and Massachusetts Bay. The 1995 Normandeau study associated with the improvement dredging of Boston Harbor provided evidence of an abundance of alewife, blueback herring, and rainbow smelt. For all gill net sampling stations combined, blueback herring (26%), rainbow smelt (25%), and alewife (15%) were found to be the most abundant species in the area (Normandeau 1995). Entrainment studies within the Mystic Station final report for 2004-2005 found that approximately 1.8 million rainbow smelt larvae were entrained in the facility (Shaw 2006). This study also reported 497 alewife and 27,379 blueback herring juveniles and adults were impinged by power plant operations. It is important to note that due to concerns of declining populations of blueback herring and alewife, these species were designated as "candidate species" under the Endangered Species Act (ESA) in November 2011. Our agency is currently reviewing this information as well as any other available information to determine if listing blueback herring and alewife under the ESA is warranted. Due to the depressed populations of rainbow smelt, this species has also been designated since 2004 as a "species of concern" under the ESA. Status reviews and research on rainbow smelt populations are ongoing. The declining population status of these anadromous species should warrant caution and a risk-averse approach in the activities that can adversely affect them, including dredging and blasting during the time of year when sensitive life history stages are present.

In addition, the substrate within the project area also serves as habitat for benthic organisms, such as shellfish and other invertebrates living within and on the surface of the sediment. These organisms contribute to the productivity of the federally-managed species as a food source for

juvenile and adult life stages of finfish. The commercially-important American lobster has been documented within Boston Harbor by the Massachusetts Division of Marine Fisheries through the Massachusetts Bay Lobster Trawl Sampling Program.

Impacts Associated with Dredging

We provided details on some of the known adverse effects to living marine resources associated with dredging and blasting in our June 2, 2008 letter. Although we do not intend to duplicate the information contained in that letter, we would like to emphasize two concerns associated with this proposed project: dredging and blasting impacts on winter flounder spawning, egg, larval, and young-of-the-year habitats and diadromous fish spawning migration passage.

Winter flounder eggs have been shown to be adversely affected by relatively small levels of sediment deposition. Research conducted at the NMFS Northeast Fisheries Science Center's Milford Lab found that sediment deposition at depths of ½ the egg diameter (~0.5 mm) resulted in reduction in the number of hatched eggs (David Nelson, personal communication, 2003). An in-situ experiment with winter flounder (*Pseudopleuronectes americanus*) eggs exposed to sediment deposition from a navigational dredging project found a slightly lower larval survival rate compared to control sites, but the differences were not statistically significant (Klein-MacPhee et al. 2004). However, the viability of the larvae in this experiment was not monitored beyond burial escapement. Similarly, laboratory experiments with winter flounder eggs buried to various depths (i.e., control, <0.5 mm, and up to 2 mm) indicated a decreased hatch success and delayed hatch with increasing depth; but differences were not statistically significant (Berry et al. 2004). More recently published laboratory studies investigating burial of winter flounder eggs reported variability among experiments, making it difficult to determine a maximum threshold level for egg burial. Berry et al. (2011) reported trends of decreasing hatching success and increased time to hatch with increasing sediment depth relative to controls. However, the percent total hatch of eggs exposed to $\leq$ 1.0 mm of sediment was not statistically different from the controls in the study. Although the percent total hatch was highly variable in eggs buried $\leq$ 2.5 mm of sediment in all experiments, less than 1 percent of winter flounder eggs hatched when sediment burial depths were > 2.5 mm. It is important to note that this study dealt solely with total hatch success, and did not deal with sublethal effects, such as developmental deformities, which may result from burial; nor did the study involve contaminated sediments. While an absolute maximum threshold for winter flounder egg burial remains uncertain, these studies indicate that sediment burial at even minimal levels can reduce hatching success and increase time to hatch.

We remain concerned that dredging activities and associated plumes of contaminated sediment have the potential to impair migration of anadromous species. Chiasson (1993) found an increase in swimming activity of rainbow smelt when elevated suspended sediments ($\geq$ 10 mg/L) were present (such alarm reactions have been found to disrupt schooling behavior of fishes). In a laboratory study, Wildish and Power (1985) found that rainbow smelt avoided suspended sediment when concentrations were > 20 mg/L. Sublethal effects to estuarine fishes can include decreased feeding, decreased oxygen transfer in fish, as well as impacts on gills and associated respiratory impacts (Wilber and Clarke 2001; Nightingale and Simenstad 2001; Wilber et al. 2005).

Impacts Associated with Blasting

As you are aware, underwater blasting and other noise-producing activities, in addition to potential lethal affects, can disrupt fish behavior including spawning and spawning migrations into and from freshwater rivers. In previous letters to you, we discussed our concerns for the potential adverse effects to federally-managed species and other NMFS trust resources, including diadromous fish in the Boston Harbor area. Specifically, we have recommended that underwater blasting be conducted during a time of year that avoids and minimizes impacts on sensitive life history stages.

As you recall, in the fall of 2007 you conducted underwater blasting between October 24 and November 14 in order to remove rock from the Boston Harbor Federal Navigation Maintenance Dredging project. As a result of this blasting, four separate fish kill events occurred within the President Roads area of Boston Harbor, impacting approximately 2,500 fish. The majority of the fish killed during the blasting were alewife, blueback herring, and rainbow smelt, which are all identified by NMFS as "species of concern", although other species such as menhaden, cunner, red hake, butterfish, and Atlantic herring were also killed. We add that the reported number of fish killed in those blasting events may have been underestimated, since some fish may not float to the surface after being killed or injured, and others may have been preyed upon below the surface of the water by other fish and not accounted for by the observer on board the barge (Keevin 1998).

Following the 2007 fish kill event, you developed a post-project blasting report in June 2008, which provides an overview of the fish kill events, as well as corrective measures to be instituted for future blasting. You indicated in the draft Environmental Assessment for the Boston Harbor Main Ship Channel and the Weymouth Fore River Channel Rock Removal project that through lessons learned from the previous blasting in Boston Harbor, a number of new blasting best management practices (BMPs) would be incorporated into the Contractor's blasting plan (e.g., a communication plan between the fish observer and the Contractor and relocating the fish startle system to an alternate vessel instead of the blast barge). In fact, several of these BMPs were incorporated in the blasting conducted in September 2012, and we note that you reported no fish kills during that recent rock removal work. However, this project involved removing just over 3,000 cy over a three-day period of blasting in September, which is a time when minimal presence of diadromous fish are expected in Boston Harbor. Because the proposed BHDDNIP involves removing approximately 1 million cy of rock over a three-year period, some of which may occur during a time of year when diadromous fish densities are the highest, we believe the potential risk of injury and mortality are orders of magnitude larger than the rock removal project in September 2012.

Comment NMFS #2

Although utilizing the BMPs incorporated in the rock removal project for the Boston Harbor Main Ship Channel and Weymouth Fore River Channel may provide some level of protection for fishery resources, we continue to contend that an underwater blasting technical working group is needed for the proposed BHDDNIP. The complexities of underwater blasting, as well as the diverse technologies and best management practices that are available, require a thorough review by a technical working group composed of federal and state resource and permitting agencies. This is particularly relevant for a project such as the BHDDNIP, which is proposed over a three-year period and involves removing approximately 1 million cy of rock.

Comment NMFS #3

Beneficial Uses of Rock as Artificial Reefs

According to your letter, dated October 24, 2012, the rock removed from the BHDDNIP may be used to create reef habitat in Massachusetts Bay. The DSEIS/DEIR issued in 2008 indicated that this could involve placing rock over an area of approximately 220-530 acres of soft bottom habitat. The DSEIS/DEIR also included two additional disposal alternatives: using the rock for upland construction purposes and the use for ongoing shore protection projects. As we discussed in our letter, dated June 2, 2008, the DSEIS/DEIR assumes that hard bottom habitat is preferable to soft bottom habitat. Although less structurally complex, soft bottom substrates serve as habitat for a variety of resources, including benthic invertebrates such as lobsters and Atlantic sea scallops, and demersal and benthic fishes such as flounder, red hake, and sculpin. We continue to believe the FSEIS/FEIR should consider the effects of the loss of soft bottom habitats as a result of the creation of artificial reefs relative to the overall ecosystem functions and values.

Comment NMFS #4

Capping of the Former Industrial Waste Site

According to your letter, dated October 24, 2012, and the DSEIS/DEIR, the USACE is considering the use of dredged material to cover potential hazardous and radioactive wastes located within the former IWS. A demonstration project to test the methodology and effectiveness of capping the IWS was scheduled during the 2007 Boston Harbor Federal Navigation Maintenance Dredging project. We continue to believe the results of this demonstration project should be considered in the FSEIS/FEIR to determine the efficacy of using the dredged material from the proposed BHDDNIP to cap the IWS.

Comment NMFS #5

Essential Fish Habitat

Section 305(b)(2) of the MSA requires all federal agencies to consult with us on any action authorized, funded, or undertaken by that agency that may adversely affect EFH. The area of the BHDDNIP and the MBDS has been identified as EFH under the MSA for 24 federally-managed species. In our letter to you dated June 2, 2008, we requested additional EFH information, but have not received it. Such information would assist us in developing specific conservation recommendations that minimize impacts to fishery resources and habitats, while providing the flexibility for you to carry out the required dredging and blasting. Nonetheless, we are obligated by our regulations to provide our EFH conservation recommendations using the best scientific information available. Furthermore, a lack of site-specific information for a project of this magnitude requires that we take a risk-averse approach in the issuance of our EFH conservation recommendations in order to ensure protection of fishery resources and habitats. We recommend pursuant to Section 305(b)(4)(A) of the MSA that you adopt the following EFH conservation recommendations:

1. To avoid impacts to winter flounder spawning, egg, larvae, and juvenile development habitat, no dredging or underwater blasting should be conducted between February 1- June 15 of any year in any areas of the Mystic River and Chelsea River, and the Reserved Channel, and the Main Ship Channel and Turning Basin landward of the Conley Terminal.

Comment NMFS #6

2. In order to protect EFH forage species, no dredging or underwater blasting should be conducted between March 1- June 30 of any year in any areas of the Mystic River and

Comment NMFS #7

Chelsea River channels and private terminal berths, the Reserved Channel and terminal berths at Massport facilities, the Main Ship Channel and terminal berths, and the Turning Basin west of the Conley Terminal to avoid adverse impacts on upstream spawning migrations of alewife, blueback herring, rainbow smelt.

3. For the remaining sections of the BHDDNIP (i.e., Main Ship Channel east of the Conley Terminal, President Roads Anchorage, Broad Sound North Entrance Channel, maintenance of the 35-foot deep lane of the North Entrance Channel, 30-foot deep Broad Sound South Entrance Channel, 15-foot deep Nubble Channel and 35-foot deep MLLW Barge Anchorage), an underwater blasting plan should be developed during the Planning, Engineering, and Design phase of the proposed project. The underwater blasting plan should be directed and developed on an underwater blasting technical working group, which should be convened as soon as possible to begin evaluating data from the proposed Boston Harbor Main Ship Channel rock removal project, as well as gathering information from other past underwater blasting projects in this and other regions. This technical working group should identify and evaluate the most current knowledge on the science and management of underwater blasting and monitoring needs that can be directly related to the proposed BHDDNIP. Recommendations of this Technical Working Group should be incorporated into the FSEIS/FEIR

Comment NMFS #8

Comment NMFS #9

4. Alternative beneficial reuse of rock material that avoid and minimize adverse impacts on biologically productive soft bottom habitats should be evaluated more fully within the FSEIS/FEIR, including using the rock for upland construction purposes and the use for ongoing shore protection projects.

Comment NMFS #10

5. The results of the demonstration capping project within the IWS should be evaluated within the FSEIS/FEIR in order to determine the efficacy of using the dredged material from the proposed BHDDNIP to cap the IWS and to assess potential impacts to biological communities within the MBDS.

Comment NMFS #11

Please note that Section 305(b)(4)(B) of the MSA requires you to provide us with a detailed written response to these EFH conservation recommendations, including a description of measures you intend to adopt for avoiding, minimizing, or offsetting the impact of the project on EFH. In the case of a response that is inconsistent with our recommendations, Section 305(b)(4)(B) of the MSA also indicates that you must explain your reasoning for not following the recommendations. Included in such reasoning would be the scientific justification for any disagreements with us over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects pursuant to 50 CFR 600.920(k).

Comment NMFS #12

Please also note that a distinct and further EFH consultation must be reinitiated pursuant to 50 CFR 600.920(l) if new information becomes available or the project is revised in such a manner that affects the basis for the above EFH conservation recommendations. Since additional information will be generated as you undertake the Planning, Engineering, and Design phase of the BHDDNIP, it may affect the basis of our EFH conservation recommendations, which would require the reinitiation of our EFH consultation

Comment NMFS #13

Fish and Wildlife Coordination Act

Comment NMFS #14

As discussed above, the BHDDNIP supports populations of shellfish and American lobster, and a number of species of anadromous fish that use the area for various stages of their life history, including the spawning migrations of blueback herring, alewife, and rainbow smelt. In order to avoid adversely affecting the sensitive spawning periods of these species, we recommend all EFH conservation recommendations listed above be adopted.

Protected Resources and Endangered Species Act Consultation

Information regarding Section 7 of the Endangered Species Act (ESA) was provided to you by our Protected Resources Division in a separate letter. For questions regarding Protected Resources and ESA consultation issues, please contact Julie Crocker at 978-281-9480.

Conclusions

Information that we requested in a letter to you dated June 2, 2008 was not provided, and has hampered our ability to consult on this action. However, we are obligated by our regulations to provide our EFH conservation recommendations using the best scientific information available.

Comment NMFS #15

Unfortunately, the lack of site-specific details for a project of this magnitude required us to take a risk-averse approach in the issuance of our EFH conservation recommendations in order to ensure protection of fishery resources and habitats. As additional information becomes available which would affect the basis of our EFH conservation recommendations, reinitiation of the consultation may be warranted. Should you have any questions about EFH and fishery related issues, contact Michael Johnson at 978-281-9130, at mike.r.johnson@noaa.gov, or at the letterhead address of this letter.

Sincerely,

Louis A. Chiarella
Assistant Regional Administrator
for Habitat Conservation

cc: Crocker/Colligan, F/NER3
Rogers/Mackay, ACOE NE
Colarusso/Timmermann, USEPA
Boeri, MA CZM
Chin, MA DEP
Evans, MA DMF

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

CENAE-PP-P

23 November 2012

MEMORANDUM FOR: Chief, Office of Water Project Review
ATTN: CEMP-NAD (Ms. Shuman), U.S. Army Corps of Engineers, 441 G. Street, N.W., Washington, D.C. 20314-1000

THRU: Commander, North Atlantic Division, U.S. Army Corps of Engineers, ATTN: CENAD-PD-CID-P (Attn: Mr. Joseph Forcina), Fort Hamilton Military Community, 301 General Lee Avenue, Brooklyn, NY 11252-6700

SUBJECT: Boston Harbor Deep Draft Navigation Improvement Study, Draft Feasibility Report and Supplemental Environmental Impact Statement, PWI #013654

1. Reference is made to the following:

a. CECW-PC Memorandum dated, 12 September 2012
b. CEMP-NAD Memorandum, dated 26 September 2012
c. CENAD-PD-CS Memorandum, dated 22 October 2012.

2. It was suggested in paragraph 7 of reference 1 a. that the previously submitted Draft Boston Harbor Navigation Improvement Project Feasibility Report (FR) remain largely intact and that the Economic Reanalysis Framework, sensitivity analysis, and results be added as an addendum bound to the current Feasibility Report. Although the Supplemental Environmental Impact Statement (SEIS) is not addressed in reference 1a, it is the District's understanding that through discussions between USACE and the MSC it has been suggested that the SEIS also be updated by an addendum.

3. The District respectfully disagrees that the FR and SEIS should be updated by addendum since no final FR or SEIS was ever produced. We believe that we need to produce a final FR and SEIS for publication and support of the Chief's Report, not merely add an addendum to the draft reports. We believe it would be problematic not to produce a final SEIS, particularly since additional efforts are needed to address issues that were not present in 2008, such as the recent listing of the Atlantic Sturgeon as a threatened species, changes to bridges and utilities, extensive maintenance work in the harbor since 2008, and the many methods and lessons learned from that work.

4. It is our intent to update only the information in the FR and SEIS that is needed to finalize these reports. The majority of edits necessary to update the Feasibility Report are in the final third of the report where alternative evaluation and recommended plan selection are discussed. These also will be outlined in the Executive Summary. We will also conduct the analysis required by ER 1110-2-1404 to determine the appropriate depth of the entrance channel. Since the 2008 report, guidance on entrance

SUBJECT: Boston Harbor Deep Draft Navigation Improvement Study, Draft Feasibility Report and Supplemental Environmental Impact Statement, PWI #013654

channel depths to address squat, the effect of wind and wave action, and safety and efficiency clearance, has changed and we will be updating the report to reflect the revised analysis. We will be updating the economics to reflect the current 3-3/4 percent interest rate. We believe that these revisions to the reports will take approximately the same time as would be needed to prepare addendums covering all the applicable topics. We are currently well underway with these revisions

5. Since it was recommended that the New England District coordinate with the vertical team regarding report revisions to ensure consistency and agreement on format, we are requesting your concurrence with the NAE plan to revise and finalize the FR and SEIS. Please feel free to call me at 978-318-8230 should you have any questions, or you may reach the project manager (Mike Keegan) at 978-318-8087.

WILLIAM C. SCULLY, P.E.
Acting District Engineer

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
5 POST OFFICE SQUARE, SUITE 100
BOSTON, MA 02109-3912

OFFICE OF THE
REGIONAL ADMINISTRATOR

November 9, 2012

John R. Kennelly, Chief of Planning
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Re: Boston Harbor Deep Draft Navigation Improvement Project

Dear Mr. Kennelly:

We are writing in response to your October 11, 2012 letter regarding work you are doing to prepare the Final Supplemental Environmental Impact Statement (FSEIS) for the Boston Harbor Deep Draft Improvement Project. Your letter details changes in the project since the DSEIS was prepared and requests confirmation that our comments on air and marine issues offered in response to the project described in the 2008 DSEIS remain valid. The primary project change described in your letter includes a reduction in the recommended project depth from 48 to 47 feet at mean lower low water in the inner harbor (between President Roads Channel and Main Ship Channel to Massport's Conley Terminal). We reviewed our 2008 comment letter and offer the following comments to assist the Corps in its efforts to develop the FSEIS for the project.

Air Issues

Since we commented in 2008 a number of changes have occurred related to air quality issues that are described below. We believe it would be prudent to discuss these issues at the upcoming Technical Working Group Meeting on December 3, 2012.

Air Quality Designation in the Project Area
EPA's final rule designating nonattainment areas for the 2008 ozone National Ambient Air Quality Standard (NAAQS) was published in the Federal Register on Monday, May 21, 2012 (77 FR 30088) and became effective July 20, 2012. This rule established initial air quality designations and classifications for the 2008 ozone NAAQS for most areas in the United States, including areas of Indian country. For the State of Massachusetts only Dukes County, including Dukes County Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts, is designated nonattainment for the 2008 ozone standard. The rest of Massachusetts including the project area in Suffolk County is designated unclassifiable/attainment for the 2008 ozone standard.

Importantly, Suffolk County, Massachusetts was designated as unclassifiable / attainment for this new standard and General Conformity only applies to nonattainment or maintenance areas.

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However, General Conformity requirements remain in place in Massachusetts due to their initial nonattainment designation for the 1997 ozone standard until such time as EPA revokes that standard. One possibility is that EPA will revoke the 1997 ozone standard one year from the effective date of our designations for the 2008 ozone standard, which would be on July 20, 2013. This is how we proceeded when we transitioned from the 1990 ozone standard to the 1997 ozone standard. However, EPA has not yet formally announced how we will handle revocation of the 1997 ozone standard and it is possible that the agency could take a different approach. Our position with regard to this change is expected to be contained within our implementation rule for the 2008 ozone standard. Publication of the rule is expected in the next month or so. We suggest that the Corps discuss the general conformity issue with us after the proposed implementation rule for the 2008 ozone standard is published.

Comment EPA #1

As addressed in our 2008 scoping comments, The Boston area carbon monoxide attainment area [Middlesex County (part) Cities of Cambridge, Everett, Malden, Medford, and Somerville; Norfolk County (part) Quincy City; and Suffolk County (part) Cities of Boston, Chelsea, and Revere], with an associated maintenance plan would also trigger General Conformity provisions.

Comment EPA #2

General Conformity Regulations

On Monday April 25, 2010, EPA finalized revisions to the General Conformity Regulation (64 FR 17254 – 17279). The Corps may be able to take advantage of the flexibility and benefits offered by the revised general conformity rule. We should plan to discuss this issue at the upcoming Technical Working Group meeting.

Comment EPA #3

Clean Data Determination

EPA published a "clean data determination" for Boston-Lawrence-Worcester (E. Mass), Massachusetts with regard to the 1997 ozone standard (see Tuesday, May 29, 2012; 77 FR 31496). Note that a "clean data determination" does not relieve states of all of their air quality planning obligations, and one such obligation that was not removed by EPA's clean data determination was the General Conformity requirement. In this same notice EPA also determined that the Boston-Lawrence-Worcester (Eastern Massachusetts) moderate 1997 eight-hour ozone nonattainment area attained the 1997 eight-hour NAAQS for ozone by its applicable attainment date (June 15, 2010).

MOVES (MOtor Vehicle Emission Simulator)

MOVES is EPA's state-of-the-art tool for estimating emissions from highway vehicles. The model is based on analyses of millions of emission test results and considerable advances in the Agency's understanding of vehicle emissions. Compared to previous tools, MOVES incorporates the latest emissions data, more sophisticated calculation algorithms, increased user flexibility, new software design, and significant new capabilities. EPA announced the release of MOVES2010 in March 2010 (75 Federal Register 9411), and released a minor revision as MOVES2010a in September 2010. In April 2012 EPA released MOVES2010b to allow MOVES users to benefit from several improvements to general model performance. MOVES2010b does not significantly affect the criteria pollutant emissions results of MOVES2010 and therefore is not a new model.

Should any new onroad mobile modeling be required, MOVES should be used in developing the onroad mobile emission inventories. Comment EPA #4

Marine Issues

Our 2008 comments on the DSEIS noted our objections to the proposed blasting activities and rock reef creation due to a lack of information relative to the extent and impact of both. Our letter strongly encouraged the Corps to meet and work with us and other interested federal and state agencies to resolve those issues. Absent any meaningful coordination on both issues over the past four years, we note that the basis for our objections has not changed. We continue to be willing to meet with the Corps and other agencies to discuss these important issues and identify ways to reduce the impact of blasting on fish and other marine life. Moreover, we believe that these discussions are an important part of the Corps work to develop a comprehensive and defensible FSEIS and we would hope that interagency coordination can help to resolve our outstanding objections in advance of the finalization of the FSEIS analysis. The comments and questions expressed in our May 23, 2008 comments on the DSEIS related to marine issues remain unchanged. We look forward to discussing the Corps' approach to address these comments at upcoming coordination meetings including the Technical Working Group Meeting scheduled for December 3, 2012. Comment EPA #5 Comment EPA #6

Thank you for the opportunity to update our previous comments. Please contact me at 617-918-1025 with any comments or questions.

Sincerely,

Timothy L. Timmermann
Associate Director
Office of Environmental Review

MASSACHUSETTS WATER RESOURCES AUTHORITY
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November 9, 2012

Mr. John R. Kennelly, Chief of Planning
Department of the Army
New England District, U.S. Army Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Re: Boston Harbor Deep Draft Navigational Improvement Project
EOEEA #12958
Feasibility Report and Supplemental Environmental Impact Report

Dear Mr. Kennelly:

The Massachusetts Water Resources Authority (MWRA) appreciates your recent letter requesting confirmation that our previous comments on the above mentioned project are still valid and remain the same. MWRA reiterates our comments submitted on the Environmental Notification Form dated February 28, 2003 and on the Feasibility Report and Supplemental Environmental Impact Report dated June 2, 2008. MWRA's concerns continue to focus on the need to protect MWRA's infrastructure in two locations within the project area:

Comment MWRA #1

- Reserve Channel: where NSTAR's four-mile 115 Kv Submarine Cross Harbor Cable runs the entire length beneath the channel and continues across the Harbor to Deer Island.

- Chelsea Creek: where MWRA has an active 36-inch diameter water main that crosses the Creek supplying East Boston and Logan International Airport.

Reserved Channel: NSTAR Cable

NSTAR's Cross Harbor Cable originates at the K Street Substation in South Boston and services the Deer Island Treatment Plant that serves over 2.5 million people in the metropolitan Boston area. The proposed dredging plan now calls to deepen the harbor's main channels and the lower portion of the Reserved Channel at the Conley Terminal from their existing - 40 foot depth at mean lower low water (MLLW) to a depth of - 47 feet MLLW. In addition to this - 47 foot dredging level, standard procedures require adding an additional two feet (for over-dredge) and in this case, given the presence of ledge, an additional two feet must be factored into the final dredge depth. As a result of these standard dredging procedures, the actual proposed depth of dredge in the Reserve Channel is - 51 MLLW. Most recent underwater surveys have revealed that NSTAR's cable at the highest point is - 52.2, which places the cable at approximately 1.2 feet below the proposed dredging depth.

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As MWRA has said in the past, MWRA's primary concern is that any blasting and dredging as part of this proposal near the cable in the Reserved Channel cannot help but pose a direct threat of damage to the cable which would result in the long-term loss of a vital energy link to its Deer Island facility and, in the process, cause a release of insulating oil in the cable to the waters of Boston Harbor, the same waters which have seen dramatic improvement in quality precisely because of the contributions of that wastewater treatment facility.

The disruption of this primary source of power to the treatment plant servicing over 43 cities and towns in metropolitan Boston would be catastrophic for MWRA over the lengthy period which would be required to replace that cable. It should be noted that even in the short term, any disruption in the use of the cable would require that MWRA depend upon and use its own back-up generating capability, which given today's fuel costs, could result in millions of dollars in annual additional expenditures charged to MWRA's ratepayers, whose municipal budgets are already substantially over-burdened. Additionally, should MWRA's sole source of back-up power fail for any reason, the environmental impacts would be disastrous.

MWRA's National Pollutant Discharge Elimination System (NPDES) Permit, issued by the U.S. EPA and the Massachusetts Department of Environmental Protection, authorizing the discharge of wastewater from the Deer Island Treatment Plant requires two separate power sources to operate MWRA's wastewater treatment and pumping facilities. Any disruption or damage to the capable would eliminate one of MWRA's two existing power sources (the cross harbor cable and the on-island power plant) thereby violating MWRA's permit condition.

For these reasons, it is extremely important that the ACOE and Massport be satisfied that any plans which NSTAR may have to protect or to relocate the cable be sufficient to ensure its integrity. To date, NSTAR has not shared its plans with MWRA. MWRA remains very concerned about the protection of the cable which is a vital and non-expendable item of infrastructure upon which MWRA relies heavily.

Comment MWRA #2

Chelsea River: MWRA Section 38 Water Main Crossing

MWRA understands that some dredging has already occurred in Chelsea Creek as part of the Department of Transportation's (DOT) recently completed Chelsea Street Bridge project. MWRA staff worked closely with DOT staff during that project. Now that the Bridge is complete, the proposal calls for further dredging in the channel to a depth of - 40, which is actually - 42 to accommodate a two foot over-dredge. It appears that the proposed depth of - 42 will not impact MWRA's Section 38, a 36-inch water main crossing under the Chelsea River because Section 38 is located at elevation - 45 (top of pipe).

It appears that the proposed dredging width of 175 feet will also not impact the existing water main. The 36- inch main at its - 45 foot depth has a minimum perpendicular width across Chelsea Creek of 195 feet. Therefore there is sufficient "length" of 10 feet on either side of the pipe.

Comment MWRA #3

Any future dredging and/or blasting in the Reserve Channel or the Chelsea Creek area should be carefully coordinated with MWRA through the 8 (m) permitting process. The Proponents should contact Mr. Ralph Francesconi at (617) 305-5827 within MWRA's Water Field Operations Group.

Please contact me at (617) 788-1165 if you have questions or need additional information. Thank you for the opportunity to comment.

Sincerely,

Marianne Connolly

Marianne Connolly
Sr. Program Manager, Regulatory Compliance

cc: Mr. Frederick Laskey, MWRA Executive Director
Michael Hornbrook, MWRA COO
Steven Remsberg, MWRA, General Counsel
Kevin McCluskey, MWRA, Dir. Public Affairs
Mike McCarthy, Work Coordination Center Mgr, MWRA
Ralph Francesconi, MWRA Water Field Operations Permitting
Michael Keegan, Project Mgr., US Army Corps of Engineers
Deb Hadden, Massport, Acting Port Director, Massport
Stewart Dalzell, Massport, Deputy Director, Env. Planning & Permitting

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

November 7, 2012

Engineering/Planning Division
Evaluation Branch

Mr. John Bullard
Regional Administrator
NOAA Fisheries
Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Dear Mr. Bullard:

This letter is to follow up on recent discussions with Ms. Julie Crocker of your staff as well as our letters of June 30, 2008 and October 24, 2012, requesting continuation of informal consultation under Section 7(c) of the Endangered Species Act (ESA) for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. As described in our letter of October 24, 2012, the project will involve dredging approximately 10 to 11 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, up to about 1 million cubic yards of rock could be removed from the harbor, some of which may require blasting. In association with this improvement work, about 150,000 cubic yards of material would be removed to deepen some terminal berths, and about 500,000 cubic yards of material would be removed for maintenance of the improved and adjacent Federal channels. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site (MBDS) which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The Federal base plan includes disposal at the MBDS. The unconsolidated materials may be used to cap the former Industrial Waste Site (IWS) in Massachusetts Bay in response to a request from the U.S. Environmental Protection Agency (EPA). The rock may be used to create reef habitat or shoreline restoration projects in Massachusetts Bay. Dredging will be accomplished using a mechanical dredge.

Specific improvements include:

- deepening and widening the harbor's 40-foot deep mean lower low (MLLW) channels, turning basin and anchorage to a depth of -47 feet MLLW to provide container ships access to the Conley Terminal, with an additional two to five feet of depth in the Broad Sound North Entrance Channel (up to -52 feet MLLW) to accommodate exposure of vessels to increased seas. The final depth selected for the entrance channel accounts for the range in quantities given above;

- deepening the 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel to -45 feet MLLW, to improve access to Massport's Marine Terminal in South Boston;

- deepening a portion of the existing 35-foot lane of the lower Mystic River Channel to -40 feet MLLW to improve access to Massport's Medford Street Terminal; and

- deepening the existing 38-foot channel in the Chelsea River to -40 feet MLLW to improve access to its petroleum terminals with widening of the channel in the bends and bridge approaches.

- In addition, terminal berths at Massport facilities on the Reserved, Main Ship and Mystic River channels, as well as private terminal berths on the Chelsea River would be deepened commensurate with the deepening of the Federal channels.

- Any required maintenance of the Federal navigation channels being improved would be carried out concurrently, as would maintenance of adjacent Federal channels needed to route shipping traffic around the deepening operation, including maintenance of the 35-foot deep lane of the North Entrance Channel, 30-foot deep Broad Sound South Entrance Channel, 15-foot deep Nubble Channel and 35-foot deep Barge Anchorage.

Rock removal by blasting is anticipated to require approximately 26 months to complete, with the required times approximately broken down as follows: 16 months in the Broad Sound North Entrance Channel; two months in the President Roads Anchorage; two months in the lower Main Ship Channel; three months in the Main Ship Channel extension area below the Ted Williams Tunnel; five months in the Reserved Channel and its Turning Area; and one month in the upper Chelsea River. Blasting may be accomplished using two blast plants working in the harbor, with each plant detonating no more than one blast per day, for maximum of two blasts per day. No blasting will occur at night. The rock areas and construction times would be further refined after design phase subsurface explorations are completed.

Federally listed species that can be found in Massachusetts waters include three species of threatened or endangered sea turtles and five species of endangered whales. In addition on February 6, 2012, five distinct population segments (DPS) of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) that inhabit the waters of the northeast and the southeast were listed under the Endangered Species Act. These include in the northeast, the Gulf of Maine (GOM) DPS, listed as threatened, the New York Bight (NYB) DPS, listed as endangered, and the Chesapeake Bay (CB) DPS listed as endangered; and in the Southeast, the Carolina DPS listed as endangered, and the South Atlantic, listed as threatened.

The sea turtles in Massachusetts nearshore waters are typically small juveniles. The most abundant being the Federally threatened loggerhead (*Caretta caretta*), followed by the Federally endangered Kemp's ridley (*Lepidochelys kempi*), and the Federally endangered leatherback sea turtle (*Dermochelys coriacea*). Green sea turtles (*Chelonia mydas*) may occur in New England waters, but are rare. Sea turtles are known to occur in Massachusetts Bay. While no surveys for sea turtles have been conducted in Boston Harbor, National Marine Fisheries Service (NMFS) believes that suitable forage and habitat exists in this area and it is likely that sea turtles occasionally visit Boston Harbor.

The Federally endangered North Atlantic Right Whale (*Eubalaena glacialis*), and humpback whale (*Megaptera novaeangliae*) are not considered residents of Boston Harbor, but on occasion entered the harbor as they complete seasonal migrations in nearby Massachusetts Bay. The Fin (*Balaenoptera physalus*), Sei (*Balaenoptera borealis*), and Sperm (*Physter macrocephalus*) whales, which are also Federally endangered species, are seasonally present in New England waters, but are typically found in deeper offshore waters and are not likely to occur in Boston Harbor.

Atlantic sturgeon belonging to each of the five DPSs occur in marine and estuarine habitat, including freshwater reaches of large rivers with access to the sea, ranging from Hamilton Inlet, Labrador, Canada, to Cape Canaveral, Florida, in the U.S. The range of all five DPSs overlap (http://www.nero.noaa.gov/prot_res/esp/ListE&Tspec.pdf). Despite extensive mixing in coastal waters, Atlantic sturgeon return to their natal river to spawn (ASSRT, 2007). Therefore, although individual sturgeon from each of the distinct population segments would generally be expected to be found within the designated areas for their populations, because their ranges overlap it is possible that fish from a given DPS may be found throughout the entire geographic range of the species. The federally threatened GOM DPS of Atlantic sturgeon includes all Atlantic sturgeon whose range occurs in watersheds from the Maine/Canadian border and extending southward, to include all associated watersheds draining into the Gulf of Maine as far south as Chatham, Massachusetts. It also includes wherever these fish occur in coastal bays, estuaries, and the marine environment from the Bay of Fundy, Canada, to the Saint Johns River Florida (FR, 2010). Only one river located in Massachusetts, the Merrimack, is known to support Atlantic sturgeon. Boston Harbor is not known to have been used historically by Atlantic sturgeon (NMFS, 1998).

Although this species is not believed to forage or spawn in Boston Harbor or its tributaries, transient individuals may occasionally be found in these areas (a juvenile was observed in the Charles River in February of 2012). However as discussed with Ms. Julie Crocker of your staff (conference call, October 17, 2012), there have been only anecdotal reports of Atlantic sturgeon being in the area, and no other confirmed reports other than the single fish observed in the Charles River in February, 2012. Any single sturgeon that may be found in Boston Harbor could have originated from any of the five DPSs due to the overlapping of the species range. However, due to the fact that the Gulf of Maine includes Boston Harbor, it is more likely that any sturgeon found in Boston Harbor would be from the GOM DPS, which is listed as threatened. (Additional information concerning the life history of Atlantic sturgeon is attached to this letter).

As mentioned previously, a mechanical dredge will be used for the removal of the unconsolidated materials and for removal of the rock after it has been fractured. Sea turtles have been known to be impacted from hopper dredges only, not mechanical dredges (Dickerson, et al. 2004). Although sturgeon have been impacted by mechanical dredges, the majority of dredging related injuries to these species has resulted from entrainment in the dragarms of hopper dredges (ASSRT, 2007). Therefore, we do not expect impacts to sea turtles, Atlantic sturgeon or

whales from dredging operations due to the type of dredge employed and the unlikelihood of their being in the area.

In our letter of October 24, 2012 we stated that we would provide supporting information concerning the effects of blasting in Boston Harbor on the above listed species relative to established noise criteria. Please find attached a summary of background information on the anticipated range of noise impact from underwater blasting to listed species. Maps showing the distribution of right whales in Massachusetts Bay, and blasting noise areas for the outermost point of blasting in the Broad Sound North Entrance Channel are also included as well as a table with calculated safety zones that we believe to be protective of marine mammals, sea turtles and Atlantic sturgeon. These safety zones were based on criteria recently received from your office and calculated using blast equations agreed upon in discussions with Ms. Julie Crocker, as well as additional information from other blasting events (Miami Harbor and Boston Harbor). We believe that they will adequately protect listed species that may occasionally occur in Boston Harbor from effects due to blasting.

In addition as indicated in your letter of September 6, 2005, sea turtles are seasonally present in Massachusetts Bay from June through November, but are not known to be present in Boston Harbor. As there have been no known sightings of sea turtles in Boston Harbor reported to the U.S. Army Corps of Engineers (USACE) by the resource agencies, it is likely that a sea turtle in the Boston Harbor navigation channels would be rare. Also as noted above, the Atlantic sturgeon occurrences in Boston Harbor are also rare, particularly in those specific areas where blasting would take place in the lower harbor, harbor entrance, and upper Chelsea River. Aside from the Chelsea River turning basin, no blasting or rock removal would occur in the upper harbor (above the tunnels).

Based on our calculations and analysis of effects on listed species, and the distribution and low probability of whales, sea turtles and Atlantic sturgeon occurring in the project area, we believe that the Boston Harbor Deep Draft Project would not likely adversely affect listed species. To further reduce potential impacts to threatened and endangered whales, sea turtles and Atlantic sturgeon in the project area, the following mitigation measures will be implemented:

- One or more NMFS-approved endangered species observers will be present at each blast site. The number of observers will depend on the number that is necessary to observe the entire safety zone. No blasting will occur until the safety zone is free from any observations of whales or sea turtles for 60 minutes, subject to safety considerations. These requirements can be added to the monitoring plan for blasting which can be submitted to NMFS for review and comment.

- The Right Whale Sightings Advisory System will be monitored as well as other communication media (i.e. NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, Notices to Mariners, and U.S. Coast Pilots) for general information regarding North Atlantic Right Whale sighting locations. In addition, the Contractor will be required to monitor the Right Whale Listening Network for information on Right Whales detected near the shipping lanes.

- No blasting will occur if Right Whales are present within the safety zone of the blast area or within a specified distance agreed to between NMFS and USACE, barring any safety concerns.
- In the unlikely event that any whales or sea turtles are observed within the safety zone during a blast event, all reasonable attempts to monitor the condition and behavior of the animal will be undertaken. These incidences will be reported immediately to NMFS to determine whether or not they would require reinitiating Section 7 Consultation.
- All blasting will be conducted using inserted delays of a fraction of a second per borehole as well as the use of stemming, which will be placed into the top of the borehole to deaden the shock wave reaching the water column.
- No blasting will occur when schools of fish are observed in the area (assuming that safety is not jeopardized). A fish observer will use hydro-acoustic monitoring (i.e. side-scan sonar) prior to any blasting event to determine that schools of fish are not located within or transiting the blast zone area (including any listed Atlantic sturgeon). In addition to the sidescan sonar, a fish startle system will be employed to deter fish. Existing startle systems are most effective with species from the Clupeid family. The startle system uses high amplitude sound at specific frequencies. Lessons learned from the previous blasting in Boston Harbor will be incorporated, where appropriate, into the Contractor's blasting plan. Some of these lessons include the development of a communication plan between the fish observer and the Contractor, and the location of the fish startle system that will be deployed on an alternate vessel instead of the blast barge.
- All project vessels will comply with voluntary speed restrictions (10 knots or less) to minimize the risk of ship strikes, as implemented in Dynamic Management Areas (DMAs) that may be established by NOAA Fisheries Service. NOAA Fisheries Service will announce DMAs to mariners through its customary maritime communication.

The proposed Federal base plan for dredged material disposal is the MBDS and/or IWS. Beneficial use of the rock would be developed with input from the Technical Working Group during the Design Phase. If something other than placing the rock at MBDS, and involving in-water disposal, becomes part of the USACE Federal Base Plan, then we would reinitiate Section 7 Consultation with you during the Design Phase to consider that change.

Your response by November 26, 2012 confirming our conclusion that the Boston Harbor Deep Draft Project would not likely adversely affect listed species would be appreciated so that we can meet our commitment to the U.S. Army Corps of Engineers Civil Works Review Board. Any questions or comments can be addressed to Ms. Catherine Rogers at (978) 318-8231.

Sincerely,

John R. Kennelly
Chief of Planning Branch

Enclosure

Copy Furnished (w/Enclosures)
Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive
Boston, Massachusetts 02128

U.S. Department of Homeland Security
United States Coast Guard

Commander
U.S. Coast Guard
Sector Boston

427 Commercial Street
Boston, MA. 02109-3046
Phone: 617 223-5757
Fax: 617 223-8219
Internet: http://homeport.uscg.mil/boston

16600/12-1251
November 7, 2012

U. S. Army Corps of Engineers
New England District
Attn: Mr. John Kennelly
696 Virginia Road
Concord, MA 01742

Dear Mr. Kennelly:

This office recently received your letter of October 11, 2012 addressed to the First Coast Guard District Commander, RDML Daniel Abel, concerning the proposed update to the Feasibility Report and associated Environmental Impact Statement and Report for the Boston Harbor Deep Draft Navigation Improvement Project. As this project is proposed for Boston Harbor, your correspondence was forwarded to Coast Guard Sector Boston for review and opportunity for comment.

As you noted, the Captain of the Port Boston provided a statement of full support for this project in 2007. We note that the currently proposed Feasibility Report offers a one foot reduction in the scope of the recommended project depth in the President Roads and Main Ship Channels from 48 feet to 47 feet at mean lower low water. Although the Coast Guard is charged with maximizing efficiencies of the Marine Transportation System (MTS), we do not feel that this one foot reduction in proposed project depth will negatively impact current and future needs of the MTS for the Port of Boston. Comment USCG #1

I thank you for the opportunity to review and validate our 2007 position pertaining to the Boston Harbor Deep Draft Navigation Improvement Project. Please direct any future correspondence concerning this project to the Chief of my Waterways Management Division utilizing this letterhead address. Should you have any questions concerning this correspondence please contact Lieutenant Commander Scott White at (617) 223-3028 or via email at Scott.C.White@uscg.mil.

Sincerely,

J. C. O'CONNOR III
Captain, U.S. Coast Guard
Commander, Sector Boston

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

October 26, 2012

Michael F. Keegan
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: CZM Federal Consistency Review Boston Harbor Deep Draft Navigation Improvement Project – DEIR/DEIS; Boston.

Dear Mr. Keegan:

Comment CZM #1

The Massachusetts Office of Coastal Zone Management (CZM) has received the necessary information to initiate our federal consistency review for the proposed project referenced above.

The notice that this proposal is undergoing federal consistency review by CZM will be published in the next edition of the *Environmental Monitor*. The publication date of that issue of the *Monitor* will initiate a 21-day public comment period. Enclosed please find a copy of the schedule that we will follow during our review. Although we have 60 days (extendable with your permission) in which to review your determination and concur with or object, we will make a vigorous effort to complete our review shortly after the close of the 21-day comment period

Note: CZM cannot complete its review and issue a decision of consistency with its enforceable program policies until all applicable licenses, permits, certifications and other authorizations have been issued by Massachusetts environmental agencies. Further, the applicable federal permit cannot be issued until the federal permitting agency receives a consistency concurrence letter from CZM for the proposed project. To keep our review timely, we suggest that you forward copies of state environmental agency licenses, permits, etc. to CZM as you receive them.

Future communications with this Office regarding the technical aspects of the above-referenced project should be directed to Valerie Gingrich (617) 626-1064 who will be conducting the federal consistency review of this project for CZM. Please call me at (617) 626-1050 if you have any procedural questions about the review process.

Sincerely,

Robert L. Boeri
Project Review Coordinator

RLB/pb
Enclosure
CZM# 5376

CZM Federal Consistency Review Schedule
For a Federal Agency Activity*

Review Steps

1. *Document Receipt*

   (a) Received consistency certification on — Oct. 26, 2012.

2. *Public Notice*

   (a) Notice of the initiation of this federal consistency review will appear in the next edition of the MEPA *Monitor* which will appear on or about — Nov. 7, 2012.
   (b) Publication in the *Monitor* begins a 21 day public comment period which will close on or about — Nov. 28, 2012.

3. CZM must issue its consistency decision within 60 days of commencement of our review unless granted an extension by the federal project proponent. The review period closes and a consistency decision will issued no later than — Dec. 28, 2012.

* 301 CMR 21.01 - 21.04, 15 CFR 930.41

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 26, 2012

Project Management Division
Programs and Civil Project Management Branch

Mr. Robert Boeri
Project Review Coordinator
The Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2138

Dear Mr. Boeri:

In our letter dated October 16, 2012, the U.S. Army Corps of Engineers (USACE), New England District, sought your reaffirmation of support and concurrence that the Boston Harbor Deep Draft Navigation Improvement Project is consistent to the maximum extent practicable with the Massachusetts Coastal Zone Management Program policies, which were attached to our letter of October 16, 2012. This current letter is written in response to your recent letter of October 24, 2012 requesting additional information on the commitment and planning by the USACE to pursue viable options regarding alternatives for beneficial reuse beyond the creation of rock reefs, including both shore protection and upland use, prior to initiating your Federal consistency review.

As discussed in a conference call between staff from our offices earlier on October 24, 2012, the USACE is committed to working further on beneficial uses for the rock to be removed from the Boston Harbor Deep Draft Navigation Improvement Project. As with the Commonwealth of Massachusetts, it is the USACE policy to investigate potential beneficial uses of dredged material for our projects. During the design phase of the project, the USACE will be conducting more extensive subsurface explorations of suspected areas of hard material to determine how much of that material is rock and how much of the rock will require drilling and blasting as opposed to removal by mechanical means. The USACE will share that information with the Massachusetts Office of Coastal Zone Management (MACZM) and the other participants in the technical working group, develop a sequencing plan for construction, and seek input from the group on those plans.

Once the volumes and the nature of the rock material as well as the sequencing plan are known, we will work with the State and Federal agencies to investigate potential beneficial uses and users for the rock material, including making the materials available for other parties to transport and use in their own projects.

As we discussed at the State Dredging Team meeting held at the MACZM offices on October 16, 2012, Federal and non-Federal responsibilities, and non-Federal sponsorship, for any beneficial uses would need to be defined before any beneficial use plan could be pursued with

the Federal project. We look forward to working with MACZM and the other agencies, and Boston Harbor interests in the final design and construction of this project.

Based on the above information, the USACE understands that MA CZM will be able to complete its Federal consistency review and determine whether or not the proposed project is consistent to the maximum extent practicable with the Massachusetts Coastal Zone Management Program policies.

If you have any questions or require any additional information please contact me at michael.f.keegan@usace.army.mil or at 978-318-8087.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E.; L.C.S.
Project Manager

Copy Furnished:

Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 24, 2012

Engineering/Planning Division
Planning Branch

Mr. John Bullard, Regional Administrator
NOAA Fisheries Service, Northeast Regional Office
55 Great Republic Drive
Gloucester, Massachusetts 01930-22768

Dear Mr. Bullard:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel, Main Ship Channel and the Lower Reserved Channel to Massport's Conley terminal of -47 feet at mean lower low water (MLLW). See attached figure. The prior recommended plan included a depth of -48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional depth in the Broad Sound North Entrance Channel to allow for exposure of vessels to increased seas (between two to five feet greater depth, or up to -52 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.

- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.

- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Your office commented on the Draft FR and DSEIS/DEIR in a letter dated June 2, 2008 (attached) covering Essential Fish Habitat (EFH), fish and wildlife resources, and Federally threatened and endangered species. Your June 2, 2008 letter requested that we reinitiate Section 7 consultation because of the increase in the proposed dredged material quantities from the initial project descriptions and the need for blasting. We responded to your Section 7 consultation request in a letter dated June 30, 2008. In our letter, we requested confirmation that the Boston Harbor Deep Draft Project would not likely adversely affect listed species at that time (sea turtles and whales). However, on August 1, 2008, an email from Julie Crocker of your staff was sent to Cathy Rogers at the USACE with questions about how the different zones aligned with marine mammal noise criteria. Because these questions were never answered, consultation was never completed. Since that time, the Gulf of Maine Distinct Population Segment of Atlantic sturgeon was listed as threatened in the Federal Register on February 6, 2012. The USACE met with your staff at your office on October 10, 2012 to discuss a path forward for Section 7 consultation. The result of this meeting was that we would send a letter requesting continued informal consultation for threatened and endangered whales, sea turtles while adding Atlantic sturgeon for your review with supporting information requested in your email dated August 1, 2008.

We are also requesting at this time that Essential Fish Habitat (EFH) recommendations be provided based on the EFH Assessment and the best available project information as previously provided in the DSEIS/EIR along with the updated project description discussed in this letter. It is understood that as additional information and details are developed within the design phase of this project it will be shared with National Marine Fisheries Service and consultation may be re-initiated along with additional studies, should it be deemed necessary. We are requesting written comments

to conclude EFH consultation by November 26, 2012, to be included in the Final FR and FSEIS/EIR.

If you have any questions or comments, please contact Ecologist, Ms. Catherine Rogers, at (978) 318-8231.

Sincerely,

for John R. Kennelly
Chief of Planning

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

October 24, 2012

John Kennelly
Chief, Planning Branch
New England Division
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

Mr. Kennelly,

This morning, the Corps and CZM participated in a conference call regarding the Boston Harbor Deep Draft Navigational Improvement Project. As you know, CZM is in the process of initiating a federal consistency review of the DEIR/DEIS for the project, which was released in 2008. CZM participated in the review of the project as part of the Massachusetts Environmental Policy Act review. At that time, CZM indicated our support for the project and also provided comments on several issues, including the continuation of the Technical Working Group/Technical Advisory Committee, documentation of outer and lower harbor resources (including a pre- and post-blasting/dredging monitoring program), the development of a comprehensive blast plan, and the evaluation of the beneficial reuse of rock material for shore protection and upland use.

In the letter prepared by the Corps on October 16, 2012 in response to these comments, a commitment was made to continue the Technical Working Group/Technical Advisory Committee, to conduct additional resource surveys of benthic and shellfish communities, develop a sequencing plan for the project, including a comprehensive blast plan, and develop a pre- and post construction monitoring program. CZM is requesting additional information on the commitment/planning by the Corps to pursue viable options regarding alternatives for beneficial reuse beyond the creation of rock reefs, including both shore protection and upland use. Several options were discussed during both the Massachusetts dredging Team meeting held on October 19, 2012 and today's conference call, including, but not limited to, use by the Department of Conservation and Recreation for the maintenance of shore protection structures, potential use by MassPort, and use by private aggregate companies.

Comment CZM #1

CZM is preparing to initiate the federal consistency review, and once the additional information has been provided, a scheduling letter will be sent to the Corps. As always, we look forward to working with the Corps on enhancing the capabilities of the port of Boston.

Regards,

Robt L. Boeri

Bob Boeri
Project Review/Dredging Coordinator
Massachusetts Office of Coastal Zone Management

October 18, 2012

John R. Kennelly
Chief of Planning
New England District
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

Attn. Marc Paiva

RE: Boston Harbor Deep Draft Navigation Improvements Project. MHC #RC.323.

Dear Mr. Kennelly:

Thank you for your letter dated October 11, 2012, received by the Massachusetts Historical Commission (MHC) on October 17, 2012. Staff of the MHC have reviewed the information regarding the change in scope for the project referenced above, and the MHC's files.

Review of the MHC's files indicates that the MHC commented on May 5, 2008, in response to the Corps letter of April 10, 2008. A copy of the MHC's comments are enclosed.

The Corps, in a letter to Massachusetts Board of Underwater Archaeological Resources, dated October 4, 2007, proposed to conduct additional identification surveys for historic properties that may be affected by the project.

In regards to the project change, the MHC advises that the Corps should review the results of previous identification efforts for historic properties in the area of potential effect, and evaluate the potential of the currently proposed project to affect previously identified historic properties, or properties not yet identified that may be located in project area that have not yet been sufficiently surveyed for historic properties. Comment MHC #1

The MHC looks forward to review of scopes for any additional proposed archaeological identification and evaluation efforts, and the Corps findings and determinations in accordance with 36 CFR 800. Comment MHC #2

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800). Should you have any questions, please contact me.

Sincerely,

Edward L. Bell
Deputy State Historic Preservation Officer
Massachusetts Historical Commission

Enclosure (MHC 5/5/2008)

xc w/enclosure:
Stewart Dalzell, Massport
Victor T. Mastone, BUAR
Joe Bagley, Boston City Archaeologist

220 Morrissey Boulevard, Boston, Massachusetts 02125
(617) 727-8470 Fax: (617) 727-5128
www.sec.state.ma.us/mhc

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 16, 2012

Engineering/Planning Division
Planning Branch

Mr. Robert Boeri
Project Review Coordinator
The Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2138

Dear Mr. Boeri:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts. At this time we are seeking your reaffirmation of support and concurrence with our Federal consistency determination for this work.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for construction of the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
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For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be removed from the harbor, some of which may require blasting. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former Industrial Waste Site in Massachusetts Bay in response to a request from the US Environmental Protection Agency (EPA). The rock may be used to create reef habitat in Massachusetts Bay.

The following is a response to your major comments with the proposed project as detailed in your letter dated June 2, 2008. USACE will continue to involve the technical work group (TWG) through the design phase of this project. The design phase of the project includes an extensive boring and probing program that will be used to determine how much rock is expected within the project area and whether blasting would be required to remove all or part of the rock from each project segment.

Using this information, USACE and Massport will work with interested TWG agencies to address concerns about potential impacts to natural resources by conducting additional resource surveys of the benthic and shellfish communities (i.e., sediment profile imaging, benthic grabs, lobster traps, early benthic phase lobster surveys, and/or towed camera) during the design phase if deemed necessary. The above information will be used to develop a construction sequencing plan for the project. A blast sequencing plan will be developed, if needed, in concert with the larger construction sequencing plan for the entire project. USACE also agrees to develop and implement a pre and post monitoring program to document the recovery of the impacted areas for benthic organisms, and shellfisheries. Post construction surveys would occur 1-3 years after completion depending on when construction is completed and availability of funding. The details of the pre and post-construction survey program will be discussed with the TWG and included in any additional NEPA/MEPA document filing, if required.

SSFATE modeling was used for the Boston Harbor Outer Harbor Maintenance Dredging Project which much of the Deep Draft Project overlaps. Actual plume monitoring was conducted during the Boston Harbor Inner Harbor Maintenance Dredging Project for USACE by Battelle in 2008. This monitoring showed that suspended sediment plumes from dredging operations were relatively low. The highest turbidity readings within 500 feet of the dredge were less than 20 NTU above background and suspended sediment concentrations less than 40 mg/l. The dredge plumes were typically confined to the channel, although low concentration plume filaments were observed on two occasions as far as 650 feet from the channel in the southern channel area. Maximum dredge plume length varied with tidal currents in the channel. Some dredge plumes detected during slack conditions had maximum lengths of less than 500 feet. The maximum ebb and flood plumes traveled further but dissipated to near background levels within 1500 feet of the dredge often evident across the full width of the channel. Since the majority of the material is parent material that is composed of Boston blue clay and glacial till material, the turbidity plumes should be less than those listed above.

In response to the agency's concerns expressed about the creation of the proposed rock reef, USACE has committed to working with the TWG during the design phase to examine potential issues, define the exact type and quantity of materials available for such use, examine the candidate sites in greater detail to determine the value of the existing habitat relative to the anticipated value of the reefs and identify a cost-sharing partner for this effort, if needed. In addition to reef habitat creation, some or all of the rock to be removed could prove suitable for other beneficial uses.

Based on the above information, the USACE has determined that the proposed work is consistent to the maximum extent practicable with the attached Massachusetts Coastal Zone Management Program policies. We are requesting your concurrence with our determination. We would appreciate your concurrence with our consistency determination by November 16, 2012. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished:

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

Coastal Zone Management Consistency Determination

The Coastal Zone Management (CZM) Act of 1972 established a national program to "preserve, protect, develop, and where possible, to restore or enhance, the resources of the Nation's coastal zone for this and succeeding generations" and to "encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone..." (16 U.S.C. 1452, Sec. 303 (1) and (2)). Section 307 (c)(3)(A) of the CZMA provides that "...any applicant for a required Federal license or permit to conduct an activity, in or outside the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide...a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity will be conducted in a manner consistent with the program." Similar requirements are included for activities conducted by or funded by a Federal agency.

The policies that are applicable to the proposed dredging project and the project's consistency with those policies are as follows:

Water Quality Policy #1. – Ensure that point-source discharges in or affecting the coastal zone are consistent with federally approved state effluent limitations and water quality standards. *The material proposed for dredging is parent material, not associated with contaminants. Also the dredged material is composed of Boston blue clay and glacial till material, not likely to produce a large sediment plume. The disposal of rock in one of the identified habitat enhancement sites would not create any water quality violations. Only minimal amounts of sediment would adhere to the rock which would be washed away as the rock falls through the water column. Any turbidity created should dissipate rapidly. The material would not be a carrier of contaminants as the rock is surrounded by material suitable for ocean disposal.*

Habitat Policy #1. - Protect coastal resource areas including salt marshes, shellfish beds, dunes, beaches, barrier beaches, salt ponds, eelgrass beds, and fresh water wetlands for their important role as natural habitats. *These resources are outside the zone of influence from the project or the resource occurs in limited amounts. Rock removed from the navigation channel is under consideration to be disposed at a beneficial use site to create hard bottom habitat.*

Coastal Hazards Policy #1. – Preserve, protect, restore and enhance the beneficial functions of storm damage prevention and flood control provided by natural coastal landforms, such as dunes, beaches, barrier beaches, coastal banks, land subject to coastal storm flowage, salt marshes and land under the ocean. *Deepening a portion of the Boston Harbor navigation channels would result in a very minor increase in land under the ocean and would not impact any storm damage prevention or flood control feature of the areas. No significant change in the beneficial function of the land under the ocean is expected from the proposed project.*

Coastal Hazards Policy #2. - Ensure construction in water bodies and contiguous land areas will minimize interference with water circulation and sediment transport. *The proposed dredging activities will not interfere with water circulation in Boston Harbor. No permanent*

structures are proposed in the body of water. Proposed dredging may result in slight increases circulation.

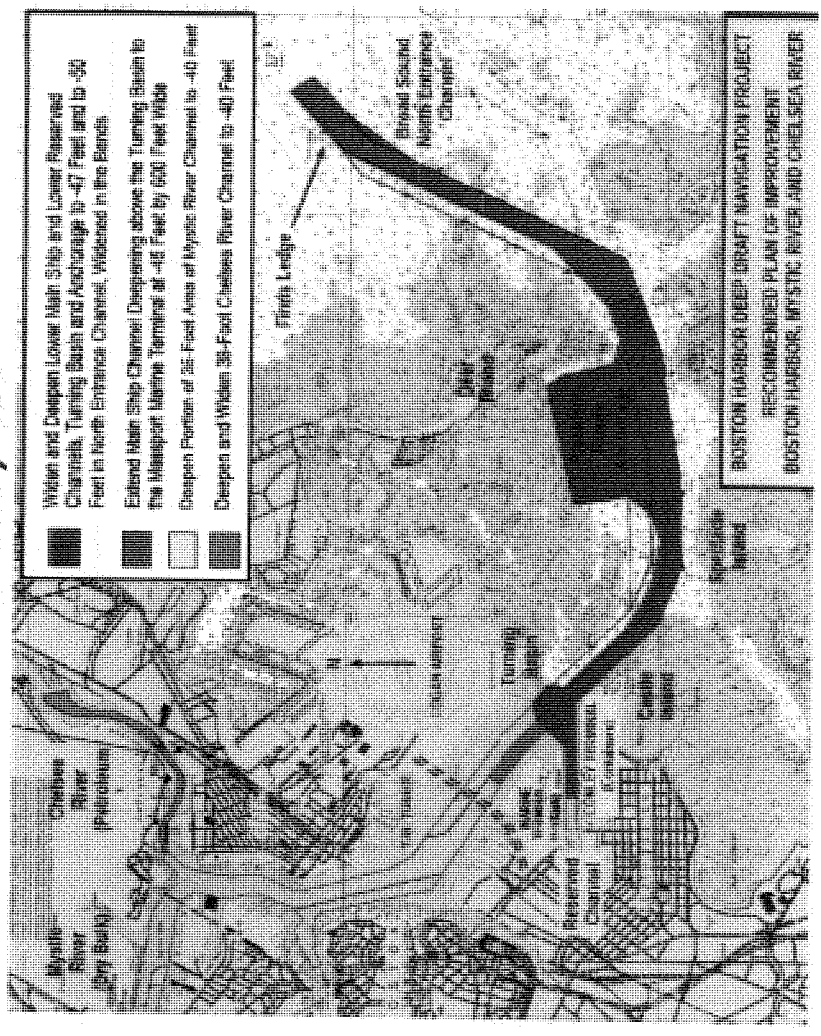
Coastal Hazards Policy #3. - Ensure that state and Federally funded public works projects proposed for location in the coastal zone will not exacerbate existing hazards or damage natural buffers or other natural resources and will not promote growth and development in hazard-prone or buffer areas. *The proposed dredging will improve navigation in Boston Harbor by deepening the navigation channels and berths to accommodate deeper draft ships expected to be added to the fleet to utilize the deeper and wider Panama Canal. The project area is in an area of marine commerce and is located in or adjacent to the State's Designated Port Area. Therefore the project is consistent with the State's policy of promoting marine development in Designated Port Areas. The proposed Deep Draft Project will remove ledge that could create a navigation hazard if not removed during deepening of the navigation channels. The proposed project is not expected to have any long-term significant adverse damage to natural resources or promote growth and development in hazard-prone or buffer areas.*

Ports Policy #1. - Ensure that dredging and disposal of dredged material minimize adverse effects on water quality, physical processes, marine productivity, and public health. *The material proposed for dredging is parent material, not associated with contaminants. Also the dredged material is composed of Boston blue clay and glacial till material, not likely to produce a large sediment plume. In addition, if feasible, rock removed during construction would be used to enhance biological productivity by increasing hard bottom habitat for marine species that favor rock habitat. Any adverse impacts will be localized and temporary. Therefore, the proposed project is not likely to have a significant long-term impact on water quality, physical processes, or public health, and could benefit marine productivity.*

Ports Policy #2. - Obtain the widest possible public benefit from channel dredging, ensuring that designated ports and developed harbors are given highest priority in the allocation of federal and state dredging funds. Ensure that this dredging is consistent with marine environmental policies. *The proposed improvement dredging is located in the Port of Boston, the largest port in New England. The proposed project would continue to promote commercial navigation in Boston Harbor by allowing larger ships to transit the port more efficiently to load and unload goods.*

Ports Policy #3. - Preserve and enhance the capacity of Designated Port Areas (DPAs) to accommodate water-dependent industrial uses, and prevent the exclusion of such uses from tidelands and any other DPA lands over which a state agency exerts control by virtue of ownership, regulatory authority, or other legal jurisdiction. *Portions of the Port of Boston are in a DPA. Deeping Boston Harbor will enhance the safety and economic efficiency of deep draft vessels transiting to these marine terminals in the DPA. This will accommodate and further promote water-dependent industrial uses.*

Boston Harbor Deep Draft Improvement Project
Boston, MA



DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Mr. Tom Chapman, Supervisor
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Chapman:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office commented on the Draft FR and DSEIS/DEIR in a letter (enclosed) dated May 14, 2008, addressing Federally-listed threatened and endangered species, and provided your final comments pursuant to the Fish and Wildlife Coordination Act in a letter dated May 29, 2007 (enclosed). Separately, the Department of the Interior commented in a letter dated June 2, 2008 on the Boston Harbor Islands National Recreation Area, including information related to harbor fish and wildlife resources. A meeting was also held in the spring of 2008 with several agencies including the National Park Service to discuss additional options for rock placement. At this time we are requesting confirmation that previous determinations remain valid before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped

through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether your prior comments are still applicable based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the previous comments on the Draft FR and SEIS/EIR are still current. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/enclosure):

Mr. Andrew L. Raddant, Regional Environmental Officer
Office of Environmental Policy and Compliance
U.S. Department of the Interior
408 Atlantic Avenue, Room 142
Boston, Massachusetts 02210-3334

Stewart Dalzell (w/o enclosure)
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Mr. Curt Spalding, Regional Administrator
U.S. Environmental Protection Agency
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Dear Mr. Spalding:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office commented on the Draft FR and DSEIS/DEIR in a letter (enclosed) dated May 23, 2008 covering air and marine impacts. At this time we are requesting confirmation that previous determinations remain valid before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk

cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.

- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether your prior comments are still applicable based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the previous comments on the Draft FR and SEIS/EIR are still current. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/enclosure):

Mr. Mel Coté, Jr., Manager
Ocean and Coastal Protection Unit
U.S. Environmental Protection Agency, Region 1
5 Post Office Square, Suite 100
Boston, Massachusetts 02109-3912

Stewart Dalzell (w/o enclosure)
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

RDML Daniel B. Abel, Commander
First Coast Guard District
408 Atlantic Avenue
Boston, Massachusetts 02110

Dear Commander Abel:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office commented during preparation of the Draft FR and DSEIS/DEIR in a letter (enclosed) dated November 9, 2007 providing support for the proposed project. At this time we are requesting confirmation that previous determinations remain valid before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether your prior comments are still applicable based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the previous comments on the Draft FR and SEIS/EIR are still current. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Mr. Craig D. MacDonald, Superintendent
Stellwagen Bank National Marine Sanctuary
175 Edward Foster Road
Scituate, Massachusetts 02066

Dear Mr. MacDonald:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office was asked to comment on the Draft FR and DSEIS/DEIR in a letter dated April 10, 2008. We have received no comments from you. At this time however, we are notifying you of a slight change in the project scope. We request any comments that you may have on this undertaking before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
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For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether you have any comments based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the Draft FR and SEIS/EIR are still valid as to areas within your jurisdiction and concern. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

for John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Mr. Richard K. Sullivan Jr., Secretary
Massachusetts Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, Massachusetts 022114

Dear Mr. Sullivan:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office commented on the Draft FR and DSEIS/DEIR in a letter (enclosed) dated June 13, 2008 which summarized comments from State, local and non-governmental agencies. At this time we are requesting confirmation that previous determination remains valid before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
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Please advise us whether your prior comments are still applicable based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the previous comments on the Draft FR and SEIS/EIR are still current. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy furnished (w/enclosure):

Mr. Bruce Carlisle, Director
Massachusetts Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114

Mr. Kenneth L. Kimmell, Commissioner
Massachusetts Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Mr. Thomas French
Natural Heritage/Endangered Species
Massachusetts Division of Fisheries and Wildlife
100 Hartwell Street, Suite 230
West Boylston, Massachusetts 01583

Ms. Marianne Connolly, Program Manager
Regulatory Compliance
Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue, Building 39
Boston, Massachusetts 02129

Stewart Dalzell (w/o enclosure)
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Ms. Ramona Peters, Tribal Historic Preservation Officer
Mashpee Wampanoag Tribe
483 Great Neck Road South
Mashpee, Massachusetts 02649

Dear Ms. Peters:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office was asked to comment on the Draft FR and DSEIS/DEIR in a letter (enclosed) dated April 10, 2008. We received no comments from you. At this time however, we are notifying you of a slight change in the project scope. We request any comments that you may have on this undertaking before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether you have any comments based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the Draft FR and SEIS/EIR are still valid as to areas within your jurisdiction and concern. Any questions or comments can be addressed to Mr. Marc Paiva at 978-318-8796.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Ms. Bettina Washington
Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Dear Ms. Washington:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office was asked to comment on the Draft FR and DSEIS/DEIR in a letter dated April 10, 2008. We received no comments from you. At this time however, we are notifying you of a slight change in the project scope. We request any comments that you may have on this undertaking before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
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- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether you have any comments based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the Draft FR and SEIS/EIR are still valid as to areas within your jurisdiction and concern. Any questions or comments can be addressed to Mr. Marc Paiva at 978-318-8796.

Sincerely,

for John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Mr. Louis Elisa
Executive Secretary & Director of Port Development
Massachusetts Seaport Council
40 Center Street
Fairhaven, Massachusetts 02719

Dear Mr. Elisa:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office was asked to comment on the Draft FR and DSEIS/DEIR in a letter dated April 10, 2008. We received no comments on our letter. At this time however, we are notifying you of a slight change in the project scope. We request any comments that you may have on this undertaking before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Ted Williams Tunnel and Central Artery Projects. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel accessing the terminal would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily to its petroleum terminals by deepening the existing -38-foot channel to -40 feet MLLW.

For the above recommended improvements, approximately 9.8 million cubic yards of clays, sands, and tills, all parent materials largely of glacial origin, will be dredged from the harbor bottom. In addition, up to about 880,000 cubic yards of rock could be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site which is located about 18 miles seaward of the harbor. The project would take about three years to construct. The unconsolidated materials may be used to cap the former industrial waste site in Massachusetts Bay in response to a request from EPA. The rock may be used to create reef habitat in Massachusetts Bay.

Please advise us whether your prior comments are still applicable based on the slight reduction in the proposed project description and in light of any new circumstances or information released since 2008 that would be relevant to the proposed project. If no written comments are received by November 9, 2012, then we will determine that the previous comments on the Draft FR and SEIS/EIR are still current. Any questions or comments can be addressed to Ms. Catherine Rogers, ecologist, at 978-318-8231.

Sincerely,

for John R. Kennelly
Chief of Planning

Enclosure

Copy Funished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Ms. Brona Simon
Executive Director and SHPO Massachusetts Historical Commission
Massachusetts State Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Dear Ms. Simon:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office was asked to comment on the Draft FR and DSEIS/DEIR in a letter dated April 10, 2008. We received no comments from your office. At this time however, we are notifying you of a slight change in the project scope. We request any comments that you may have on this undertaking before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -47 feet MLLW, with an additional three feet of depth in the Broad Sound North Entrance Channel (up to -50 feet MLLW). Massport would also deepen the berths at the Conley Terminal to at least 50 feet. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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Please advise us whether you concur with your previous determination based on the slight reduction in the proposed project description. If no written comments are received by November 9, 2012, then we will conclude that you have no comments and that the Draft FR and SEIS/EIR are still valid as to areas within your jurisdiction and concern. Any questions or comments can be addressed to Mr. Marc Paiva at 978-318-8796.

Sincerely,

for John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

October 11, 2012

Engineering/Planning Division
Planning Branch

Mr. Victor T. Mastone
Director and Chief Archaeologist
Board of Underwater Archaeology
251 Causeway Street, Suite 800
Boston, Massachusetts 02114

Dear Mr. Mastone:

The U.S. Army Corps of Engineers (USACE), New England District, in partnership with the Massachusetts Port Authority (Massport), is updating the Final Feasibility Report (FR) and joint Final Supplemental Environmental Impact Statement and Final Environmental Impact Report (FSEIS/FEIR) for the Boston Harbor Deep Draft Navigation Improvement Project prior to its public release sometime in early 2013. The Final FR and joint FSEIS/FEIR examines proposed improvements to the deep-draft Federal navigation channels in Boston Harbor, Massachusetts.

Your office was asked to comment on the Draft FR and DSEIS/DEIR in a letter (enclosed) dated April 10, 2008. We received a letter from your office dated June 2, 2008 that concurred with the findings and recommendations of the archaeological surveys. The Board also concurred with the recommendation that a remote sensing archaeological survey should be conducted for the areas of potential affect in the Mystic River and Chelsea River Channels, should proposals to deepen these areas be implemented. At this time however, we are notifying you of a slight change in the project scope. We request any comments that you may have on this undertaking before we proceed with issuing the final report.

Since the 2008 Draft FR and DSEIS/DEIR were released, the USACE has been conducting additional economic studies of the proposed port improvements at the direction of USACE Headquarters. That process has resulted in a reduced scope of improvements being recommended for Boston Harbor. The change in recommendation consists of a reduction in the recommended project depth in the inner harbor from the President Roads Channel and Main Ship Channel to Massport's Conley terminal of 47 feet at mean lower low water (MLLW). The prior recommended plan included a depth of 48 feet in these areas. The following is a description of the past and current improvements now being recommended:

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through the Port of Boston, rather than through the Port of New York and New Jersey and moved to New England by truck.

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Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Copy Furnished (w/o enclosure):

Stewart Dalzell
MASSPORT
One Harborside Drive
Boston, Massachusetts 02128

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

CEMP-NAD 26 Sep 2012

MEMORANDUM FOR Commander, North Atlantic Division, (CENAD-ET-P)
ATTN: Ms. Linda Monte

SUBJECT: Boston Harbor Navigation Improvements Study – Additional Economic analyses to respond to HQUSACE Policy Comments on the Final Feasibility report and Supplemental Environmental Impact Statement (SEIS).

1. Reference Office of Water Policy Review memo dated 12 Sep 2012, subject as above, providing final comments on the Final Feasibility reports and SEIS.

2. The HQ final comments are attached and are self-explanatory. I'll need a new schedule on when the required items are expected to be completed by the District, submitted through NAD, and then to HQ together with a Division Commanders submittal letter and when we can estimate a reasonable schedule for the Civil Works Review Board meeting. We will need to work on the proposed agenda as well.

7. If you should have any questions please contact me, or Catherine Shuman, HQ Planner for the NAD RIT at (202) 761-1379.

Encl

PETER C. LUISA
Deputy Chief, Civil Works
NAD Regional Integration Team
Directorate of Military Programs

CECW-PC 12 September 2012

MEMORANDUM FOR CEMP-NAD (ATTN: Mr. Pete Luisa)

SUBJECT: Boston Harbor, Massachusetts Navigation Improvement Study - Additional Economic Analysis to Respond to HQUSACE Policy Comments on the Final Feasibility Report and Supplemental Environmental Impact Statement (SEIS)

1. This memo is in response to the Boston Harbor Economic Reanalysis submitted by the New England District project delivery team on 31 May 2012. This reanalysis was conducted to address HQUSACE policy review comments on the Final Feasibility Report and SEIS.

2. A Civil Works Review Board (CWRB) briefing was held for the Boston Harbor, Massachusetts Navigation Improvement Study on 21 August 2008. The District Commander's recommended plan consisted of improvements for accessing four segments of the port: 1) the Main Ship Channel to the port's sole container terminal (Conley Terminal); 2) Main Ship Channel access to the non-Federal sponsor's (MASSPORT) redeveloped MASSPORT Marine Terminal; 3) the Mystic River Channel to MASSPORT's Medford Street Terminal; and 4) the Chelsea River Channel. The recommended plan was estimated to cost about $304 million, to provide about $12 million in net annual benefits, and to have a benefit-to-cost ration of 1.74 at 4-7/8 %.

3. The CWRB concurred that the recommendations for the Main Ship Channel extension to the MASSPORT Marine Terminal and the Mystic River access to MASSPORT's Medford Street Terminal would be contingent on further analysis and preparation of a Limited Re-evaluation Report during the design phase, as neither of these two terminals was yet occupied.

4. The HQUSACE policy review team raised three basic issues with the economic analysis for the access to the Conley Terminal: 1) the landside analysis of transportation costs and determination of the portion of land transported cargo that could shift to ship transport to Boston; 2) waterside analysis of the vessels that might carry those shifting boxes at various depths with or without deepening; and 3) the analysis of vessel loading and sailing drafts used.

5. The reanalysis and supporting assumptions submitted by the New England District evaluated the economic effects of channel depths ranging from 46-49 feet MLLW for the Main Ship Channel to the Conley Terminal. Assumptions were made regarding vessel loading, trade routes, and other factors such as tidal delays. The results indicate that net benefits increase significantly with each additional foot of depth to a depth of 47 feet MLLW. Net benefits experience only a minimum increase between 47 and 48 feet MLLW, which is the depth where the maximum net benefits are realized. ER 1105-2-100 requires that where two cost-effective plans produce no significantly different levels of net benefits, the less costly plan is to be the NED plan, even though levels of outputs may be less. Based on the reanalysis submitted by the New England District, the HQUSACE policy review team concurs that the policy compliant NED plan consists of a 47-foot channel for the segment of the project that includes the Main Ship Channel to the Conley Terminal. Where appropriate, qualitative outputs such as the beneficial use of dredged material and reduced truck traffic and air quality impacts should be described to further support the recommended plan.

CECW-PC
SUBJECT: Boston Harbor, Massachusetts Navigation Improvement Study - Additional Economic Analysis to Respond to HQUSACE Policy Comments on the Final Feasibility Report and Supplemental Environmental Impact Statement (SEIS)

6. In accordance with ER 1110-2-1404, the depth of the entrance channel will reflect this 47-foot depth adjusted to address squat, sinkage in fresh water, the effect of wind and wave action, and safety and efficiency clearance. Should the non-Federal sponsor desire a Locally Preferred Plan (LPP) with deeper depths in either the main ship channel or in the entrance channel, a waiver from ASA(CW) is required.

7. The previously submitted Boston Harbor Navigation Improvement Project Main Report would remain largely intact except that the Framework, sensitivity analysis, and results will be added as an addendum bound to the main report. The main report will include a new recommendation section that reflects the results of the reanalysis and is signed by the District Commander. The Executive Summary will be revised to reflect the additional information and other modifications to the report as appropriate. It is recommended that the New England District coordinate with the vertical team when incorporating these revisions to ensure consistency and agreement on format.

8. An abbreviated briefing of the CWRB will be held no less than 21 calendar days after HQUSACE receives the Division Commander's transmittal memo for the final report and SEIS. The purpose of the meeting is to secure approval to release the final report and SEIS and the draft Chief's Report for S&A review in accordance with the 1944 Flood Control Act and for final NEPA review. The abbreviated approach is expected to demonstrate a more efficient and effective way to conduct CWRB's consistent with the spirit of SMART planning. The Office of Water Project Review will work with the NAD Regional Integration Team and the NAD Chief of Planning and Policy to craft a proposed agenda and logistical arrangements for the CWRB.

Wesley E. Coleman, Jr.
Chief, Office of Water Project Review
Directorate of Civil Works

DEPARTMENT OF THE ARMY
NORTH ATLANTIC DIVISION, CORPS OF ENGINEERS
FORT HAMILTON MILITARY COMMUNITY
GENERAL LEE AVENUE, BLDG 301
BROOKLYN, NY 11252

REPLY TO

CENAD-PD-CID-S

22 September 2009

MEMORANDUM FOR: Commander, New England District, US Army Corps of Engineers, ATTN: CENAE-EP-PN

SUBJECT: Boston Harbor, Massachusetts – Feasibility Cost Sharing Agreement (FCSA) Amendment #2 – PWI 013654, P2 109034

1. Reference is made to CENAE-EP-PM memorandum, dated 28 August 2009, SAB, requesting approval to execute a Feasibility Cost Sharing Agreement (FCSA) amendment.

2. The District's request to execute the subject FCSA amendment is approved. The North Atlantic Division, Programs Directorate has reviewed the subject package and concurs with the District's proposal to execute an amendment to the FCSA for excess study costs in the amount of $850,000. These costs must ultimately be shared on an equal (50% Federal and 50% non-Federal) basis in accord with the terms of the Agreement. The Federal Government may initially pay the Sponsor's share of excess study costs, which are ultimately reimbursed by the Sponsor, in accordance with the provisions and timeframes of Article II.C and Article III.D of the Agreement.

3. The amendment is approved for execution within 21 calendar days from the date of this memorandum. You may not deviate from this approved amendment without prior Programs Directorate authorization. The District should prepare a minimum of four final amendment originals. The Sponsor should sign the amendment first, and upon execution by the District Engineer, the District should retain two amendment originals, and the remaining original amendments should be provided to the sponsor. A copy of the amendment should be forwarded to CENAD-PD-CID (Mr. Paul Sabalis) not later than 14 days after execution.

4. The point of contact for this action is Mr. Paul Sabalis, P.E. Mr. Sabalis may be reached at (718) 765-7089.

LLOYD CALDWELL, P.E., SES
Director of Programs

Encls.

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF:
CENAE-EP-PN

28 August 2009

MEMORANDUM FOR Commander, North Atlantic Division, U.S. Army Corps of Engineers CENAD-PD-CID-P (Attn: Mr. Joseph Forcina), Ft. Hamilton Military Community, 301 General Lee Avenue, Brooklyn, New York 11252-5700

SUBJECT: Request Approval to Execute Amendment Number Two to the Feasibility Cost Sharing Agreement (FCSA) for the Boston Harbor, Massachusetts, Deep Draft Navigation Improvement Study, PWI 013654, P2 109034.

1. NAE requests NAD provide approval to execute enclosed Amendment Number Two to the FCSA between the Massachusetts Port Authority (Massport) and the Department of the Army for the Boston Harbor, Massachusetts, Deep Draft Navigation Improvement Study. This amendment increases the total study cost to cover changes for the additional economic analysis requested by HQUSACE as a result of the Civil Works Review Board action of 21 August 2008.

2. Also enclosed is a copy of the original FCSA, Amendment Number One to the FCSA dated July 1, 2008, and the District's Legal Certification for the proposed amendment, (Exhibits 1, 2 and 3).

3. Please contact Mr. Mark Habel of my staff at 978-318-8871 if you have any questions on the enclosed amendment. We look forward to receiving approval of this amendment as soon as possible so we can proceed with requested additional analysis and, if necessary, preparation of a revised final Feasibility Report.

Encls

ANTHONY T. MACKOS, P.E.
Acting Chief, Engineering/Planning Division

Copy Furnished:

Peter Sabalis, DST, NAD
Richard Ring, NAD

MS DST

RECEIVED
8/31/09

From: Ring, Richard J NAD
To: Vietri, Joseph R NAD
Cc: Blum, Peter R NAD; Habel, Mark L NAE
Subject: FW: Boston Harbor - Revised Framework Estimate & Timeline
Date: Thursday, August 13, 2009 1:50:27 PM

Joe,
Looks like agreement on the revised RF from OWPR. Mark Habel (NAE) did a great job on this especially on #6. It looks like a final RF will be available to Massport tomorrow and can be mentioned by Col DeLuca and/or Col Feir if they phone Massport.
Rich

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, August 13, 2009 1:45 PM
To: Habel, Mark L NAE; Ring, Richard J NAD; Hughes, Thomas E HQ02; Coleman, Wesley E Jr HQ02; Thalhauser, Jenifer E NAN02; Cone, Steven R IWR; Vietri, Joseph R NAD; Blum, Peter R NAD; Brown, Theodore A HQ02; Caldwell, Lloyd NAD
Cc: O'leary, Edmund J NAE; Kennelly, John R NAE; Scully, William C NAE; Mackos, Anthony T NAE; Byrne, Robert H NAE; Keegan, Michael F NAE; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM
Subject: RE: Boston Harbor - Revised Framework Estimate & Timeline

OK, thanks Mark, all that makes sense to me.

Ken Claseman
Office of Water Project Review
HQUSACE
Office: (202) 761-5451
Cellular: (202) 281-0813

-----Original Message-----
From: Habel, Mark L NAE
Sent: Thursday, August 13, 2009 1:21 PM
To: Claseman, Kenneth G HQ02; Ring, Richard J NAD; Hughes, Thomas E HQ02; Coleman, Wesley E Jr HQ02; Thalhauser, Jenifer E NAN02; Cone, Steven R IWR; Vietri, Joseph R NAD; Blum, Peter R NAD; Brown, Theodore A HQ02; Caldwell, Lloyd NAD
Cc: O'leary, Edmund J NAE; Kennelly, John R NAE; Scully, William C NAE; Mackos, Anthony T NAE; Byrne, Robert H NAE; Keegan, Michael F NAE; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM
Subject: RE: Boston Harbor - Revised Framework Estimate & Timeline

Thank-you Ken: Per your comments:

1. The coordination meetings are identified by the red lines on the timeline, referenced to the note at the top of the page as "Checkpoints or in-Progress Reviews (Approximate)". These would be teleconferences, video conferences or face-to-face meetings as each situation required.

2. Agreed. Have moved this back two weeks to conclude concurrent with the ATR.

3. Changed line item to read "DDN PCX Review of any Models & Approval for Use/Certification" to cover both possibilities.

4. Changed line item to read "HQ Reviews Revised Report and Prepares for CWRB Action"

5. Agreed. Third from last line item changed to read "Prepare & Submit Revised FFR and Draft Chief's Report to NAD & HQ"

6. Disagree. When we began the Framework development process this was discussed and we had decided to have the re-analysis only cover getting back to the Board. The remainder of the process is already covered in the existing Feasibility scope and budget covered by the current FCSA. Completing the Framework effort will get us back to the point of resuming the ordinary course of the project. The FCSA modification will deal solely with the Framework effort. Wrapping the Feaisbility phase completion tasks back into the Framework effort now will require us to also wrap in the budget and scope of that effort. The District would prefer not to have to further revise the package at this point and to continue keeping the two efforts separate. The Sponsor well understands the post-CWRB process.

Mark L. Habel, CENAE-EP-PN
978-318-8871

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, August 13, 2009 12:49 PM
To: Habel, Mark L NAE; Ring, Richard J NAD; Hughes, Thomas E HQ02; Coleman, Wesley E Jr HQ02; Thalhauser, Jenifer E NAN02; Cone, Steven R IWR; Vietri, Joseph R NAD; Blum, Peter R NAD; Brown, Theodore A HQ02; Caldwell, Lloyd NAD
Cc: O'leary, Edmund J NAE; Kennelly, John R NAE; Scully, William C NAE; Mackos, Anthony T NAE; Byrne, Robert H NAE; Keegan, Michael F NAE; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM
Subject: RE: Boston Harbor - Revised Framework Estimate & Timeline

Mark,

My thoughts - all are related to the timeline.

1. The coordination meetings between the District, the MSC and HQ should be clearly identified on the timeline.

2. I think the NWW Cost Review typically occurs concurrent with the ATR.

3. Models will probably be "approved for use" rather than "certified."

4. There needs to be time for a final HQ review after the submittal of the revised report. If that is what is intended by the statement "HQ prepares briefing" it should be revised to indicate a HQ review of the revised report.

5. Also, District preparation of the draft Chief's Report could be indicated on the timeline.

6. There are many items beyond CWRB approval which should probably included so the sponsor is clearly informed. These include an S&A Review {30 days} and final NEPA review {about 40 days mostly concurrent}, responses to S&A (RIT) and NEPA (MSC) comments, finalization of Chief's report package, complete Documentation of Review Findings (OWPR), Chief signs Final Report of the Chief of Engineers (RIT). Report is forwarded to ASA(CW) who forward it to OMB for concurrance, ASA(CW)transmits to Congress.

Ken Claseman
Office of Water Project Review
HQUSACE
Office: (202) 761-5451
Cellular: (202) 281-0813

-----Original Message-----
From: Habel, Mark L NAE
Sent: Tuesday, August 11, 2009 3:34 PM
To: Ring, Richard J NAD; Claseman, Kenneth G HQ02; Hughes, Thomas E HQ02; Coleman, Wesley E Jr HQ02; Thalhauser, Jenifer E NAN02; Cone, Steven R IWR; Vietri, Joseph R NAD; Blum, Peter R NAD;

Brown, Theodore A HQ02; Caldwell, Lloyd NAD
Cc: O'leary, Edmund J NAE; Kennelly, John R NAE; Scully, William C NAE; Mackos, Anthony T NAE; Byrne, Robert H NAE; Keegan, Michael F NAE; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM
Subject: Boston Harbor - Revised Framework Estimate & Timeline

Boston Team: Attached is an Excel sheet containing the revised study cost estimate and timeline for the Boston Harbor Reanalysis Framework. The consolidated estimate (contract and in-house costs, analysis and report revision/reviews) is the first worksheet in the file. The second worksheet is the timeline for the effort. The other sheets are the roll-up of contract cost details.

Also attached is the final version of the Framework scope - to give all pieces in one email.

In order to provide the final version to Massport by this Friday, please provide any comments on the estimate/timeline to me by 15:00 on Thursday 8/13.

Mark L. Habel, CENAE-EP-PN
978-318-8871

From: Claseman, Kenneth G HQ02
To: Habel, Mark L NAE; O"leary, Edmund J NAE
Cc: Ring, Richard J NAD; Keegan, Michael F NAE; Kennelly, John R NAE; Scully, William C NAE; Vietri, Joseph R NAD
Subject: Re: Boston Harbor - Revised Framework
Date: Thursday, August 06, 2009 5:09:48 PM

I concur

----- Original Message -----
From: Habel, Mark L NAE
To: Habel, Mark L NAE; Claseman, Kenneth G HQ02; O'leary, Edmund J NAE
Cc: Ring, Richard J NAD; Keegan, Michael F NAE; Kennelly, John R NAE; Scully, William C NAE; Vietri, Joseph R NAD
Sent: Thu Aug 06 15:50:55 2009
Subject: RE: Boston Harbor - Revised Framework

Having spoken further with Ken just now, attached is a clean version covering his last request. Edits are all to Page 5 in the paragraphs on either side of the table. If all concur we'd like to make this available for release to Massport.

Mark L. Habel, CENAE-EP-PN
978-318-8871

-----Original Message-----
From: Habel, Mark L NAE
Sent: Thursday, August 06, 2009 4:14 PM
To: Claseman, Kenneth G HQ02; O'leary, Edmund J NAE
Cc: Ring, Richard J NAD; Keegan, Michael F NAE
Subject: RE: Boston Harbor - Revised Framework

Where referenced in the table and dsicussions paragraphs above and below the table, the term confidence interval has been replaced by error.

Mark L. Habel, CENAE-EP-PN
978-318-8871

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, August 06, 2009 3:01 PM
To: O'leary, Edmund J NAE; Habel, Mark L NAE
Cc: Ring, Richard J NAD; Keegan, Michael F NAE
Subject: Re: Boston Harbor - Revised Framework

I concur that the term "error" is preferable, however the main point of my concern is that we are not going to proceed with the analysis if we don't meet the minimum standard we have agreed too. Again, the sentence needs to be revised or deleted.

----- Original Message -----
From: O'leary, Edmund J NAE
To: Habel, Mark L NAE
Cc: Ring, Richard J NAD; Keegan, Michael F NAE; Claseman, Kenneth G HQ02
Sent: Thu Aug 06 13:45:17 2009

Subject: FW: Boston Harbor - Revised Framework

Mark,

Could you replace the term "confidence interval" with the word "error" to satisfy Ken's comment in Paragraph 2 of his e-mail below.

Ed

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, August 06, 2009 2:40 PM
To: O'leary, Edmund J NAE
Subject: Re: Boston Harbor - Revised Framework

Ed,

On point 2, the write-up still needs to be consistent with the minimum standard we agreed to.

Ken

----- Original Message -----
From: O'leary, Edmund J NAE
To: Claseman, Kenneth G HQ02
Cc: Habel, Mark L NAE; Ring, Richard J NAD; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE
Sent: Thu Aug 06 13:11:20 2009
Subject: RE: Boston Harbor - Revised Framework

I agree with Paragraphs 1 and 3. However, I do not agree with Paragraph 2. Confidence interval and error are the same thing. The confidence level will always be 95 % and the maximum error or confidence interval that we can live with is + or - 15 %. To avoid confusion we should not use the term confidence interval (it's too close to confidence level) and use the term error.

Ed

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, August 06, 2009 1:22 PM
To: Habel, Mark L NAE; Hughes, Thomas E HQ02; O'leary, Edmund J NAE; Ring, Richard J NAD; Cone, Steven R IWR
Cc: Ware, Charles L HQ02
Subject: Re: Boston Harbor - Revised Framework

This SOW identifies a mimum confidence level of 15 percent in one place, which is not right. The minimum confidence level should be 95 percent and the maximum error bounds should be + or - 15 percent. Please make sure these numbers are used consistently throughout the document.

Also reference the sentence that states, "The vertical team recognizes the potential for the survey effort to yield a lesser confidence interval than 5 percent, and agrees that the re-analysis will need to proceed even with a lesser shipper participation." This statement is incorrect and contradicts the minimum 95 percent confidence level, with + or - 15 percent error limit. The sentence needs to be deleted or re-written to conform to minimum levels we have agreed too.

By the way, the example sample size example provided are for proportion. When estimatin mean values a different sample estimating procedure base on variance is used.

Ken

----- Original Message -----
From: Habel, Mark L NAE
To: Ring, Richard J NAD; Keegan, Michael F NAE; Claseman, Kenneth G HQ02; Hughes, Thomas E HQ02; Coleman, Wesley E Jr HQ02; Thalhauser, Jenifer E NAN02; Cone, Steven R IWR; Vietri, Joseph R NAD; Blum, Peter R NAD; Brown, Theodore A HQ02; Caldwell, Lloyd NAD
Cc: O'leary, Edmund J NAE; Kennelly, John R NAE; Scully, William C NAE; Mackos, Anthony T NAE; Byrne, Robert H NAE
Sent: Thu Aug 06 10:39:22 2009
Subject: Boston Harbor - Revised Framework

I've revised the Framework to include Ken's track-changes and incorporated Ed's new language on the staistics and sampling. Two versions are attached: A final Mark-up showing today's changes/edits, and a "Clean" version wthout the mark-up that's easier to read.

In the Mark-up version, the following are of note.

On page 3 highlighted in yellow I added some language to respond to Steve Cone's email.

On Page 4 to 5 in track-change and highlighted in green is the reworked section on statistics and sampling.

On page 11 highlighted in yellow is a new paragraph on Tasks 5 and 6 to bring the Framework in line with the way the estimate is structured.

The District is seeking VT concurrence with the re-analysis Framework text.

Mark L. Habel, CENAE-EP-PN
978-318-8871

BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY FINAL FEASIBILITY REPORT AND SEIS

Framework for Additional Economic Analysis to Respond to Office of Water Project Review Comments from Civil Works Review Board Meeting of 21 August 2008 and CWRB VTC of 18 September 2008

Framework Revised 6 August 2009

This Framework outlines the scope of an economic reanalysis of the Boston Harbor Improvement Project resulting from comments raised at the August 2008 Civil Works Review Board meeting and subsequent conferences, vertical team meetings, and special meetings to review scope specifics and data source issues. The Framework scope provides a path forward to resolve the remaining comments and concerns with project design depth optimization.

BACKGROUND AND FEASIBILITY ANALYSIS

The Boston Harbor Feasibility Study was initiated in July 2002 in accordance with a Feasibility Cost-Sharing Agreement executed with Massport. The study underwent a Feasibility Review Conference in July 2005, a pre-Alternatives Formulation Briefing meeting in May 2007, Agency Technical Review of the AFB and Draft reports from August 2007 to June 2008, an Alternative Formulation Briefing in November 2008, public review of the Draft Feasibility Report and SEIS in April to May 2008, completion of Independent External Peer Review in June 2008, submission of the Draft Final Report in July 2008, a Civil Works Review Board meeting in August 2008, and follow-on CWRB Teleconference in September 2008.

The Draft and Draft Final Feasibility Reports recommended deepening the main channels of the port of Boston to 48 feet from the sea to Massport's Conley Container Terminal in South Boston, a distance of about 6 miles, with an additional two feet of depth in the entrance channel. The recommended project carried a cost of about $308 million, of which about 89 percent was for the containership channel improvements. Benefits for the containership channel improvements were principally developed as reduced landside transportation costs, from containers now shipped to and from New England origins and destinations through the PONYNJ being shifted to water carriage directly to Boston. The shorter trucking distance from Boston v. PONYNJ generated the benefits, estimated at about $480 per container shifted to Boston.

As drawn from the Feasibility Report's economic analysis; the base-year (2014) condition is for a total of at least 900,000 TEUs to be shipped through the Boston Harbor New England hinterland by all transportation means (ship, barge, truck, rail). The Feasibility Report estimates that the existing three services (1 COSCO service and 2 MSC services) will increase vessel size as demand grows to carry about 172,000 TEUs in the base year (as compared to 131,000 in 2006, or the total of 220,000 TEUs handled by Conley Terminal

from all carriers in 2007). The Feasibility Report also estimates that the most likely condition for barge and rail is a continuation of the existing 81,000 TEUs annually due to cost and infrastructure limitations on those means of transport. This leaves 647,000 TEUs out of the 900,000 base year total transported into the region in 2014 by truck from other ports, the majority of these from the PONYNJ, but also from other US east coast ports as well, with a minor number carried over the land bridge from the west coast.

These numbers are subject to constant change, as existing conditions continue to overtake industry volume projections. The 900,000 TEU number has likely changed since that part of the analysis was prepared. HQUSACE also notes that additional TEUs will likely be shipped into the region from other sources, including by rail over the land bridge from the US west coast. The completion of the expanded Panama Canal improvements in 2015 was included in the without-project condition for the Feasibility analysis and will continue to be assumed in the re-analysis.

HQUSACE QUESTIONS

There were three principal comments from HQUSACE (Office of Water Project Review) on Boston Harbor relative to container-shipping benefits and the District's 48-foot recommendation for the Main Channels Improvement Plan. As taken from the OWPR's presentation slides these comments are:

(1) Assessment of Existing Conditions: The study needs to provide more detailed information on the existing condition that will explain why trucking is more cost-effective than waterborne transportation. The report needs to determine what movements are sensitive to depth constraints and what movements are not. This analysis will identify the volume of movements that are sensitive to draft constraints as well as the destination of these movements. Both the demand for waterborne movements as well as the value of transportation savings for these movements will be more clearly defined. Project optimization could be impacted by the results of this information. The District needs to evaluate in more detail the existing commodity movements, compare commodities that are being trucked under existing conditions to those that are moving by ship and the final destination of both movements.

(2) Formulation and Analysis of Alternatives: The study needs to formulate and evaluate other alternatives that may achieve a reduction in transportation cost. The study's depth optimization considers the current shipping lines to Boston only. Considering alternate vessel mix to achieve the estimated shift of only 86,000 TEUs may lead to a different optimized depth. The District needs to analyze all current movements of New England containers through NY and Boston. This should include "analysis of current tonnage size and type of vessel, annual volume of movements, frequency of movements, and volume of individual shipments" (ER 1105-2-100). This information will help define potential movements that may occur due to various deepening alternatives.

(3) Sailing Drafts/Fleet Mix: The analysis for each channel depth, including the future without project condition, should use a realistic distribution of sailing drafts. Under existing conditions with constrained channel depths the distribution of sailing drafts may be very narrow. However, as channel depth increases and the constraint is removed this distribution

should approach what is seen in other ports. The distribution of sailing draft may effect channel optimization. The resolution of the prior comment should also provide the necessary data to resolve this issue.

These three HQUSACE comments all revolve around the same basic question – what is the most likely without-project condition for container shipping at Boston, and what is the appropriate means of performing depth optimization measured from that without-project condition.

In a conference call on 3 September 2008, the District, NAD and HQUSACE (RIT and OWPR) staff discussed the District's proposed Framework for responding to the questions, HQUSACE's additional comments on that draft Framework, and the type and level of analyses that HQUSACE believed would satisfy its request and answer the questions. The following Framework lays out the approach resulting from that discussion, as modified over the past ten months as the District, with assistance from the Vertical Team, investigated approaches and methodologies for conducting the several components to the re-analysis. Most recently, these discussions included a teleconference and interagency meeting, hosted by the Corps Institute for Water Resources (IWR) on 27-28 July 2009, with the U.S. Department of Transportation, Bureau of Transportation Statistics, the Internal Revenue Service, and U.S. Census, to determine what data sources existed on which to base the first phase of the analysis.

APPROACH TO THE RE-ANALYSIS

The several questions posed can be categorized as Landside Analysis, Waterside Analysis, Vessel Loading/Draft Analysis, and some additional minor questions. The Framework also includes a communications strategy for full involvement of the Vertical Team and Sponsor in all phases of the re-analysis. The specifics of each are as follows:

Task 1 - Landside Analysis:

The purpose of the Landside Analysis is two-fold. First, to attempt to confirm the cargo transportation shift levels the District used in the draft Feasibility Report, or provide a basis for a modified project depth optimization recommendation. And Second, to provide more substantial analysis of the existing, without-project, and with-project conditions with respect to carriers' and shippers' practices. This is intended to shed light on why so much of New England's container volume is currently shipped through the PONYNJ and under what conditions that volume might shift to Boston. The output of Task 1 will be identification of the cargo volume determined "eligible" for a shift to direct waterborne carriage through the Port of Boston. This output would be used to conduct the Waterside Analysis in Task 2.

The first work element in Task 1 is to collect data on New England container shipments needed to conduct the analysis. The District will acquire more complete 2007 PIERS data from the Waterborne Commerce Statistical Center. An examination of the PIERS database indicates origin/destination fields in that source are not actual shipment addresses, but largely the billing addresses of the shippers. A direct survey of shippers will be required to acquire the origin/destination data. The District anticipates that this effort will be

accomplished through a combination of in-house labor by both NAE and NAN elements and by contract. The required information includes:

- The actual origin and destination of the containers; i.e. the specific locations (zip codes or municipalities) where the boxes are "stuffed or "unstuffed." This will enable computation of overland transportation distances.
- The type and weight of cargo in individual containers and its value.
- The user or shipper of the cargo.
- Freight charges and fees
- The vessel carrying the container and terminal it was shipped through.
- The method of landside shipment or other trans-shipment (truck, rail, barge).
- Solicit information on how their operations would change as a result of channel deepening at the Port of Boston.

The available data sources would be examined in more detail to determine which of these questions can be answered without resorting to surveys in order to limit survey scope and costs.

Approximately 30 to 40 (exports) and 200 (imports) shippers/receivers account for about 80 % of container shipments through the PONYNJ. Additional shippers account for Boston's container traffic, with some overlap between the two ports. Overall it is estimated that between 200 and 300 shippers carry New England cargo through the two ports. Data available through PIERS, USDOT and US Census will be used along with information supplied by the Port Authorities and trade organizations to develop a list of contacts for shippers, freight forwarders and other principal interests involved in shipping New England containers. These companies will be contacted to determine their willingness to participate in a survey or interviews to yield the required data. IWR will be consulted in developing the questions to be asked and the sampling plan to be employed, ensuring the representativeness of the sample and ensuring lack of bias in the survey and analysis of results. Depending on the nature of the survey, OMB approval of survey format and questions may be required. NAE will contact and attempt to get information from as many shippers as possible. The Vertical Team recognizes the difficulty in convincing private companies to share often propriety information and recognizes that not all shippers will be willing to provide information.

It is understood that the PONYNJ conducted a Gate Survey at its terminals for its 1999 study. While dated, this information could give insight as to the distribution of origin/ destination locations to check the reasonableness of our own analysis. In addition to shippers, other companies may track container shipments, such as the freight forwarders who stuff and un-stuff boxes carrying multiple shipments for a number of customers, the exchange companies that collect rent for box owners, and the drayage companies that own and manage the chassis that carry the containers. A number of each of these should be included in the survey for balance and to help provide a more complete picture of the industry's practices.

At the conclusion of the survey/interview effort a stratified random sample of shippers/receivers by New England state, from the population surveyed, will be designed and conducted to analyze the data for the purpose of determining the physical location

where containers are transiting to and from. This information will be used to estimate weighted averages of distances from New York and Boston to each of the New England states. A sample shall be selected to ensure a minimum 95% confidence level for these estimated distances. The sample culled from the survey responses will take into account a balancing of the size of the shipping company, the type of cargo/commodity shipped, the origin/destination of the shipment, and other factors to use a representative sample of the total population of containers shipped.

NAE has calculated required sample sizes for a population of 250 shippers with a 95 % confidence level and error rates of 5%, 10% and 15%, shown in the table below. The formula used to calculate sample size can be found in Sampling Techniques by William Cochran, 1964, Section 4.4. The result is the same as that found at http://www.surveysystem.com/sscalc.htm, a web site referenced by HQ. This result is for a simple random sample for the entire population of shippers. It is likely that the District will be using stratified random sampling of sub-divisions (the six New England states) of this population. The survey will strive to achieve a sample size that meets the 5% error limit, but will proceed with the analysis provided a representative sample size that does not exceed the 15% error rate is achieved.

Population	Confidence Level	Error	Sample Size Needed
250	95%	5%	152
250	95%	10%	70
250	95%	15%	37

Vertical Team consensus will be sought on the formula used to calculate sample size, the representativeness of the sample, and the methodology used to determine the sample. The Vertical Team recognizes the potential to get conflicting information from users and shippers in competition with each other regionally. The Vertical Team recognizes the potential for the survey effort to yield a representative sample with a greater error than 5%, and agrees that the re-analysis will need to proceed even with a lesser shipper participation, but will not proceed with an error greater than 15%. The Vertical team also concurs that the results of the representative survey will allow an appropriate extrapolation of information collected to cover all applicable shippers so that a project benefit can be determined.

The second work element in Task 1 is analysis of the data to yield the required inputs for Task 2. The District anticipates that this effort will be accomplished by contract.

The landside analysis will include a detailed assessment of current shipping conditions based on existing trade routes and New England carrier container distribution by vessel class as well as by distance from origin and destination. Cargo origin/destination data will be used to answer questions such as the following:

- How many New England TEUs transported by truck from the Port of NYNJ are actually available to shift to waterborne transport directly to the Port of Boston?
- What factors result in such a large volume being transported by truck now, as opposed to direct carriage by water to Boston?

- Why do they use truck or water transport and at what cost?
- Are there other factors that favor truck transport over water such that any portion of this volume is not available for shift to ship carriage?
- Where specifically are the truck transported boxes going to (or coming from) in New England?
- And from that, what is the cost of truck transport per TEU? (It should be noted that measured from the existing three services carrying 172,000 TEUs, it would require at least twelve more direct containership services to carry the entire additional 647,000 TEUs to Boston.)
- Determine the rationale behind shippers' existing business practices and their flexibility to change these operations.

The analysis will rely on the results of the shipper survey effort and PIERS data for both Boston Harbor and the PONYNJ to describe the state and practices for New England container cargo shipped through both ports. Available data from IWR, USDOT, and US Census will be used to check the results of the analysis. The analysis will determine whether there are consistent differences in the New England cargo shipped through each port that might lead to a conclusion that only a portion of the PONYNJ landed New England cargo might be eligible to shift to direct Boston landing. The analysis will also develop, by trade route and by carrier, New England container distributions (1) by vessel class (waterborne) for both ports, and (2) by distance (landside) to origin and destination for both ports.

Additionally, a Probit Model will be developed to explain the current proportions of cargo shipped through the PONYNJ and Boston and the results used to forecast the potential change in future shipments to Boston Harbor. This analysis will be performed with proprietary data from at least one carrier, MSC. Its purpose is to identify the determinants of demand for direct container service into the ports of NYNJ and Boston. The results will be applied to other carriers to identify the potential for container shift directly to Boston. A sample of 20 shippers will be contacted to verify the conclusions of this analysis.

HQUSACE also requested that the analysis include a discussion of efforts by the PONYNJ under that Port's Port Inland Distribution Network (PIDN) initiative aimed at getting trucks off the road in NY and NJ. The District explained how the Feasibility Report discussed some of the initiatives, such as the unsuccessful barge feeders, the demise of the Albany barge feeder even with subsidies, and the demise of the Bridgeport CT feeder even before it got off the ground. NAE will confer with NAN and the Contractor and the report on Task 1 activities and analysis will provide additional discussion of the PONYNJ PIDN, but further detailed analysis of this will not be required.

Task 1 will conclude with preparation of a report describing in detail the data collection process, including the shipper survey effort, development of the representative sample used, the analysis performed including the methodologies followed, and the results. Data will be presented aggregated to the greatest level of detail possible without identifying individual shippers or carriers. At the conclusion of Task 1 it is expected that a more detailed understanding of container industry practices with respect to shipping New England container cargo through both Boston and PONYNJ will result. Conclusions will be reached as to whether and to what extent deepening of the port of Boston would result in shifting

containers now landed at PONYNJ to direct waterborne shipping through Boston. The population and distribution of containers determined "eligible" for such a shift will be used to guide the Waterborne Analysis in Task 2.

Task 1 will require a number of checkpoints for Vertical Team involvement in providing input, advice and decision-making. These will include in-progress reviews covering:

- Input on the questions to be asked during the shipper interviews will be sought from the Vertical Tea, Sponsor and IWR.
- Representativeness of the sample of shipper data used for the origin/destination analysis and the methodology used for determining the sample.
- Review of the Task 1 report including Agency Technical Review.

Task 2 - Waterside Analysis:

Once the population of TEUs "eligible" to shift to direct waterborne transport to Boston rather than land at NYNJ is determined, Task 2 will examine the existing means to affect that transport. Task 2 includes two work elements, a carrier survey effort followed by data analysis and conclusions.

The waterside analysis will be supported by interviews with the three carriers now calling on Boston and several of the many carriers now calling on PONYNJ but not on Boston which carry New England cargo. A total of 13 interviews with carriers will be conducted to assess fluctuations in Boston container volume and help define the range of possible without-project and with-project conditions. Interview questions will include:

- What was the reason behind the decision by COSCO to initiate a new service and MSC to retain one service and add another? Would an absence of deepening at Boston be likely to result in those lines dropping Boston service? Why do they call at Boston?

- What are CGM-CMA's future plans for Boston service? They dropped one Boston service from Europe only to begin a new Boston service from the western hemisphere in 2009. What are their plans and what role would channel depth play?

- What has been the reason for the fluctuations in the volume of container cargo moving through Boston up to a few years ago when volumes began climbing? What was the reason behind the departure of some shippers from Boston service, including Maersk?

- In order to support an analysis of the without-project carrier fleet by trade route, interviews will discern what carriers and services carry New England boxes into PONYNJ that do not call at Boston, why they don't currently call at Boston, and what changes if any would need to occur (deepening to what depths) to entice them to call on Boston. Would they call at Boston under the 40-foot fully maintained depth, or some greater improved depth? If not, then why not? What ships do they use now, and what ships do they plan to bring to the PONYNJ as that Port's 50-foot deepening project gets completed? A sample of at least ten shippers landing New England boxes at PONYNJ that do not now call at Boston should be interviewed to determine answers to these questions.

At the conclusion of the carrier survey effort the Vertical Team and Sponsor will meet to review the information gathered and determine if adjustment to the details on the Task 2 analysis are warranted.

Using the results of Task 1, supported by the carrier interview responses, the analysis will clarify any change in the fleet mix, number of Boston services, or loading of vessels in either the without-project base year condition, or the with-project condition at any incremental depth. If any additional carriers express a strong interest in direct service to Boston with full maintenance or at some improved depth increment, then the following questions would require answers:

- How many of the boxes available for shift from PONYNJ landings to Boston landings would be carried by those services and by what vessel classes and drafts?
- What channel depths are required for those new services to operate?
- How would any new services be expected to evolve over the project period of analysis, with reference to the known evolution of the existing Boston services.
- Do those numbers affect the remaining pool of shift-eligible boxes available for carriage by larger vessels belonging to the existing three Boston services?

The carrier survey and analysis should also examine to potential for Boston Harbor to loose carriers in the without-project condition. The existing carriers should be questioned as to what conditions may cause them to eliminate Boston calls from their services. A sensitivity analysis will be included examining the impact of a potential loss of service at Boston.

Following the carrier survey and analysis of the data provided, the range of future fleet mix for the without-project and with-project futures at Boston will be developed. The future fleet for each carrier should be based on analysis of their existing fleets including new orders and supported by information collected in the survey. The stated plans of the three existing container services calling at Boston to use larger ships at Boston must continue to be considered. For example - MSC has been calling at Boston for several years and their fleet mix has changed over this time. Future fleet forecasting will be adjusted to reflect MSC's historic fleet mix. COSCO has its own evolution history for US East Coast service. Total Boston fleet forecast analysis will include how this change compares to other ports and changes to the world fleet. Questions to be considered include:

- Does the fleet-mix analysis adjusted for practices at PONYNJ support plans for moving to larger 5600 TEU or greater ships?
- Is there cargo remaining for them to carry after other modes of transport not requiring deepening at Boston (or requiring lesser depth deepening at Boston), such as new services by other carriers, are factored into the analysis?
- What effect does the continued deepening of the PONYNJ have on the future fleet at Boston?
- How do these considerations then effect the depth optimization for Boston, if at all?

The Task 2 analysis will develop the anticipated fleet mix for Boston Harbor under all conditions. Based on this future fleet mix, transportation costs based on origin to destination for the without-project and alternative with-project conditions will be calculated. The results of these inquiries may require running and presentation of additional sensitivity analyses by incremental depth, depending on the substance of the information gathered.

Task 2 will conclude with preparation of a report describing in detail the information developed (questions and responses) from the carrier survey effort, discussion of the carrier survey information, development and analysis of the future fleets including a description of methodology followed, display the number of TEUs by carrier for both without-project and alternative with-project conditions, and display the transportation cost savings, or benefits, for each with-project condition depth alternative. The fleet mix and TEU data will be used to conduct Task 3 of the re-analysis.

Task 2 will require a number of checkpoints for Vertical Team involvement in providing input, advice and decision-making. These will include in-progress reviews covering:

- Input on the questions to be asked during the carrier interviews.
- Review of the information developed through the carrier surveys and input on development of the Task 2 analysis methodology, including fleet mix development.
- Review of the fleet mixes and TEU volume distributions developed for the without-project and alternative with-project conditions.
- Review of the Task 2 report including Agency Technical Review.

Task 3 - Vessel Sailing Drafts Analysis:

HQUSACE points out that even under existing conditions, there is some variance in vessel loading and drafts inbound and outbound with the existing three services. The Feasibility Report concluded, based on interviews with the existing Boston carriers, and analysis of current practices (from pilots' detailed records of drafts on all transits), that vessels would always arrive and sail at drafts close to the maximum for those vessels. This was due primarily to the shippers statements concerning Boston's geographic location on their routes (first-in or last-out for North America), Boston's tidal advantage which encourages greater loading for specific arrival/sailing windows, and Boston's high export percentage relative to other east coast ports which results in loading of more full boxes outbound. HQUSACE has requested that sailing drafts be re-examined with reference to experience at other ports with depths similar to that being recommended for Boston.

The Corps New York District (NAN) is planning to conduct an analysis of vessel draft and loading trends and future projections for the PONYNJ, specifically traffic through Newark Bay (Port Elizabeth terminals), under a Memorandum of Agreement with the Port Authority of NY and NJ. That analysis is required as part of the investigations for raising the elevation of the Bayonne Bridge span over the shipping channel to Newark Bay to take full advantage of the ongoing deepening of those channels. That analysis will yield data pertinent to the PONYNJ carriers. NAE will coordinate with NAN to examine the results of the Bayonne study and determine the applicability of that data to the Boston re-analysis.

However, the PONYNJ and Boston are dissimilar in terms of number of services (more than 30 at NYNJ versus 4 at Boston), the distance from the terminals to the sea (24 miles at NYNJ and 6 miles at Boston), tides (average range of about 5 feet at NYNJ and 9 feet at Boston), and other factors such as routing and exports mentioned above. It may be more appropriate to select a subset of PONYNJ services that are first-in or last-out at NYNJ for consideration. IWR is also working on a container cargo loading model, in part using funds provided by the ARRA.

The data and any loading model, if used for this re-analysis, would still need to be adjusted to account for Boston's tidal advantage and export loads. The specifics of this analysis will require additional discussion with the Vertical Team once progress on Task 2 is sufficiently along to enable a determination on Task 3. Additional information beyond that solicited by NAN for the Bayonne Bridge study may need to be asked of the carriers to secure data necessary for the Boston Harbor responses. One question to be answered in adapting any model would be whether Boston's position as first-in or last-out in terms of port rotation for the services affect a difference in sailing drafts? Several ports are being looked at for the IWR loading model. Data is available in database format from 1999 to 2007 from the navigation data center that includes sailing draft, preceding port, next port, and vessel name. The analysis of this data could be completed in a short period of time, but will rely on substantial completion of Task #2 to initiate this work.

An analysis will be performed of actual sailing drafts for existing conditions, and predicted drafts for both the future without-project condition and the future with-project conditions for the alternative depths under consideration for Boston Harbor. The analysis will not assume that containerships sail at their design draft, but will assess anticipated sailing drafts for both the with-project and without-project conditions based on the estimated weight of the container cargo. Variation in sailing drafts on longer transoceanic routes may stem from differences in the weight of boxes (type of cargo) and the number of empty boxes carried.

At the conclusion of Task 3 the vessel loading analysis will be used to adjust the inputs on TEU loads and weights per vessel call at Boston Harbor for the several carriers and services included in the analysis. A report describing and summarizing Task 3 efforts will be prepared including tables and charts to showing distribution of vessels and demonstrating current operating practices in the container industry and specifically for Boston will be prepared. The future fleet distribution and sailing drafts for Boston Harbor should reflect industry practices and the weight of the cargo. Actual drafts relative to maximum drafts will be determined and displayed. In the end, data leading to a new mix of drafts under the without-project condition and the base year and other alternative with-project future conditions, may require re-visiting the project's depth optimization.

Task 3 will require a number of checkpoints for Vertical Team involvement in providing input, advice and decision-making. These will include in-progress reviews covering:

- The vessel loading model and adjustments to be made to that model for use at Boston Harbor will be discussed and concurrence sought before applying the model
- The revisions to the without-project and with-project fleet mixes from Task 2 for use in Task 3 analysis will be reviewed before use.

- The TEU weights and other inputs to the loading model will be reviewed before applying the model.
- The output of the model, confidence in its results, and appropriateness of its use will be discussed before using the results for any adjustment in the project depth optimization.
- Review of the Task 3 report including Agency Technical Review.

Task 4 - Sensitivity Analysis Concerning the ILA Fee:

One of the Independent External Peer Review comments questioned whether or not the avoidance of the ILA (International Longshoreman's Association) fee assessed on New York landed cargo was an NED benefit, or was simply a transfer. The District and HQUSACE agreed that the ILA fee could be looked at either way, and that the District would address this by running a sensitivity analysis to look at the project benefits with both a declining fee and with no fee as were suggested by the IERP. This is not expected to impact depth optimization. Once Task 3 is completed and the final project optimization has been prepared and discussed, a sensitivity analysis will be prepared using both a declining ILA fee and elimination of the ILA fee. This analysis will be included in the final revised economic appendix submitted for ATR and HQUSACE staff review.

Former Task 5 - Benefits for Existing Boston and Non-Boston Cargo:

Benefits from economies of scale to boxes not landed/shipped at Boston, but carried on ships calling at Boston, by the three existing Boston services, or any new Boston services will be investigated and any benefits determined. HQUSACE has pointed out that additional project benefits from savings in transportation of these boxes could be quantified and included in the project benefits, as deepening Boston would result in that cargo also being carried on larger ships at a per-box savings in transportation cost. These benefits will also be quantified if they exist, however, conditions at Boston are not likely to drive carrier decisions on what vessels to place in service compared to the PONYNJ. This analysis will be included in the benefit mix when conducting Task 2, and itemized in the final revised economic appendix submitted for ATR and HQUSACE staff review. This effort and its estimate have been incorporated into Task 2.

Tasks 5 and 6 – Review Responses and Revised Container Shipping Benefits Appendix:

The estimates and timeline developed for completing the work outlined in this Framework will include two additional Tasks as follows: Task 5 consists of responses by the PDT, including the contractors performing the bulk of this work, to the comments made by Corps and Sponsor reviewers, including the Agency Technical Review team, NAD and HQUSACE. Task 6 consists of drafting and finalizing a new Container Shipping Benefits Appendix incorporating the results of the prior Feasibility benefits analysis and the re-analysis conducted in accordance with this Framework, and where appropriate comparing and reconciling the results of the two efforts.

Other Required Reviews and Tasks:

In addition to the tasks identified above, other concerns were raised and suggestions made during IEPR team and OWPR staff review of the Feasibility Report. These items will also be addressed as part of the re-analysis

(A) Agency Technical Review of New Analyses: Any new analyses, including assumptions, calculations, and conclusions would be submitted to the PCX for DDN and the ATR team (NAN staff led by SAM, the PCX) for Agency Technical Review. The scope, cost and timeline for any further ATR cannot be determined until the specific nature of the new analyses and report to be reviewed is known. For purposes of this scope and estimate it was assumed that a revised recommendation would result from the re-analysis requiring a revised report that would need another round of ATR, and that each of the three major reanalysis tasks would yield a report that would be submitted for ATR. All ATR and responses would be conducted using Dr. Checks. The ATR team will be invited to participate in all project coordination meetings and in-progress review meetings.

(B) Model Certification of New Spreadsheets: It may be necessary to submit any new or revised benefit or commerce projections spreadsheets to the PCX for DDN if such spreadsheets are determined to be "models" requiring such review. That determination can not be made until the specific nature of the new analyses is determined. For purposes of this scope and estimate it was assumed that at least some tools used for the re-analysis would be considered models subject to certification review.

(C) Potential for Revisions to the Feasibility Report: Should the new analysis lead the team to make a different recommendation than that now in the Feasibility Report, then the report, and to a lesser extent the SEIS, would require revisions to the Report and other project documents. The extent of such revisions and the time required to complete them, and prepare a new version of the report for review and publication will not be known until the results of the re-analyses are completed and their impact on the recommendation is known. For the purposes of this scope and estimate, it is assumed that a different recommendation would be made, requiring a re-write with revisions to the SEIS and a need to re-coordinate with Federal and State resource agencies, harbor users, and the public.

(D) NWW Review of Revised TPCS: Should the new analysis lead the team to make a different recommendation than that now in the Feasibility Report, then the Total Project Cost Schedule and the Construction Schedule for the Recommended Plan would need to be revised and re-submitted to NWW for review and approval. In any event the project cost estimates will need to be updated to the current price level period once the economic re-analysis is completed for inclusion in the revised Feasibility Report. The District will submit any revised TPCS, cost estimates (including a revised contingency cost analysis), and construction schedule to NWW (the Center of Expertise for Cost Estimating) through the PCX for review and approval.

(E) Independent External Peer Review: This Framework was provided to the DDN PCX who contracted with Battelle for the Independent External Peer Review team that reviewed the Feasibility Report to review the Framework. The IEPR team reviewed the Framework and concurred that this scope will cover sufficient analyses to address the IEPR comments

made on the Feasibility Report. That action closed the IEPR process. No further IEPR review will be required for the additional analysis.

COMMUNICATIONS STRATEGY

This re-analysis for the Boston Harbor Feasibility Study represents a significant financial commitment on the part of the Corps and Massport to respond to the review questions and present a revised report for consideration and action. Completion of a quality product that will meet reviewer's expectations will require close coordination by the Corps Vertical Team, Sponsor and Contactors throughout the conduct of the re-analysis effort.

Frequent project delivery team (PDT) meetings, Vertical Team coordination meetings and in-progress review meetings will be held during the course of the re-analysis. The Sponsor, Contractors and ATR team will be invited to participate in all meetings and conferences. PDT meeting will be held at least once monthly at either the District or Massport offices.

A series of in-progress review meetings, most held by conference call, will be conducted as laid-out below to ensure Vertical Team buy-in at critical steps in the process for the three principal tasks.

Task 1 In-Progress Review Topics:

- Input on the questions to be asked during the shipper interviews will be sought from the Vertical Team, Sponsor and IWR.
- Representativeness of the sample of shipper data used for the origin/destination analysis and the methodology used for determining the sample.
- Review of the Task 1 report including Agency Technical Review.

Task 2 In-Progress Review Topics:

- Input on the questions to be asked during the carrier interviews.
- Review of the information developed through the carrier surveys and input on development of the Task 2 analysis methodology, including fleet mix development.
- Review of the fleet mixes and TEU volume distributions developed for the without-project and alternative with-project conditions.
- Review of the Task 2 report including Agency Technical Review.

Task 3 In-Progress Review Topics:

- The vessel loading model and adjustments to be made to that model for use at Boston Harbor will be discussed and concurrence sought before applying the model
- The revisions to the without-project and with-project fleet mixes from Task 2 for use in Task 3 analysis will be reviewed before use.
- The TEU weights and other inputs to the loading model will be reviewed before applying the model.
- The output of the model, confidence in its results, and appropriateness of its use will be discussed before using the results for any adjustment in the project depth optimization

Draft reports for the three principal tasks, results of ATR reviews, cost reviews and model certifications will all be submitted to the Sponsor by letter for review and comment. .

Any development during the course of the re-analysis that would require consideration of revisions to the study tasks, scope, estimate or schedule will require notice to, coordination with, and agreement by the entire Vertical Team and the Sponsor (Massport).

A revised Draft Final Feasibility Report and Draft Chief of Engineers Report would be prepared and submitted to NAD and HQUSACE at the conclusion of the re-analysis and all required reviews. All draft reports will be reviewed by the Sponsor before submittal for approval in the manner that the 2008 draft report was processed. The project will not require re-submission to the Civil Works Review Board, except perhaps in a summary manner for action on a recommendation consistent with the re-analysis results.

From: Claseman, Kenneth G HQ02
To: Thalhauser, Jenifer E NAN02; Habel, Mark L NAE
Cc: Ring, Richard J NAD
Subject: RE: Boston Harbor Meeting Summary/Path Forward
Date: Thursday, July 30, 2009 11:19:46 AM

Yes - I concur.

Ken Claseman
Office of Water Project Review
HQUSACE
Office: (202) 761-5451
Cellular: (202) 281-0813

-----Original Message-----
From: Thalhauser, Jenifer E NAN02
Sent: Thursday, July 30, 2009 10:53 AM
To: Claseman, Kenneth G HQ02; Habel, Mark L NAE
Cc: Ring, Richard J NAD
Subject: RE: Boston Harbor Meeting Summary/Path Forward

Ken, Mark - I believe this now closes the loop on the minutes, and that Mark's version sent at 1043 is the final (highlighted area will remain but I will 'un-highlight' it.

Do you both agree?

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, July 30, 2009 10:46 AM
To: Habel, Mark L NAE
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02; Ware, Charles L HQ02; Scully, William C NAE; Byrne, Robert H NAE; Blum, Peter R NAD; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM; Caldwell, Lloyd NAD; Brown, Theodore A HQ02; Coleman, Wesley E Jr HQ02; Vietri, Joseph R NAD
Subject: RE: Boston Harbor Meeting Summary/Path Forward

OK - this makes sense to me.

Thanks,

Ken Claseman
Office of Water Project Review
HQUSACE
Office: (202) 761-5451
Cellular: (202) 281-0813

-----Original Message-----
From: Habel, Mark L NAE
Sent: Thursday, July 30, 2009 10:43 AM
To: Claseman, Kenneth G HQ02
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02; Ware, Charles L HQ02; Scully, William C NAE; Byrne, Robert H NAE; Blum, Peter R NAD; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM; Caldwell, Lloyd NAD; Brown, Theodore A HQ02; Coleman, Wesley E Jr HQ02; Vietri, Joseph R NAD

Subject: RE: Boston Harbor Meeting Summary/Path Forward

Yes it does. The 3rd sentence of the yellow highlighted paragraph in the meeting MFR reads "The shipper survey data used for the analysis should be broad enough to provide a representative sample of the range of cargo/commodity types, shipping company sizes, and New England origins/destinations." That seems to cover it.

The language intentionally implies that we will need to come to an agreement on what set of the data we end up collecting will be used for the sample - that's the "methodology" referenced that will need to be determined once we see what sources we've received data from.

The re-write of the Framework scope text, which we will have ready for all to look at tomorrow, will lay these points out in more detail.

Mark L. Habel, CENAE-EP-PN
978-318-8871

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, July 30, 2009 10:30 AM
To: Habel, Mark L NAE
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02; Ware, Charles L HQ02; Scully, William C NAE; Byrne, Robert H NAE; Blum, Peter R NAD; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM; Caldwell, Lloyd NAD; Brown, Theodore A HQ02; Coleman, Wesley E Jr HQ02; Vietri, Joseph R NAD
Subject: RE: Boston Harbor Meeting Summary/Path Forward

Mark,

It seems to me Dr. Moser's input (that you can extrapolate the data as long as you obtain a "representative" sample) resolves the question. Do you agree?

Ken Claseman
Office of Water Project Review
HQUSACE
Office: (202) 761-5451
Cellular: (202) 281-0813

-----Original Message-----
From: Vietri, Joseph R NAD
Sent: Thursday, July 30, 2009 10:07 AM
To: Habel, Mark L NAE; Claseman, Kenneth G HQ02
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02; Ware, Charles L HQ02; Scully, William C NAE; Byrne, Robert H NAE; Blum, Peter R NAD; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM; Caldwell, Lloyd NAD; Brown, Theodore A HQ02; Coleman, Wesley E Jr HQ02
Subject: Re: Boston Harbor Meeting Summary/Path Forward

Team:

Before we get too far down the road I want to make sure we are clear on expectations. In particular, there seems to be some minor disagreement as out lined in the notes from Mark and Ken on the Shippers to be interviewed and the value of that information.

I have cc'd both Lloyd, Wes and Tab on this e mail since we cannot afford anymore delays or confusion and we need to be in 100 percent agreement on the way forward.

Let's close the loop on these e mails and if still not in agreement we need to have a Call with the entire vertical team.

Thanks to everyone for your hard work and dedication in trying to move this study forward.
Thanks
Joe Vietri
Chief Planning & Policy
Director Nat Plng Center for Costal & Storm Damage North Atlantic Division
917 613 3873 (cell)
718 765 7070 (office)

----- Original Message -----
From: Habel, Mark L NAE
To: Claseman, Kenneth G HQ02
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02; Ware, Charles L HQ02; Scully, William C NAE; Byrne, Robert H NAE; Vietri, Joseph R NAD; Blum, Peter R NAD; Hodson, Thomas J NAN02; Fraenkel, Naomi R NAN02; Bradley, Kenneth P SAM; Moseby, Bernard E SAM
Sent: Thu Jul 30 06:15:28 2009
Subject: RE: Boston Harbor Meeting Summary/Path Forward

Ken and VT: I have accepted all the suggested edits to the MFR, including some suggestions from Ed O'Leary, and all of Ken's edits except that dealing with his third comment from the email below.

In sustitution, the District offers the new paragraph on page 4 highlighted in yellow. Since, as we learned Tuesday, the available data sources will not readily answer the origin/destination and other questions, we need to rely on surveys/interviews of shippers. Not everyone we talk to will end up being a beneficiary, and not everyone we don't talk to won't be. The survey, regardless of our best efforts to contact as many shipping interests as possible, will yield only a sample of the shipper/container population. The survey results will need to be extrapolated over the entire New England shipper/container population to provide us with credible answers. Once the survey is completed a methodology for accomplishing this will need to be developed, reviewed, and concurred in by the VT. Its is the survey, and the methodology developed for using the data resulting from the survey, that will be one step in the means of documenting eligible benefits. But we cannot limit our benefit stream to only those companiues willing to share data with us in our sample.

Mark L. Habel, CENAE-EP-PN
978-318-8871

-----Original Message-----
From: Claseman, Kenneth G HQ02
Sent: Thursday, July 30, 2009 8:30 AM
To: Habel, Mark L NAE
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Hughes, Thomas E HQ02; Cone, Steven R IWR; Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02; Ware, Charles L HQ02
Subject: RE: Boston Harbor Meeting Summary/Path Forward

Mark,

I have made a few suggested revisions to the MFR (see attachment).

My hope is that the District will at least try to contact as many shippers as possible (which I think is

NAE's intent). I just don't want to leave the impression that we are setting a minimum standard for interviews and then we will stop trying as soon as the minimum is attained (I don't think NAE has any intention of doing this, but I want the language in the SOW to be clear on this point).

I also added a suggestion for monthly meetings or conference calls as a minimum. I think it is a good idea to have a minimum number defined in the SOW (it may aleviate a concern of the sponsor), however the frequency is completely negotiable as far as I am concerned.

The other item in added was to note that the Corps can only claim benefits that can be documented (i.e. we can't count benefits for shippers who won't talk to us, unless there is another way to obtain an understanding of their operations).

I think the statement regarding the CWRB is correct, but I need to confirm, which I will do today and let you know.

Suggest you include the ATR team (Tom Hodson, Naomi Fraenkel and Bernard Moseby) in the review of the final SOW.

Thanks,

Ken Claseman
Office of Water Project Review
HQUSACE
Office: (202) 761-5451
Cellular: (202) 281-0813

-----Original Message-----
From: Habel, Mark L NAE
Sent: Wednesday, July 29, 2009 2:59 PM
To: Keegan, Michael F NAE; Ring, Richard J NAD; Thalhauser, Jenifer E NAN02
Cc: Kennelly, John R NAE; Coleman, Wesley E Jr HQ02; O'leary, Edmund J NAE; Claseman, Kenneth G HQ02; Hughes, Thomas E HQ02
Subject: Boston Harbor Meeting Summary/Path Forward

I've edited Jenifer's cut, with Mike and Rich's comments. Also attaches the attendees sheet and IWR agenda, both referenced in the MFR.

Mark L. Habel, CENAE-EP-PN
978-318-8871

Memorandum: For the Record **29 July 2009**

Subject: Boston Harbor Deepening Feasibility Study Economic Reanalysis, Containerized Cargo Data Needs Meeting, 28 July 2009, Institute for Water Resources – Alexandria, Virginia

Background:

The Boston Harbor Draft Final Feasibility Study was presented to the Civil Works Review Board in August 2008. As a result of comments received during review, additional economic analysis was required to finalize optimization of the recommended project depth. A Framework for conducting the reanalysis was developed an concurred with by the Vertical Team. The Framework consists of three broad tasks, (1) develop additional detail on landside transportation practices, costs and cargo types to more accurately determine the population of NYNJ landed New England cargo considered eligible for a shift to direct water carriage to Boston, (2) analysis of waterborne carriage methods to handle that shift of cargo volume, and (3) analysis of vessel loading practices to determine actual transit drafts. Identification of data sources necessary to perform the first portion of Task #1 of the reanalysis has been ongoing for several months, with input from all levels of the Vertical Team Consultation with the U.S. Customs, U.S. Census and the IWR identified several data sources that may provide part of the information needed. This meeting was scheduled to receive input and discussion amongst the several agencies and offices and determine what may or may not be possible to achieve with the available data.

The project Sponsor, Massport, was invited to attend the meeting, but declined. The U.S. Census Bureau was unable to attend the meeting, but did participate in a conference call with NAE, NAD and IWR the day prior. The information provided by the U.S. Census was relayed and discussed at the 28 July meeting.

Meeting Participants:

The meeting was held at the IWR offices, Casey Building, Fort Belvoir, Virginia, on 28 July 2009, from approximately 09:30 to 14:00. Participating agencies and offices were:

Corps - HQUSACE – OWPR and NAD RIT
Corps - NAD
Corps - NAE
Corps – IWR
Corps - LRB
Department of Transportation, Bureau of Transportation Statistics
Internal Revenue Service

The meeting sign-in sheet an agenda are attached.

Meeting Objectives:

The objective of the meeting was to determine a means to move forward with Task #1 of the Boston Harbor Framework for additional economic analysis requested by the OWPR. The first portion of Task #1 involves assembly of data on landside transportation practices, costs, routes, and origin/destination of containerized cargo landed at Boston or NYNJ and shipped to or from New England.

The meeting focused on the need to understand what data sources are available from IWR, Census, Customs, DOT, and IRS. Specifically, to determine the ultimate physical destination and origin of container imports and exports, respectively. The outcome of this discussion will facilitate further discussion on how to proceed: 1. use available data only to complete the container destination question and supplement existing PIERS data to be used in the economic re-analysis; 2. use the available data to identify data needs which may be met by on the ground surveys of shippers, to scope such surveys, and to check on the reasonableness of data collected by survey.

Leave meeting with a clear path forward to develop and execute a final Framework which will lead to an approved feasibility report, final favorable action by the CWRB, a Chief's report, and ultimately project authorization via WRDA 2010.

Discussion:

An in-depth discussion of available Import/Export Waterborne data was held; contributions were made by USACENDC, USDOT, and IRS. U.S. Census information from the 27 July conference call was also discussed.

IWR-NDC staff presented the available PIERS data, its source and use by the Corps. The limitations of this source were discussed. While some PIERS data is applicable and will be used in the analysis, all concluded that the major shortcoming is the lack of actual origin/destination data on containers, a key need for the reanalysis.

IWR-NDC and USDOT-BTS staff presented and led discussion on the U.S. Customs (import-focused) and U.S. Census (export-focused) data. Although the Customs and Census data is of value to the team three problems exist: 1. Census data is protected; physical access to this data is a challenge as it is protected and located in New Orleans, and 2. use of some data is restricted due to confidentiality restrictions. 3. The data collected is related to shipments, not containers and it is unknown if a direct correlation can be made from the available data to the containers which is the basis for the land-side analysis. Use of the Census data would require a National Interest Determination, and MOU with the Census Bureau, Security Inspection of the data storage/use location by Census, and signing a non-disclosure agreement. Access to and use of the data would entail a number of additional restrictions, and putting such agreements in place would take more than one year.

Discussion was held on whether average weights by volume for various commodities could be used to back-into part of the analysis, the practicability of this approach was questioned. The "entering commerce" locations from these data sources may not correspond to the location where the container is "stuffed" or "de-stuffed" (the location needed for the analysis; containers may carry multiple (even 100s) of "shipments" (or a single shipment may include multiple containers); and containers may pass through multiple handlers on their journey to and from the port or warehouse.

US DOT-BTS discussed their data and its application and the reports they produce (some summary copies were provided). DOT prepares a Freight Analysis Framework, develops conversions factors for weight by volume for commodities, and conducts Commodity Flow Surveys. While these include some origin/destination data, it is by shipment and is not correlated to containers. You could use DOT's Freight Analysis Framework (FAF) to look at commodity movements between cities, but only to support general arguments on tonnage of cargo moved by commodity, not numbers of containers.

It was brought up that the PONYNJ has conducted a Gate Survey of containers entering and leaving selected terminals in that port. NAE will contact NAN to determine how best to acquire the data that resulted from that survey from the Port Authority, and determine its applicability to the Boston reanalysis.

Direct surveys of shipping interests could be conducted to yield the needed data. Interests with origin/destination information would include Shippers and Shipping Agents, Freight Forwarders (those stuffing, de-stuffing and renting boxes for smaller shippers), Exchange Companies (who keep track of boxes for owners and collect rent), and Chassis Management Companies (who keep track of chassis for owners). A quick look at the PONYNJ revealed that about 30 to 40 shippers accounted for 80% of exports from the PONYNJ. Extrapolating to the number of import shippers would yield an additional 200 or so companies. Adding Boston shippers to the mix would give a total of between 200 and 300 companies accounting for 80% of the shipping through the two ports.

It was suggested that some of the available data sources (DOT, PIERS, Census) could be used to narrow the search for the population of shippers to be surveyed or interviewed. Also, that some of the data sources could be used as a check of any information yielded by such surveys. However the consensus was that the available data sources alone would not yield the information required for the first step of Task #1 – identifying the origin and destination of container traffic in New England.

Summary:

It was apparent at end of discussion that although there is additional data available for NAE use which can supplement the data to be used in the economic re-analysis. Because the data is not container specific it cannot be used directly in the re-analysis but can be used to guide survey efforts to obtain

missing data, particularly container origin/destination data. Shipper interviews will be required. The data likely will help NAE identify the key NYNJ and Boston shippers and other interests to be contacted and to check information provided from the interviews. Data that is applicable to this purpose includes Census data, Selectivity File Data (USACENDC source), and possibly the Gate Survey that were done on the PONYNJ (NAE will contact NAN and determine the applicability of this information).

IWR, NAD RIT, OWPR, NAD, and NAE fully understand that available data will still not give a clear picture of the destination of container boxes and therefore must be supplemented by on-the-ground surveys of shippers. It is believed that approximately 200 to 300 shippers in Boston and NYNJ account for approximately 80 percent of the containers shipped. The surveys will focus on these shippers, but must also take care to include a relatively representative sample of cargo types and volumes. NAE will attempt to contact all of the aforementioned 200-300 shippers, however it was recognized that it is unlikely that responses will be provided by all shippers and that NAE will ultimately obtain information from a representative sample to support the methodology analysis. Confidence limits will be identified in the reanalysis scope.

The District and the Vertical Team understand that an analysis based on shipper surveys will yield specific data for only a sample of the shipper/container population. The District will endeavor to contact as many shippers and other pertinent interests as possible. The shipper survey data used for the analysis should be broad enough to provide a representative sample of the range of cargo/commodity types, shipping company sizes, and New England origins/destinations. Once the survey is complete and the data distribution known, the District will develop the methodology to be used to analyze the survey data for use in the re-analysis and seek Vertical Team consensus on that methodology. The methodology must include a means of extrapolating the survey results to the larger New England container population.

NAE is scheduled to deliver a detailed Scope of Work for the remainder of the Response Framework to MassPort by end of the first week in August with a study cost constraint of a total 850k. The scope is required to have interim milestones, specific tasks costs and a communication plan that identifies how interim "buy-off" with the Corps vertical team will occur (In-Progress Reviews, etc.).

Path Forward:

Following the interagency meeting, Corps staff including USACE-NAE; USACE-NAD; HQUSACE-CEMP-NAD; and HQUSACE-OWPR conferred as to the path forward and concluded as follows:

NAE will develop a revised Framework scope of work including methodology to identify survey methods supplemented by existing data, the analyses to be undertaken for each Task and expected products and outputs. .

Once developed the revised Framework will be reviewed by the Vertical Team for concurrence.

With Vertical Team concurrence, NAE will complete the revised Framework to include the cost, interim milestones and communication plan which will be provided to the Vertical Team review and concurrence prior to submittal to Massport.

Additional SOW effort cost will not exceed $850,000.

The revised Framework's Communications Strategy will include IPR 'check point' meetings or conference calls involving the Sponsor and Vertical Team, which will be held on an as needed basis, approximately once a month.

Once work is initiated, a time frame of approximately one year consisting of approximately 9 months of data collection and analysis and 3 months of report processing. Where possible this timeframe will be shortened to meet the goal of a revised draft final Feasibility Report and Chief's Report submitted in time for the project's inclusion in a potential WRDA 2010 for authorization.

NAE will ask for an expedited ATR and approval of the report. The Vertical Team believes that a full re-presentation of the project to the CWRB is not needed.

BOSTON HARBOR DEEPENING FEASIBILITY STUDY
CONTAINERIZED CARGO DATA NEEDS MEETING
28 July 2009
Institute for Water Resources – Alexandria, Virginia

Name	Representing/Agency/Office	Phone/Email
MARK HABEL	CORPS-New England Dist.	mark.l.habel@usace.army.mil 978-318-8871
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Ken Claseman	HQUSACE-OWPR	kenneth.g.claseman@usace.army.mil (202) 761-5451
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Matthew Chambers	RITA/BTS	(202) 493-2332 matthewchambers@dot.gov
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JON BROWN	USACE INCX	716 879-4430

Availability and quality of data sources for Boston Harbor
Tuesday July 28th 0930 -1430 EDT
IWR Classroom, Casey Building Room 264
7701 Telegraph Rd.
Alexandria, VA 22315

Directions and Map (IWR Headquarters): http://www.iwr.usace.army.mil/inside/people/facilities.cfm

Call in Number if necessary: 1-866-846-1051
Passcode: 9739 032#

Problem to be addressed: Of the 900,000+/- container TEUs with an eastern or northern New England origin or destination, only about 200,000=/- are directly shipped through Boston Harbor on three carrier services. The bulk of the remainder are shipped through the PONYNJ. What carriers and shippers carry these New England TEUs? Are there factors or reasons that some TEUs would not shift to direct shipment through Boston? What costs and time are involved with overland transport. Can the data shed light on why more carriers don't ship through Boston now given the potential savings. The result of our analysis will determine what portion of the PONYNJ-shipped boxes might be considered eligible for a shift to direct shipment through Boston.

* Introductions, expectations, and concerns (All)

* Discussion of the problem at hand (lead by USACE-NAE)

* Timelines addressing the issue/problem (USACE-NAE)

* Corps Import waterborne data from Customs (USACE-NDC), (CBP)

  * Data handling and safeguards
  * What's readily available
  * What's the Quality

* Corps Export waterborne data from Census (USACE-NDC), (CENSUS)

  * Data handling and safeguards
  * What's readily available
  * What's the Quality

* Other sources: PIERS, Manifest Data, etc.

* Quality and completeness of data for cargo origin/destination (USACE-NDC)

* Linking Census/Customs data with other sources (All)

* Enhancing Census/Customs data with survey information (DOT)

* Landside data available from Federal Highways and Railways (DOT)

* Survey and sampling methods. Can the Commodity Flow Survey, or the techniques used for the survey, help? (DOT), (CENSUS)

* Conclusion : Can problem be solved given what is known from discussion above, and time and resource constraints (ALL). Creating a template for future studies

From: Scully, William C NAE
To: Keegan, Michael F NAE; Kennelly, John R NAE; Habel, Mark L NAE; Byrne, Robert H NAE
Subject: FW: Boston Harbor
Date: Wednesday, July 08, 2009 8:16:57 AM

Team:

For your info, review and comments as appropriate back to me. I believe there are a couple of things in here that are not quite on the mark. For example: 1) Wes' comment that suggests NAE never sent up the draft ltr as requested for MG Temple's signature to Customs - - which Lloyd corrects in his response email to Wes; 2) The comment in Wes's recap that Massport informed the DCG that they could only afford 45 feet is I believe incorrect - - I think they only were saying we're willing to go with 45 feet out of total frustration.

Bill

-----Original Message-----
From: Caldwell, Lloyd NAD
Sent: Tuesday, July 07, 2009 10:06 PM
To: Coleman, Wesley E Jr HQ02; DeLuca, Peter A COL NAD; Feir, Philip T Col NAE; Vietri, Joseph R NAD; Forcina, Joseph NAD; Scully, William C NAE
Cc: Temple, Brian H NAD
Subject: Re: Boston Harbor

Wes--- Absolutely excellent recap of the saga. Others may have details of some of the events, but this portrays it well. I can add that regarding the letter to Customs, it was my guidance that it was a District Cdr action vs a DCG action. I expect the results would be the same in any case.

One question. How did this go from what appears to be three straight forward actions last Sept to something so complex today? Have the three agreed actions morphed to something different, or is it just the "devil's in the details" factor?

Lloyd

Sent from my BlackBerry Wireless Handheld

----- Original Message -----
From: Coleman, Wesley E Jr HQ02
To: Caldwell, Lloyd NAD; DeLuca, Peter A COL NAD; Feir, Philip T Col NAE; Vietri, Joseph R NAD; Forcina, Joseph NAD; Scully, William C NAE
Cc: Temple, Brian H NAD
Sent: Tue Jul 07 21:18:34 2009
Subject: RE: Boston Harbor

Sirs...

Our 23 March letter to Massport stated that the draft scope of work had been provided to the Independent External Peer Review team, we were in the process of evaluating their review comments, would revise the scope of work and timeline as appropriate, and that we would share the revised scope with them on or about 31 May 2009. There was no commitment to when the work would be completed, but the DCG-CEO, in the same letter, committed that we would be vigilant to limit the scope and cost of any additional analysis to that which is absolutely necessary to finalize this effort.

As an aside, I was copied on an email exchange between the DCG-CEO and IWR on 1 June regarding Savannah Harbor in which the DCG-CEO suggests that perhaps we can apply lessons learned from

Savannah to other projects including Boston Harbor and believed that we owed feedback on Boston by this Fall. Then in a 26 June email, following a 22 June Massport response to NAE's 2 June letter, the DCG-CEO expressed concern that when he visited NAE on 10 April,, he promised Massport that we'd have an answer by Fall 2009.

Below is my take on events since the CWRB. It obviously doesn't detail all of the behind the scenes work being done by NAE, NAD, and HQUSACE. Hope this helps, and please advise if the information is incorrect:

At the 18 September CWRB follow-up meeting, the District summarized the scope of work developed by the vertical team that would address the three OWPR concerns. The effort would include Landside Analysis with additional trade and cost information for trucked cargo; Waterside Analysis with additional fleet mix and service information from existing and other carriers; additional sensitivity and benefit analyses; and additional review, report revision and management efforts. This would result in an effort costing $579,000 ($263,000 non-Federal) and requiring 9-months.

The decision of the Board at that time was that additional analyses would be conducted before release of the project for S&A review would be considered. They also wanted the team to resolve the EPR comments and reexamine the scope/time/cost estimate to ensure only essential elements/data were included in the estimate. The revised scope or a written status report was to be delivered to the Board members within 3 weeks (9 October 2008) and the CWRB did not plan to reconvene to review the reexamined scope. The DCW is the decision authority regarding the additional analyses.

The team pulled together the revised framework in by the 9th of October, and on the 28th of October, the DCW notified the NAD Commander that he was aware that the scope outlined additional work that would cost about $600K and require about 6 months to complete. Checkpoints were incorporated in the schedule to ensure that work is reviewed at key points and not just at the end of the process. He had coordinated the scope with the DCG and he concurred with the path forward. NAD was directed to move out and to expedite, as much as practicable, this work at minimum cost necessary to properly identify the NED plan and support a recommendation by the Chief of Engineers.

The team had its first Checkpoint on 21 November. GI feasibility funds in the amount of $50,000 were provided to NAE to proceed. As Boston Harbor was only budgeted for PED in FY09, these funds under the CRA were transferred to an account to fund the extended feasibility efforts for the first quarter. Additional funds for the remainder of the FY would be transferred from PED to feasibility as needed as work progressed. As of 21 November, funds had been provided to the DDN PCX (SAM) to modify the contract with Battelle to engage the IEPR team in reviewing the July responses to the 14 original June IEPR comments. This further IEPR review was to cover the Corps responses to all the original IEPR comments, whether economic related or on other project topics. The further review of the economic topics was to be conducted with a view to whether the Framework for the Additional Economic Analyses was sufficient to address the IEPR comments on project economics. SAM expected to have an IEPR response to the Corps by 19 December.

The IEPR response was provided to SAM on 22 December, and to the District and HQUSACE on 29 December. The panel stated that "The Framework for Responding to Office of Water Project Review Comments from Civil Works Review Board Meeting of 21 August and CWRB VTC of September 18 (hereafter: Framework) represents a reasonable and thorough scoping of the issues, data and expected outputs to correctly redress the economics issues that are not currently addressed by the Draft Feasibility Report (DFR) April 2008." The panel also made two suggestions: to have a plan for dealing with missing PIERS data, and to explicitly recognize the relative costs of the waterside services that include and exclude Boston Harbor so that nearly all of the benefits not rest on truck freight savings, "which is an incorrect simplification and misspecification of the problem." On 13 January, following our receipt and review of the IEPR response, we held our second Checkpoint.

Massport wrote the DCG on 22 January expressing its frustrations.

NAE and Massport met with HQUSACE staff at the AAPA meeting in Los Angeles on 29 January. NAE committed to meeting with NAD, Massport and the vertical team in a series of conference calls the following week to discuss the ongoing effort to define the data needs and availability for the Framework of additional analyses. There were also to be discussing a potential work-around raised by Massport to

move out on an interim recommendation for a 45-foot project provided (1) no further analysis (the Framework) is required by HQUSACE for that depth to be recommended, and (2) with analysis in support of 48 feet and a final recommendation to be deferred to occur a little down the road.

At the beginning of February, NAE contacted NAD and HQUSACE regarding additional funds needed for data collection due to data accuracy issues. The first task of the Framework assumed that only an in depth examination of the PIERS data was needed to determine what portion of cargo was really New England origin or destination cargo, who the users, shippers and carriers are, what the value of the cargo and cargo types are, and just where the cargo is being shipped from/to. This task is the foundation of the other future tasks. On further examination by NAE, and by NAN with respect to their ongoing study of the Bayonne Bridge, it was determined that the PIERS data were largely inaccurate when it came to the most critical information on origin and destination of the containerized cargo. The PIERS data most often cite the shipping entities' billing addresses, and not the addresses to which the containers are being transported overland. The only other means of getting this data is to solicit it from the carriers, shippers, end users, trucking firms, US Customs, US Census, etc. NAE thought this a very labor-intensive effort far beyond the scope and cost estimated originally for the Framework. NAE requested $30,000 to determine what data other than PIERS existed from each of these potential sources, whether it is obtainable/accessible, useful for our purpose of filling the gaps in the PIERS data, whether any confidentiality issues exist with that data, and what effort would be involved to acquire, screen and analyze such data. Because Boston Harbor is one of the first port studies to raise the issue of landside transportation cost savings benefits, and that all port studies may be to some extent impacted by the recognition of PIERS data shortcomings on origin/destination and other data, NAE requested that the $30,000 be provided at 100% Federal expense outside of the project FCSA. HQUSACE did not approve the request. A modification to the Framework based on the results of the $30,000 effort was ultimately promised to Massport by 31 May in our 23 March response to their 22 January letter to the DCG.

On 24 March, the DCG wrote the DCG-CEO and the NAD Commander advising of "a very disappointing, and frankly embarrassing" discussion at the AAPA Conference with Massport in which they suggested that we not only had done nothing, but we had actually gone backwards, now deciding that the data we used earlier was invalid. Massport informed the DCG that they could only afford 45 feet and were willing to move out with construction at that depth. The DCG asked the DCG-CEO and the NAD Commander (and through them, the DCW, the HQUSACE Chief of Planning, and the RIT Deputy) if we could accommodate the 45-foot request. The RIT Deputy advised the DCW that we do not have the latitude to make a recommendation of 45' unless the analysis optimizes the project at that depth. The Chief of Planning concurred. The RIT Deputy also suggested that we could consider through risk and uncertainty that the project be optimized at one depth now, but possibly support a deeper depth in the future - stopping short of pursuing a contingent authorization for the deeper depth..

On 10 April, the DCG-CEO met with Massport. In preparation for that, we were asked our take on the delay and when we thought we would be ready for the CWRB. The DCW advised that the District had committed to providing the scope, cost, and schedule together for the additional analyses, including review by HQUSACE, by 31 May and that this was included in our response to Massport. He also advised that this information is the first step with the CWRB and that the optimum channel depth would depend on the fleet forecast, sailing draft assumptions, and assumptions regarding use of tides. These are the key waterside issues and we expected to see reasonable assumptions based on good empirical evidence.

On 5 May, NAE conducted a vertical team call because they had hit a roadblock in acquiring the necessary data on container origin/destination. They identified that US Customs collects and has this info, but that Customs would not release the data. NAE wanted to confer with HQUSACE and NAD on how to proceed or what HQUSACE may be able to do to change Customs position. Two options were offered on how to draft the Framework and estimate - get the data from Customs and it is exactly what is needed, or undertake a labor-intensive canvassing of the carriers and shippers to get what will likely be a more limited population of data, and develop some type of model to adapt and extrapolate that data to arrive at the inputs needed. NAE would cost both options. The OWPR offered to see if the DCG-CEO would sign a letter to Customs requesting the data. NED was to provide a draft letter for the DCG-CEO's signature. It was to include an explanation of specifically what data was needed and how it would be used. NED was also to identify a POC in Customs. OWPR requested that the draft letter be properly coordinated with the NAD Commander confirm this way forward. I don't believe the draft

letter was provided to HQUSACE.

On 2 June, NAE wrote Massport with the cost and schedule for the revised Framework. The DCW asked his independent advisor if the Framework was on the right track. The DCW was told that the Framework is on the right track with respect to measuring the land side cost savings and that based on the data he had seen for the Savannah Harbor study with respect to cargo weights and sailing drafts of various classes of vessels at various ports, it may be difficult to optimize the net NED benefits at 48 ft.

On 15 June, the NAD Chief of Programs and HQUSACE Chief of Planning discussed the project. NAD offered to brief the Chief of Planning with a focus on current issues and if there are things HQUSACE can do to help. The Chief of Planning thought that experts in the PCX for Inland Navigation may be able to assist in the data issue.

Massport responded to NAE's 2 June letter on 22 June.

On 24 June, NAE held a call to request HQUSACE assistance in getting the Customs data and how to proceed if that effort fails.

On 26 June, the DCG-CEO expressed concern that when he visited NAE on 10 April,, he promised Massport that we'd have an answer by Fall 2009. He also wished that he'd known about the difficulty with Customs earlier and might have been able to help. He asked that we re-look and see what can be done by this Fall.

Wesley E. Coleman, Jr.
Deputy Chief for Civil Works
North Atlantic Division Regional Integration Team
Phone: 202-761-5782 Fax: 202-761-1829

-----Original Message-----
From: Caldwell, Lloyd NAD
Sent: Tuesday, July 07, 2009 5:44 PM
To: DeLuca, Peter A COL NAD; Feir, Philip T Col NAE; Coleman, Wesley E Jr HQ02; Vietri, Joseph R NAD; Forcina, Joseph NAD; Scully, William C NAE
Cc: Temple, Sheri M NAD; Temple, Brian H NAD
Subject: Re: Boston Harbor

Joe---

Now that the date/time is set, pls advise me who can be on the call, and let's prepare a chronology of actions to discuss. I got feedback today from Gary Loew that in his discussions at HQ, MG Temple has characterized this as a failure on our part. He might have talked directly with COL DeLuca about his thoughts. In any case, from what I know, that is not a fair characterization of the matter.

Reportedly he understands that we were committed to have initiated a study by 31 May with conclusion by this Fall. He believes the delay at this point to be due to our recalcitrance/ineffectiveness. Don't know where he's gotten his info, but expect he is not aware of the challenges. Do not want us to be defensive in any way, but think we can ensure he has the full picture by identifying the key actions over the past months- plus how we see the way ahead. If there are things we should have done better/differently, let's say so.

The meeting planned for 21 Jul was intended to get senior eyes on the matter to assess how we can adjust the requirement or plan concretely a way forward to which we all agree. Don't know that we can accomplish that in the meeting this week, but expect his objective to be to understand why no progress, and to get commitment for completion. Pls distribute the info I had previously asked for to COL D, Tab, Wes, NAE, and me; and advise who will be on the call. Pls coord with NAE to decide who can address each topic (CWRB tasker, chronology, next actions). Expect MG T will open the meeting with his thoughts. Others' thoughts?

Lloyd

Maritime Department
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909
TOLL FREE (800) 294-2791 FAX (617) 946-4422 (617) 946-4466
www.massport.com

June 22, 2009

Colonel Philip T. Feir
District Engineer
New England District
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: Boston Harbor Deep Draft Navigation Improvement Project

Dear Colonel Feir:

I am writing in response to your June 2, 2009 letter updating me on the Corps' progress on defining the scope and cost of the additional economic analysis required to complete the Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP) Feasibility Report. While I appreciate the hard work that the New England District staff have put into this effort, it is hard for me to understand how 10 months after the initial presentation to the Civil Works Review Board (CWRB), the Corps still has not reached final agreement on the scope and cost to move forward. It is also astounding that this additional work will require at least an additional year and $850,000 to complete. I note that with this additional cost, the project budget will be 55 percent above the original budgeted cost. Additionally, there appears to be no agreement within the Corps that this analysis will satisfy all of the concerns raised at the CWRB. Nonetheless, I appreciate the update and trust that you will let me know when you have a firm estimate and need a commitment from us to move forward.

In order for Massport to consider your request for our commitment to move forward on this project, we will need the following:

1. A line item breakdown of costs for the additional work, including an associated scope of work for each task, the goal of each task, and indication of whether the work will be done internally or via contractors;

2. A detailed schedule for each task;

3. A plan for how the Corps will manage and adhere to the budget and schedule;

4. A detailed plan for how the New England District staff will communicate effectively with HQ staff and external reviewers such that we do not get to the end of the 12 months and $850,000 dollars and learn that they disagree with nuances of the methodology, interpretations of the data, etc.;

5. A commitment from the Corps to notify us immediately of disagreements or other factors that may impact the schedule or budget; and

6. Quarterly reports on the project status and consistency with the schedule and budget.

We look forward to receiving confirmation on the final scope and budget for the additional work as well as the information noted above.

Sincerely,

Michael A. Leone
Port Director

cc: Major General Temple

dh/wordfile/dredge2/ddnip/Col Feir letter June 2009.doc

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

June 2, 2009

Engineering-Planning Division
Planning Branch

Mr. Michael A. Leone
Director of Maritime
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Dear Mr. Leone:

I am writing as a follow-up to the commitments Major General Temple made to Massport in his letter dated March 23, 2009, concerning the scope and cost of the additional economic analysis required for the Boston Harbor deep draft improvement feasibility study.

Following the Civil Works Review Board (CWRB) meetings held last summer, the Corps prepared a Framework to address the reviewers' comments that highlighted a requirement to reanalyze the project's economic justification and depth optimization. The cost of the Framework's effort was estimated at about $580,000, and after additional analysis was updated in January 2009 to $645,000 in order to capture increased labor rates and make up for a calculation error in the original estimate. This included $275,000 for contract economic analysis; $210,000 for non-contract analysis, preparation of a new Economic Appendix, revision of the Feasibility Report (assuming no change in the recommended plan), reviews of the revised report, and another visit to the CWRB; $110,000 for a more extensive revision and review of the report should a different recommendation result from the reanalysis; and an estimated $50,000 in Massport in-kind services for participating in the reanalysis, review and re-presentation.

Independent External Peer Reviewers reviewed the Framework and concurred with its scope. However, the peer reviewers and Corps staff concluded that a critical assumption in the Framework's first task – that PIERS data would be sufficient to make determinations of cargo origin and destination – was invalid, and that other sources would have to be identified in order to obtain this data. In response to this issue, the Corps has been working to identify a source that would allow us to obtain this necessary data more simply than having to engage in the potentially more costly and time consuming effort of acquiring data directly from carriers and shippers. As we learned more about each data source and the extent to which we could use the information as part of our analysis, we developed a more detailed scope and estimate to address the multitude of tasks identified in the reanalysis Framework. As part of this scope and estimate development process, we identified the U.S. Customs and Border Protection as a

possible data source, and have requested in writing that they provide us with access to their data. We are currently awaiting their response.

Acquiring and adapting the U.S. Customs data for use with the PIERS data is estimated to carry an additional cost of approximately $75,000. Our more detailed scoping of the contract economics tasks led us to conclude that our original estimate was about $130,000 too low. This is based in part on the Corps' ongoing experience with the scope of reanalysis efforts and data availability from other port deepening projects such as Savannah, Delaware River and Port Canaveral. The contract cost estimate for the Boston Framework now equates to $480,000, which includes acquiring and adapting the Customs data. With $210,000 for non-contract efforts, $110,000 for more extensive revisions involving a changed recommendation, and $50,000 for Massport in-kind services, the total estimate for the reanalysis Framework effort is $850,000. Massport's share of this cost would be $50,000 for in-kind services and $375,000 in cash. As this effort would be conducted under the excess study cost provisions of the Feasibility Cost Sharing Agreement (FCSA), Massport's cash contribution would not be due until the construction phase of the project.

Before we finalize and forward to you the revised Framework scope and estimate, we want to ensure that we can obtain access to the U.S. Customs data. We expect to have this information shortly. Once your concurrence with the scope and estimate for the reanalysis effort is received, and an amended FCSA executed, the Corps will proceed with issuing a request for proposal for the contract task items. Upon successful negotiation and award of the task order we would then proceed with the Framework effort. The contracting process is estimated to take one month, with about eight months to conduct the work and an additional three months to complete the report revisions and re-present the project to the CWRB. If an FCSA amendment were executed by August 1, 2009, then an August 2010 CWRB meeting would be possible. The project would then be back on track for inclusion in a Chief of Engineers' Report, the publishing of a final Feasibility Report and SEIS for state and agency review, as well as preparation of a Record of Decision (ROD) and other documents for submittal to the Assistant Secretary, OMB and ultimately Congress by February 2011.

If you have any questions, please feel free to contact me at (978) 318-8220. We are anxious to resume working with you to complete this important project.

Mike,
Staying positive and continuing to push forward on this effort!! Please call me if you have any questions or concerns. V/r, Tom

Sincerely,

Philip T. Feir
Colonel, Corps of Engineers
District Engineer

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

March 23, 2009

North Atlantic Division
Regional Integration Team

Mr. Michael A. Leone
Director of Maritime
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Dear Mr. Leone:

Thank you for your letter of January 22, 2008, regarding the Boston Harbor Deep Draft Navigation Improvement Project. You raised concerns with the U.S. Army Corps of Engineers' review process. We value our partnership with Massport and I will address the concerns that you raised.

The Corps implemented a comprehensive peer review process in May 2005 with the publication of nationwide guidance that established a thoughtful, balanced peer review. That guidance adopted most of the recommendations from a National Research Council 2002 report, *Review Procedures for Water Resources Project Planning* and implemented the Office of Management Budget guidelines on peer review. Provisions in the Water Resources Development Act of 2007 (Sections 2034 and 2035) reinforce and add further definition to the Corps review processes. All decision documents and their supporting analyses undergo a district quality control and an agency technical review conducted by a qualified team outside of the home district. In cases where there are public safety concerns, a high level of complexity, novel or precedent-setting approaches, controversy, significant interagency interest, a total project cost greater than $45 million, significant economic, environmental and social effects to the Nation, or where requested by the Governor of an affected State, an independent external peer review will be conducted. In addition to the technical reviews described above, decision documents are reviewed throughout the study process for their compliance with law and policy. These reviews culminate in Washington-level determinations that the recommendations in the reports and the supporting analyses and coordination comply with law and policy, and warrant approval or further recommendation to higher authority by the Chief of Engineers.

As a result of this review process, the team is addressing comments raised by the external and policy compliance reviews. The methodology for evaluating project benefits has remained consistent throughout the study process. Most of the comments relate to the quality and quantity of the data that support the methodology and substantiate the benefits associated with the transportation savings for the container ships.

Resolution of these issues is necessary to properly optimize and identify the National Economic Development (NED) plan. For navigation projects, the alternative plan that reasonably maximizes net economic benefits consistent with protecting the Nation's environment is typically recommended.

The team is currently developing the tasks and costs for the analysis necessary to address the remaining comments. You have my commitment that we will be vigilant to limit the scope and cost of any additional analysis to that which is absolutely necessary to finalize this effort. I have enlisted the support of an independent advisor, at Federal expense, who has a wealth of technical and policy experience and who will act as an integrator. He has assisted in development of the draft framework which includes the identification of data needs and the scope of work and budget to address both the external peer review and Corps policy review comments. He will continue to assist throughout the Corps policy review. The draft scope of work was provided to the Independent External Peer Review team. We are in the process of evaluating their review comments and will revise the scope of work and timeline as appropriate. We will share the revised scope with you on or about 31 May 2009.

I understand that you have requested that the Corps fully fund this re-evaluation process or commit that the reanalysis required by the Civil Works Review Board this past summer be the last analysis required by the Corps to move forward. While the cost of the external review panel is a Federal expense and limited to $500,000, any costs that are the result of the comprehensive review process are shared as described in the feasibility cost sharing agreement between the Department of the Army and the Massachusetts Port Authority for the Boston Harbor Navigation Improvement Feasibility Study, Boston, Massachusetts dated 27 June 2002 as amended in 2008 (see enclosure). Section 105(a) of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2215(a)), specifies the cost-sharing requirements applicable to the study. We have determined that these costs can be considered "excess feasibility study costs", so we can move forward using Federal funds, allowing Massport to defer providing its cost sharing match in accordance with the time frames shown in Article III.D of the agreement.

Completion of this analysis will address the remaining concerns of the Civil Works Review Board and ultimately will allow us to complete a Chief of Engineers Report for the Boston Harbor project. The schedule for this effort is subject to the scope of work and timeline to be developed for the framework. The Chief of Engineers Report is transmitted to the Assistant Secretary of the Army for Civil Works (ASA(CW)) for approval. The ASA(CW) will formally submit the report to the Office of Management and Budget (OMB) for budgeting consideration. OMB will determine how the proposed project relates to the policy and programs of the President. Upon receiving OMB advice, the ASA(CW) will transmit the report to Congress for authorization. Authorizing legislation normally references the recommendation outlined in Chief of Engineers Report.

I am available to meet with you to further discuss your concerns if you are so inclined. If you require further assistance, please feel free to contact me or Mr. Wesley E. Coleman, Jr., Deputy Chief, North Atlantic Division Regional Integration Team at 202-761-5782.

We will move forward together with you as expeditiously as possible and as prudence will allow.

Sincerely,

Merdith W. B. Temple

Merdith W. B. Temple
Major General, U.S. Army
Deputy Commanding General
for Civil and Emergency Operations

Encl

Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909
Telephone (617) 428-2800
www.massport.com

July 28, 2008

Colonel Philip T. Feir
District Engineer
New England District
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Re: Boston Harbor Deep Draft Navigation Improvement Project

Dear Colonel Feir:

Welcome to the New England District Office! I look forward to working with you to continue to provide safe, accessible navigation channels into the Port of Boston.

The Massachusetts Port Authority ("Massport") and the U.S. Army Corps of Engineers ("the Corps") New England District have had a long and productive history of working together to deepen and maintain the Port of Boston's navigation channels and we look forward to continuing this partnership under your leadership. We greatly appreciate the ongoing hard work of your staff on the Boston Inner Harbor Maintenance Dredging Project (BIHMDP), which is currently underway in the harbor, as well as on the Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP), for which the Final Feasibility Report/Supplemental Environmental Impact Statement/Environmental Impact Report ("Final FR/SEIS/EIR") will be submitted for public review in the coming weeks.

Massport has reviewed the Final FR/SEIS/EIR for the BHDDNIP. We concur with the report's conclusions and support the Recommended Plan of Improvement. Specifically, the following four improvements to Boston Harbor's system of General Navigation Features are proposed:

1. Deepen the federal navigation channels from Massachusetts Bay to Massport's Conley Container Terminal in South Boston to enable deeper draft containerships to access the Port. A depth of -50 feet at mean lower low water (MLLW) would be provided in the Broad Sound North Entrance Channel, and 48 feet in the Main Ship Channel between the Outer Confluence and the Reserved Channel, the President Roads Anchorage, the lower Reserved Channel, and the Reserved Channel Turning Area. The Main Ship Channel above the Roads would be widened to 900 feet below Castle Island and 800 feet above Castle Island, with additional width provided in the bends of the Main Ship and North Entrance Channels. Massport would deepen the two active berths at Conley Terminal to a depth of at least three feet greater than that provided in the improved channel.

2. Extend the deepening of the Main Ship Channel above the Reserved Channel Turning Area to the Massport Marine Terminal, at a depth of -45 feet MLLW and width of 600 feet. Massport or our tenant at this facility would provide a depth of at least -45 feet MLLW in the berth at the Marine Terminal. We understand this recommended improvement is contingent on development of an active bulk cargo operation requiring the deeper channel prior to initiation of construction for the deeper channel.

3. Deepen an approximately 9-acre area of the 35-foot lane of the Mystic River Channel to -40 MLLW feet to improve access to Massport's Medford Street Terminal in Charlestown. Massport has already deepened the berth at this terminal to -40 feet MLLW and would maintain that depth in the future. We understand this recommended improvement is also contingent on development of an active bulk cargo operation requiring the deeper channel prior to initiation of construction for the deeper channel.

4. Deepen the existing 38-foot Chelsea River Channel to -40 feet MLLW. The channel would be widened by about 50 feet along the East Boston shore in the bend immediately upstream of the McArdle Bridge and in the bend downstream of the Chelsea Street Bridge. The channel would also be widened through the new navigation opening of the Chelsea Street Bridge. We understand this recommended improvement is contingent on replacement of the Chelsea Street Bridge by the Commonwealth of Massachusetts and the City of Boston, and the agreement of the five principal Chelsea River marine terminals to deepen their berths to at least -40 feet MLLW.

All of these improvements are integral to ensuring the future vitality, safety and security of the Port of Boston. The Port of Boston is New England's only full service port, providing infrastructure and value-added services to enhance the competitiveness of New England trade-dependent companies, and ultimately benefitting New England residents and consumers. The Port generates an estimated 34,000 total jobs and $2.4 billion annual economic impact to the Commonwealth of Massachusetts and the New England region, and provides significant environmental benefits by reducing the number of trucks and related air emissions on the region's roadways. Key port cargos include containerized cargo, petroleum products, and dry bulk cargo (automobiles, cement, road salt, gypsum and scrap metal) – most of which will benefit from the proposed improvements.

Of particular importance to Massport is the channel deepening to Conley Terminal. Container volumes at Conley have increased 50 percent since 1995, and we expect annual volumes to more than double by 2025 to exceed 500,000 TEUs. The shipping lines calling Conley continually seek to bring larger ships into their east coast rotation. If the Port of Boston cannot accommodate the deeper draft vessels, the lines will not call Boston and the cargo will need to be trucked into the region from other ports resulting in significant economic and environmental impacts.

Massport is actively working to increase our terminal capacity, efficiency and minimize our environmental impact to allow us to accommodate our projected future growth. Specifically, we have completed or are actively working to:

- Complete a $25 million repaving and equipment purchasing project to increase our terminal capacity by 50 percent;
- Implement a terminal productivity improvement program and acquire an upgraded terminal operating system;
- Maximize the container handling footprint of Conley Terminal and purchase three additional dockside cranes and more yard equipment to support the increased vessel activity;
- Purchase the former Coastal Oil Terminal abutting Conley to preserve our future terminal expansion options;
- Implement a comprehensive ISO 14001 Certified Environmental Management System (this was completed in 2003 - the first container terminal in the U.S. to achieve this milestone, and a model for other ports);
- Retrofit our existing yard equipment and purchase new "greener" equipment to reduce air emissions; and
- Convert all of our yard equipment to Ultra Low Sulfur Diesel to reduce air emissions.

Contingent on the approval of Massport's Board and appropriation of the needed funding by our Board, the Commonwealth of Massachusetts or other funding sources, Massport intends to enter into a Design Phase agreement to share the cost of project design with the Corps. Design Phase activities are expected to commence in early 2009 and be completed in early 2011. We understand the Design Phase cost for the Federal project features is estimated at $5,634,000, with Massport responsible for an initial 25 percent, or $1,408,500 plus an additional 10% or $563,400 prior to or after construction for a total design non-Federal cost share of $1,971,900.

We further understand that the Construction Phase costs for the Federal project features is estimated at $297,805,000 with the non-Federal sponsor responsible for an initial cost share of $97,885,000 based on: (1) division of cost-sharing between the cost of deepening the channels to 45 feet requiring a 25 percent cost share and the cost of deepening the channels beyond 45 feet requiring a 50 percent cost share; plus (2) the remaining non-Federal share of Design Phase costs allocated to deepening beyond 45 feet. The non-Federal sponsor will also provide an additional ten percent of the total design and construction costs at the completion of construction, currently estimated at $30,344,000. We understand that, contingent on Congressional authorization of the project and appropriation of Federal funds, that construction could begin as early as 2011. Massport intends to actively pursue funding for the non-Federal project costs, and to serve as the non-Federal sponsor, contingent on approval by our Board and appropriation of adequate funds.

Subject to the approval of Massport's Board and provision of the needed funding by our Board or other funding sources, Massport also intends to fully fund any work performed by the Corps for design and construction activities associated with berth dredging, and will provide all lands, easements, rights of way and relocations (LERR) required for construction

and future maintenance of the project. We further understand that any LERR costs incurred by Massport for construction of the project, currently estimated at $165,000, will be credited against the 10 percent post-construction share of project costs.

Massport is a legislatively-chartered independent State authority. Massport owns and operates Logan International Airport, the Tobin Bridge, the Conley Container Terminal, the Black Falcon Cruise Terminal, and several other bulk cargo terminals. Massport has the statutory authority to set and collect fees for the use of its facilities, enter agreements for lease and operation of facilities, and issue bonds to raise funds for capital improvements of its facilities.

Massport is the non-Federal Sponsor for the BHDDNIP Feasibility Study, the 1990-authorized deepening of the harbor's major tributary channels constructed in 1998-2001 (the Boston Harbor Navigation Improvement Project), and construction of the confined disposal cells being constructed in the harbor for the ongoing BIHMDP. Massport has reviewed the cost-sharing and other responsibilities of the Sponsor as detailed in the Feasibility Report. Massport intends to work with the Commonwealth and other potential funding sources to provide the non-Federal share of design and construction of the improvements recommended in the Feasibility Report. The completed "Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents" is attached to this letter, as requested by the Corps.

We look forward to continuing to work with you and your staff on this exciting and critical project for the Port of Boston.

Sincerely,

Michael A. Leone
Port Director

Enclosure: Non-Federal Sponsor's Self-Certification of Financial Capability for Decision Documents

cc: Louis Elisa, Seaport Advisory Council

dh/wordfile/dredge2/ddnip/Massport FFR letter – July 2008.doc

From: Rogers, Catherine J NAE
To: "Julie.Crocker@Noaa.Gov";
cc: Habel, Mark L NAE; Keegan, Michael F NAE; Mackay, Joseph B NAE; Kammerer-cody, Denise E NAE;
Subject: RE: boston
Date: Monday, July 21, 2008 9:19:13 AM

Julie,

Thanks much for the quick response!

Thanks,
Catherine J. Rogers
Environmental Resources Section
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone - (978) 318-8231; Fax - (978) 318-8560
catherine.j.rogers@usace.army.mil

-----Original Message-----
From: Julie.Crocker@Noaa.Gov [mailto:Julie.Crocker@Noaa.Gov]
Sent: Monday, July 21, 2008 9:17 AM
To: Rogers, Catherine J NAE
Subject: boston

Hi Cathy.

I did receive your letter re. the blasting and the information looks like just what we were looking for - thank you! I've drafted a response concurring with the Corps' not likely to adversely affect determination. I noted on the clearance sheet that there needed to be a quick review so hopefully I will have it soon...I'll email a PDF of the signed letter as soon as I have it.

Thanks again for taking the time to put together all the info that is in the letter.

Julie

BOSTON HARBOR DOCKING PILOTS
36 NEW STREET EAST BOSTON, MA 02128
1-800-836-8847

July 17, 2008

Mr. Michael Keegan
Army Corp. o Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: EOEA #12958

Dear Mr. Keegan

I thank you for your recent help in directing me with regard to comments on the Boston Harbor Deep Draft Navigational Project. For the purposes of this letter I am directing comments towards Plan "F" or the Chelsea River area. I do understand that the comment period is closed but would appreciate your considering my comments nevertheless.

As a brief introduction so you can better understand from whom these comments are coming, please allow me to provide you a short description of our position in the Port of Boston. As a group we provide pilotage service to a large percentage of all vessels calling at Chelsea River terminals. Our pilots have many years experience and many thousands of transits in this river. Verification of this can be attained from the terminal operators, vessel owners and the USCG.

I appreciate the Area "F" plan and agree with the proposed changes as described. However, I see a potential for a future situation which may create a new congestion problem for the upper Chelsea River. I understand, of course, that all of this depends on the replacement of Chelsea Street Bridge.

At present we have a congestion problem that arises when large vessels are moored at the Conoco Terminal which creates a situation where other vessels do not have enough room to safely transit past. This problem is **not** solely created by the Chelsea Street Bridge but additionally by the channel width and the turn prior to the Conoco terminal, as well. This is an example which would be envisioned further up the river in the area of the Gulf Terminal.

At present the maximum size of vessels transiting the upper reaches of the Chelsea River is set at 90' (due to Chelsea Street Bridge regulations). At present, passage of one large vessel past another moored at the Gulf terminal is a challenging maneuver with little room for error. We are able to accomplish this maneuver safely but we believe any increase in vessel beam past 90' and possibly to 106' (panamax) would be unsafe without widening the Federal channel.

In 2007 we piloted 44 ships with a 90' beam into the Gulf Chelsea Terminal. As the average panamax vessel's discharge time is 30 – 36 hours the terminals above the Gulf Terminal could potentially be looking at up to 66 days of delay time each year to vessels calling at their facilities. This would not be an economic improvement for these terminals. Because it would seem the driving force behind the Bridge replacement project and this dredging project is both economic and safety driven and would suggest allowing larger vessels to move in an out of the entire river (an idea we don't completely agree with) we would like to propose that the Area "F" plan include a widening of the federal channel on the east side of Chelsea River adjacent to the Gulf Terminal.

With the potential reduction of the safe usable channel by as much as 32' (2 panamax vessels at 106' of beam each) we believe that the federal channel should be widened by a least 50' directly abeam of the Gulf Terminal and another 200' along the length of the channel both up and down stream.

Thank you for considering our comments.

Best Regards,

Captain George Lee
President – Boston Harbor Docking Pilots
36 New Street
East Boston, Ma 02128
gelee@comcast.net
(978)-360-6602

Habel, Mark L NAE

From: Habel, Mark L NAE
Sent: Sunday, July 13, 2008 10:53 AM
To: Habel, Mark L NAE
Subject: FW: EPA's January 8, 2008 Proposed General Conformity Revisions.

Attachments: 20080108_NPRM_fs.pdf; Proposed Rule_Revisions to General Conformity Regulations_73 FR 1402 1428 01082008.pdf

20080108_NPRM_f s.pdf (29 KB)

Proposed ile_Revisions to Gen

-----Original Message-----
From: Williamson.Tim@epamail.epa.gov [mailto:Williamson.Tim@epamail.epa.gov]
Sent: Friday, July 11, 2008 4:57 PM
To: Rogers, Catherine J NAE
Cc: cooke.donald@epamail.epa.gov; Timmermann.Timothy@epamail.epa.gov; Higgins.Elizabeth@epamail.epa.gov
Subject: Fw: EPA's January 8, 2008 Proposed General Conformity Revisions.

Hi Catherine,

Per our conversation this morning, my colleague Donald Cooke assembled the information below concerning EPA's proposed modifications to our conformity regulations. His note nicely summarizes and presents the substance, but let me re-emphasize two procedural points:

1. The timing of any final regulation is very uncertain. It's currently slotted for Feb 09, but that assumes a new administration will jump on these changes and get them out within a month of taking office.
I'll let you be the judge of how likely that is.

2. These are only proposals; a lot could change in the final regulation. Again, note that the final will be issued by the next administration in all likelihood.

Hope this helps.

Tim Williamson
Office of Regional Counsel
EPA New England
617-918-1099
----- Forwarded by Tim Williamson/R1/USEPA/US on 07/11/2008 04:53 PM -----

Donald Cooke/R1/USEPA/US		To
	Tim Williamson/R1/USEPA/US@EPA	
07/11/2008 10:48 AM		cc
		Subject
	EPA's January 8, 2008 Proposed General Conformity Revisions.	

General Conformity Regulations.

On Tuesday, January 8, 2008, EPA proposed revisions to the General Conformity Regulations (73 FR 1402 — 1428). Depending on the timing of the Final Environmental Impact Statement and the Army Corps of Engineers' General Conformity Determination, the Corps of Engineers may be able to take advantage of the flexibility and benefits offered by a revised final general conformity rule.

The purposes of the above comment was to alert the Corps of Engineers to potential changes which could help the COE in satisfying its general conformity requirements. EPA's Spring 2008 - Semi Annual Regulatory Agenda lists a Final Rule "Revisions to the General Conformity Regulations" action date for February 2009, which is subject to change.

I have attached a copy of EPA's fact sheet as well as a copy of the January 8, 2008 Federal Register Proposed Rule for you information,
(See attached file: 20080108_NPRM_fs.pdf) (See attached file: Proposed Rule_Revisions to General Conformity Regulations_73 FR 1402 1428 01082008.pdf)

In addition I have identified a number of proposed changes in the proposed rule which may be of interest with respect to the Boston Harbor Project.

- The EPA is proposing additional categories of actions that Federal agencies can include in their "presume to conform" lists and EPA is also proposing to permit States or Tribes to establish in their General Conformity SIPs or TIPs "presume to conform" lists for actions within their State or Tribal area.

- EPA is proposing to allow, under certain conditions, the State and Federal agency to negotiate alternate schedules for the implementation of the offsets and mitigation measures. The EPA is proposing a new section (40 CFR 93.163) to allow alternate schedules for mitigating emissions increases. The mitigation timing approach could allow some flexibility for Federal agencies and States or Tribes to negotiate a program for some emissions mitigation to occur in future years. States or Tribes could consider this approach to accommodate short term increases in emissions if there is a substantial long-term reduction in emissions.

- The EPA is proposing to allow Federal agencies to obtain emission offsets for general conformity purposes from another nearby nonattainment or maintenance area of equal or higher nonattainment classification provided the emissions from that area contribute to violation of the NAAQS in the area where the Federal action is located or in the case of maintenance areas, the emissions from the nearby area contributed in the past to the violations in the area where the Federal action is occurring.

- Several Federal agencies and other parties involved in the process suggested that EPA should consider exempting construction activity emissions from the conformity regulations requirements. Although the existing General Conformity Regulations do not specifically mention construction emissions,

they implicitly require Federal agencies to include emissions from construction activities in the conformity evaluation.

The EPA understands the concerns of the other Federal agencies and in the discussion about the revision to the definition of ''caused by,'' has identified a number of ways that Federal agencies can work with the State, Tribe, and local agencies to ease the burden of reviewing construction emissions. In addition, EPA is seeking comment on the possibility of exempting short-term construction projects from the General Conformity Regulations. One option would be to define short-term emissions as lasting no more than 2 years. Another option would be to define short-term emissions consistent with how they are defined for Transportation Conformity. Currently under the Transportation Conformity regulations, construction emissions are not required to be included for construction that lasts no longer than 5 years at individual sites

- The EPA is proposing to allow States or Tribes to include an enforceable commitment in the SIP or TIP to address future emissions from a Federal action.

Donald O. Cooke, Environmental Scientist U.S. Environmental Protection Agency EPA New England Regional Office One Congress Street, Suite 1100 (CAQ) Boston, Massachusetts 02114-2023

Telephone (617) 918-1668
Fax # (617) 918-0668
E-Mail cooke.donald@epa.gov

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

July 8, 2008

Engineering/Planning Division
Evaluation Branch

Mr. Robert Varney, Regional Administrator
U.S. Environmental Protection Agency, Region 1
1 Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Varney:

This letter is written in response to your comments dated May 23, 2008 on our Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement/Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. In addition to complying with the National Environmental Policy Act (NEPA), the SEIS/EIR also serves the State and Massport's needs for a Massachusetts Environmental Policy Act (MEPA) document.

Your office rated the Draft SEIS/EIR sections on dredged material disposal at the Massachusetts Bay Disposal Site (MBDS) and capping of the Industrial Waste Site as L0-1 "Lack of Objections-Adequate", in accordance with EPA's national rating system. However, a rating of E0-2 "Environmental Objections-Insufficient Information" was given for aspects of the project relating to impacts from blasting of ledge rock to deepen the port's channels, and for potential impacts from the proposal to beneficially use the blasted rock to create rock reefs in Massachusetts Bay as habitat enhancement. This letter responds to your three general comments regarding impacts from:

1. blasting,
2. our proposal to beneficially use the rock removed from the deepened navigation channels as habitat enhancement, and,
3. air quality conformity requirements.

In addition, EPA's concern that these issues would not be addressed in full until the design phase of the project, which is after the issuance of the Final SEIS/EIR and the closure of the NEPA process, is also discussed below. More specific comments submitted by EPA are addressed in our response to comments in the Final Feasibility Report and SEIS/EIR. A comment and response table covering the issues raised by your letter is enclosed. This text will be included in the revised Public Involvement Appendix to the Final Feasibility Report and SEIS/EIR. Also, commitments on specific topics will be included in the design phase scoping section of the Final Feasibiiity Report and in the Final SEIS/EIR.

The Corps civil works process and project phasing, and the relationship to the NEPA process was discussed with the agencies in the Technical Working Group meetings, most recently on May 19, 2008, and also with your staff in a conference call on July 1, 2008. Large Corps civil works projects of this nature require specific Congressional action (authorization and/or funding) at each phase of project investigation and development: including reconnaissance, feasibility, design, and construction. The feasibility phase, for which this report and SEIS/EIR have been prepared, is intended to answer the request by Congress for a report and recommendation on whether Federal involvement in further navigation project improvements to Boston Harbor is warranted. This includes providing a specific recommendation on proposed project features, and an estimated cost for design and construction of those improvements. The feasibility phase has investigated the proposed navigation improvements to the level of detail necessary to answer the Congressional request for a Feasibility Report and the requirement to satisfy NEPA with the public release of the SEIS.

A Record of Decision (ROD) would be issued by the Assistant Secretary of the Army for Civil Works once the draft Chief of Engineers Report, which includes the Final Feasibility Report and SEIS/EIR, is reviewed at the Federal cabinet level and by the public. The State would also need to approve the project before a ROD is released. The Chief of Engineers Final Feasibility Report would then be forward to Congress for approval. Upon receipt of funding, the project would advance into the design phase (Planning, Engineering and Design, or PED). The design phase will cover the following tasks:

1. complete any necessary field investigations to support detailed design of the project,
2. prepare and publish for public review any needed supplemental NEPA/MEPA documents to present design phase investigations and any project design changes,
3. secure any required regulatory approvals, and
4. prepare the documents necessary to solicit bids for construction of the project.

The Feasibility Report includes a list and estimate of the costs of several tasks to be undertaken in the design phase. These include: subsurface investigations to define the exact nature of hard materials at depth and differentiate between rock and other materials; development of several "plans" in consultation with the Technical Working Group as detailed below (blasting plan, project sequencing plan), further investigation(s) and recommendation(s) on potential beneficial uses of rock and other dredged material, and development of monitoring plans for various aspects of the project.

The design phase investigations will yield additional detailed data on several technical issues and topics as listed below. At this time the following principal study areas are expected to include:

- Design Phase subsurface investigations, revised dredged material quantities and subsequent preparation of the blasting plan.
- Design Phase resource characterization efforts and dredge area baseline monitoring to allow for impact and recovery assessment of the benthic, fisheries, and shellfish resources.

- Detailed construction sequencing plan employing the dredged materials estimates, blasting plan and resource characterization effort.
- Air Quality emissions conformity evaluation to determine if there are any cost-effective alternatives available to meet the emissions requirements other than construction period shutdowns. Availability and cost of emission credits and offset opportunities will be investigated. Adjustments to the construction sequencing plan would be made according to the selected final plan of meeting air quality requirements.
- Beneficial use opportunities for rock. Once final rock quantities, types and locations are identified, the potential for beneficial use other than rock reef creation will be further investigated with the State and local communities.
- Additional opportunities for the creation of rock reef habitat will be further investigated with the NMFS, EPA, the State, and other interested TWG members. Modification to site selection locations, site investigations, reef design, placement methods, and post-construction monitoring will be developed in coordination with affected resource agencies.
- The use of dredged material to cap the former Industrial Waste Site will be evaluated. This will require U.S. EPA to prepare a NEPA document to permit placement of these materials as cap at that site.

The information generated by the above investigations may result in changes to the Federal project base plan, which would require preparation of one or more supplemental NEPA and MEPA documents. These document(s) will present the findings and recommended actions consistent with the investigations initiated during the design phase and subsequent negotiations with the Federal and State agencies, and other TWG participants. This will allow for public review and input into the design of the project. If as a result of the above investigations it is determined that additional mitigation is required beyond what has already been identified in the SEIS/EIR, then additional Federal and/or Sponsor funding would be sought to cover those costs as part of the project.

Any questions or comments can be addressed to Ms. Catherine Rogers at 978-318-8231 or the study manager, Mr. Mark Habel at 978-318-8871.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

June 30, 2008

Engineering/Planning Division
Evaluation Branch

Ms. Mary Colligan, Assistant Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, Massachusetts 01930-3097

Dear Ms. Colligan:

This letter is written in response to your letter dated June 2, 2008 requesting reinitiation of Section 7 consultation pursuant to the Endangered Species Act for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. Your letter states that our initial description of the project indicated that only two to six million cubic yards (cy) of material would be removed, as opposed to the 12.1 million cy currently proposed for removal, and that we did not indicate that blasting would be necessary. As requested in your letter, we are providing your agency with a determination of effects to listed species in the project area from the additional dredging as well as from the proposed blasting. Potential effects to listed species to be analyzed include underwater noise resulting from blasting, and project information on timing, sequencing, and monitoring.

Federally listed species that can be found in Massachusetts waters include three species of threatened or endangered sea turtles and three species of endangered whales. The sea turtles in Massachusetts nearshore waters are typically small juveniles. The most abundant being the Federally threatened loggerhead (*Caretta caretta*), followed by the Federally endangered Kemp's ridley (*Lepidochelys kempi*), and the Federally endangered leatherback sea turtle (*Dermochelys coriacea*). Green sea turtles (*Chelonia mydas*) may occur in New England waters, but are rare. Sea turtles are known to occur in Massachusetts Bay. While no surveys for sea turtles have been conducted in Boston Harbor, NMFS believes that suitable forage and habitat exists in this area and is likely that sea turtles occasionally visit Boston Harbor.

The Federally endangered North Atlantic right whale (*Eubalaena glacialis*), and humpback whale (*Megaptera novaeangliae*) are not considered residents of Boston Harbor, but on occasion entered the harbor as they complete seasonal migrations in nearby Massachusetts Bay. The Fin (*Balaenoptera physalus*), Sei (*Balaenoptera borealis*), and Sperm (*Physter macrocephalus*) whales, which are also Federally endangered species, are seasonally present in New England waters, but are typically found in deeper offshore waters and are not likely to occur in Boston Harbor.

Although the amount of dredged material indicated in our letter dated March 29, 2005 has increased, the amount of time indicated to remove the material has remained the same. With construction shut-downs for air quality compliance, the recommended deepening plan would be completed in less than three years. If no construction shut-downs are needed, than the project would be completed in a little over two years. A dredging and blasting schedule based on the recommended deepening alternative with construction shut-downs was outlined in Table D2-30 of the Draft Feasibility Report and Supplemental Environmental Impact Statement/Report. However, this may change, dependent on recommendations provided by the Technical Working Group on the best sequencing plan based on project need and biological resources of concern. In either case, sea turtles have been known to be impacted from hopper dredges only, not mechanical dredges (Dickerson, et.al. 2004). As the project would only use a mechanical dredge, no impacts to sea turtles, or whales, from dredging would be expected. Impacts from blasting would be limited and are discussed in more detail below.

Please find attached a summary of background information on the anticipated range of noise impact from underwater blasting to listed species. Maps showing the distribution of large whales in Massachusetts Bay, and blasting noise areas for the outermost point of blasting in the Broad Sound North Entrance Channel are also included. As indicated in your letter, sea turtles are seasonally present in Massachusetts Bay from June through November, but are not known to be present in Boston Harbor. As there have been no known sitings of sea turtles in Boston Harbor reported to the Corps by the resource agencies, it is likely that a sea turtle in the Boston Harbor navigation channels would be rare.

Based on our calculations and analysis of effects on listed species, and the distribution of whales and sea turtles in the project area, we believe that the Boston Harbor Deep Draft Project would not likely adversely affect listed species. To further reduce potential impacts to threatened and endangered whales and sea turtles in the project area, the following mitigation measures will be implemented. A marine mammal and sea turtle observer will be present any time blasting in the harbor is to occur. Blasting will not occur while marine mammal(s) or sea turtle(s) are present within the safety zone. If blasting needs to occur to prevent injury to humans, and a marine mammal or sea turtle is present within the safety zone, then efforts will be made to encourage the animal to move from the area or other efforts, based on recommendations from the marine mammal and sea turtle observer. In addition, all disposal scows will follow the protocols for disposal at the Massachusetts Bay Disposal Site or Industrial Waste Site to prevent ship collisions with whales, in particular the North Atlantic Right Whale, and sea turtles. There have been no past occurences of collision of disposal vessels with whales. In addition, the Contractor will be required to monitor the Right Whale Listening Network for information on Right Whales detected near the shipping lanes.

We request your response by July 18, 2008 confirming our conclusion that the Boston Harbor Deep Draft Project would not likely adversely affect listed species would be appreciated so that we can meet our commitment to the Civil Works Review Board. Any questions or comments can be addressed to Ms. Catherine Rogers at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Habel, Mark L NAE

From: Keegan, Michael F NAE
Sent: Tuesday, June 10, 2008 8:54 AM
To: Habel, Mark L NAE
Subject: FW: Emailing: 10461-1

Attachments: 10461-1.TIF

10461-1.TIF (504 KB)

FYI

-----Original Message-----
From: Connolly, Marianne [mailto:Marianne.Connolly@mwra.state.ma.us]
Sent: Thursday, May 22, 2008 8:42 AM
To: Keegan, Michael F NAE
Subject: FW: Emailing: 10461-1

<<10461-1.TIF>> Hi Mike,
It seems that the wastewater siphons are safe. Just fyi.

Who is the proponent for the Bridge replacement? I need to get our engineering folks to talk to them? Is it Mass Highway? Or the City?
Thanks,
Marianne

-----Original Message-----
From: Flynn, Terrence
Sent: Thursday, May 22, 2008 8:07 AM
To: Connolly, Marianne
Subject: Emailing: 10461-1

Here is a drawing of the wastewater siphons crossing the river. I think the siphon shown on the Section 38 drawing has been abandoned. This drawing shows the wastewater siphons at approximately 50 below mean low water.

Terry
x5734

PART 3

CORRESPONDENCE RECEIVED DURING PUBLIC REVIEW OF THE DRAFT FEASIBILITY REPORT AND DSEIS/DEIR

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

OFFICE OF THE
REGIONAL ADMINISTRATOR

May 23, 2008

Curtis L. Thalken, Colonel
District Engineer
ATTN: Programs and Project Management Division (Mr. Michael Keegan)
696 Virginia Road
Concord, Massachusetts 01742-2751

RE: Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) for the Boston Harbor Deep Draft Navigation Improvement Dredging, Boston, Massachusetts (CEQ # 20080143)

Dear Colonel Thalken:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, we have reviewed the U. S. Army Corps of Engineers, New England District (Corps) Draft Supplemental Environmental Impact Statement (DSEIS) for the Boston Harbor Deep Draft Navigation Improvement Dredging project proposed in various areas of Boston Harbor.[1] The DSEIS was prepared by the Corps in partnership with the Massachusetts Port Authority (Massport).

The DSEIS details Massport's goal to establish a deeper channel for access to the Conley Container Terminal in South Boston and to make port improvements in the Mystic and Chelsea Rivers and in the Main Ship Channel above the Reserved Channel. The proposed channel deepening is intended to help reduce tidal delays currently experienced by containerships and bulk carriers that use Boston Harbor. Other anticipated improvements beyond the Corps work to deepen the Federal channels would include work by Massport to deepen vessel berths at the Conley and Marine terminals. The project is expected to generate a total of 12.1 million cubic yards of non-rock dredged material (parent material) and 1.2 million cubic yards of rock.

The DSEIS proposes disposal of the majority of the dredged material at the Massachusetts Bay Disposal Site (MBDS)[2] and proposes the use of some of the non-rock dredged material (parent material) as cover at the former Industrial Waste Site.[3] Based

[1] This letter serves as our comment on the DSEIS and the Draft Environmental Impact Report prepared under the Massachusetts Environmental Policy Act.

[2] The MBDS is approximately 17 nautical miles east of the entrance to Boston Harbor adjacent to the Stellwagen Bank National Marine Sanctuary.

[3] The Industrial Waste Site is located 20 miles east of Boston in 300 ft. of water.

on our review of the information contained in the DSEIS, EPA has no objections to use of the MBDS for disposal of the dredged material. Also, EPA has no objection to the use of parent material as cover at the former Industrial Waste Site, and we view the proposed capping plan as an opportunity to further reduce the remaining risk associated with waste barrels that may still exist at the site.

We focused our review of the DSEIS on air quality impacts, removal of rock in the project area by blasting, and the potential for beneficial reuse of rock material to construct rock reefs. Each of these issues is discussed to varying degrees in the DSEIS. These issues are discussed below and in detail in the attachment to this letter.

The DSEIS describes a range of potential impacts to air quality that are directly related to the type of dredging equipment utilized and the duration of the work, and proposes a multi-year dredging/construction schedule in order to keep annual emissions low enough to avoid triggering the offset requirements of the Clean Air Act general conformity regulations. We are concerned that the DSEIS focuses on avoiding the need to offset emissions without a vigorous examination of the possible cost to the marine environment as a result of lengthening construction schedules to reduce annual emissions. We request that the Corps provide a full analysis of the environmental tradeoffs and costs of avoiding triggering the air emission offsets. In addition, this analysis should include developing contract provisions to require the cleanest construction equipment available and fully consider offsets as a means to reduce the in-water construction time/marine impacts of the project. We are also concerned that as currently written, the DSEIS postpones the determination on the use or viability of emission credits/offsets until the design phase after completion of the NEPA process and Record of Decision. We do not support this approach because we believe the issue should be fully vetted for public review as part of the EIS. We recommend that the Corps work closely with EPA and other interested state and federal stakeholders to resolve this issue in advance of the publication of the FEIS.

Comment EPA #1

In addition to unresolved air issues the DSEIS lacks information to fully describe the potential impacts associated with proposed rock blasting and the creation of rock reefs--a proposed beneficial use of the dredge material. At a May 19, 2008 interagency meeting the Corps reported that the final extent and amounts of the proposed blasting will not be made known until sometime after the Spring of 2009 when extensive borings will be conducted to characterize the type and quantities of the rock to be removed, and that more specific discussions regarding how the material will be removed will not be possible until that point.

Comment EPA #2

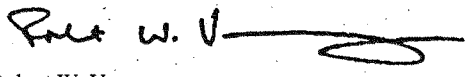
We are concerned that there is only limited information in the DSEIS regarding the potential for impacts and whether measures can be implemented to successfully minimize and mitigate blasting impacts, and that the Corps does not intend to fully address this issue until post EIS design and permitting. In addition, we are also concerned that only limited information is included in the DSEIS regarding the establishment of rock reefs, not enough information to inform a decision whether the proposed sites and potential impacts are acceptable. Our comments in the attachment recommend the establishment

of two advisory panels comprised of state and federal stakeholders (and others as appropriate) to address these outstanding issues.

EPA appreciates the opportunity to offer comments on the DSEIS and encourages the Corps to work closely with EPA and other interested federal and state agencies and other stakeholders to develop strategies to effectively address the air and marine impacts associated with the proposed project. We have rated the disposal of the dredged material at the MBDS and capping of the Industrial Waste Site LO-1 "Lack of Objections-Adequate", in accordance with EPA's national rating system, a description of which is attached to this letter. Moreover, based on a lack of information relative to the extent and impacts of blasting and the proposal to create rock reefs we have rated those aspects of the EIS EO-2 "Environmental Objections–Insufficient Information." We look forward to working with the Corps to resolve these issues and suggest a meeting to discuss our comments more fully. Please feel free to contact Timothy Timmermann of the Office of Environmental Review at 617/918-1025 to set up a meeting.

Comment EPA #3

Sincerely,



Robert W. Varney
Regional Administrator

Attachment

cc:

MEPA Unit

Summary of Rating Definitions and Follow-up Action

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potentially unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2--Insufficient Information
The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

Additional Detailed Comments on the Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) for the Boston Harbor Deep Draft Navigation Improvement Dredging, Boston, Massachusetts

Marine Issues

Blasting

According to the DSEIS, the project will result in the removal of between 450,000 and 1,400,000 cubic yards of rock through dredging and blasting. The duration and magnitude of blasting described in the DSEIS is of a scope that has the potential for serious and significant impacts to fish and marine mammals. The DSEIS highlights the multiple fish kills that resulted from blasting performed in Boston Harbor last fall despite the implementation of preventative measures. Based on that experience, we view the blasting as the most significant source of risk for impact to marine organisms associated with the project. While we understand the difficulty of quantitatively predicting impacts from blasting, we believe that significant effort will be required to develop an acceptable plan to minimize the impacts of blasting on the wide range of marine organisms in Boston Harbor. We appreciate the Corps' and Massport's commitment in the DSEIS to work with federal and state agencies to develop approaches to minimize impacts from blasting. In order for this project to move forward, we believe that the Corps and Massport should:

- **Continue their work to establish an interagency underwater technical working group.** We recommend that the Corps work closely with the working group to identify, discuss and evaluate measures that could be implemented to minimize blasting impacts. These measures should include, but not necessarily be limited to, technological fixes, sequencing, time-of-year restrictions, and examination of whether or not the limits of the channel could be shifted as a means to avoid the areas of rock. We strongly encourage the Corps to establish the working group immediately so that the group's work can be incorporated into the FEIS. We also note that the Draft Feasibility Report (page 186) explains that it may be possible to rip (remove) the bedrock with a large toothed bucket mounted on an excavator. According to the analysis, the viability of that alternate removal method (and the overall magnitude of impacts expected from the rock removal component of the project) will not be known until the design phase of the project. We believe that the development of this critical information should proceed now and be presented in the FEIS, not delayed to the design phase of the project outside of the NEPA/MEPA review process. If the development of that information is delayed and information regarding the impacts of rock removal will be developed after the current NEPA process, the Corps should explain how the information will be made available to the agencies and public for review and comment through a supplemental NEPA process. We also recommend that the

Comment EPA #4

working group be maintained throughout the life of the blasting component of the project to help address any unforeseen developments should they arise. As part of the process we recommend that the working group be convened or informed on a regular basis to gauge success of control measures and review project progress (based on the reported results of the monitoring program described below). Rock removal techniques should be revisited as necessary when additional detailed geologic information becomes available.

Comment EPA #4

- **Commit to an extensive monitoring program spanning the entire project life cycle that will provide real-time information on the impacts of blasting.** The monitoring program should be developed in consultation with the working group and should include reporting protocols to explain the chain of events should large fish kills or marine mammal impacts occur as a result of blasting. EPA looks forward to working with the Corps and participating on the working group to help develop the protocols, including those regarding notification of the group following notable events. The working group in conjunction with the Corps and Massport will then explore options for response actions, operational changes, or additional minimization measures, if they are indicated.

Comment EPA #5

- **Work to make sure that the public is kept fully informed of the blasting program and working group discussions as the project advances.** We recommend that the Corps also consider inviting interested members of the public and industry to join the working group. Transparency in this part of the process will be critical given that the DSEIS does not include complete impact information related to rock removal for the project.

Comment EPA #6

Beneficial Reuse

The DSEIS presents the Massachusetts Bay Disposal Site (MBDS) as the preferred method of disposal for the non-rock dredged material. The DSEIS also provides preliminary information regarding the potential beneficial reuse (disposal) of some or all of the parent material to cap areas of the Industrial Waste Site and use of the blasted rock material to create rock reefs. EPA does not object to the disposal of project generated dredged material at the MBDS. And, in general, we support the Corps and Massport investigation of the potential to beneficially reuse a portion of the dredged material generated by the project.

Comment EPA #7

With respect to the plan to cap areas of the former Industrial Waste Site we note that the risk of a fisherman recovering an intact waste barrel to the surface is fairly remote because the area is technically closed to fishing and many of the barrels have already corroded. Therefore we view the proposed capping plan as an opportunity to further reduce the remaining risk.

Comment EPA #8

With respect to the proposal to establish rock reefs, we support the concept of habitat restoration and enhancement; however, we have concerns about the locations selected for reef development and believe that significantly more information needs to be developed to fully understand the potential for impacts from this use proposal. The DSEIS states that reefs encompassing between 186 and 518 acres could be constructed at the Broad Sound or Massachusetts Bay sites. We have concerns about these particular sites due to the large size of the proposed reefs and the habitat functions these areas now appear to perform. The DSEIS describes the geomorphology of Broad Sound site as 43% gravel and cobble and the Massachusetts Bay site as 50% sand waves. The Corps' recent denial of the proposal to place dredged material at Winthrop Beach due to fisheries concerns (including adverse affects on cod spawning and lobsters) and comments highlighting the value of sand waves for fish in comments recently submitted by the National Marine Fisheries Service on the Minerals Management Service's Cape Wind EIS are relevant to this issue. Both of these instances support our position that the Corps and Massport need to more precisely define the potential for impacts associated with the project. As part of this additional evaluation we believe that the impacts associated with a range of reef sizes for both potential sites should be explored in the FEIS.

Comment EPA #9

EPA strongly recommends that the Corps consider establishing a separate working group comprised of federal and state agencies and other interested stakeholders to address issues associated with rock reef creation. As with the blasting issues detailed above, the results of the working group efforts related to rock reef formation should be incorporated into the FEIS for review and comment. As above, we also believe that the information should be provided during the NEPA process, not later during the design phase of the project. At this point, the DSEIS does not contain sufficient information for EPA to determine whether rock reefs will be an acceptable use of the rock material generated by the project.

Acoustic Monitoring System

The FEIS should evaluate the potential for impacts of blasting on the recently installed buoy listening and monitoring system in the Boston shipping lanes.[4] As you may know, the listening and monitoring system is designed to reduce the likelihood of ships colliding with whales by providing close to real time information to ship captains regarding the presence of whales in the shipping channel. The FEIS should include substantive information, including results of consultation with NOAA, to explain whether any proposed blasting will harm marine mammals and/or the effectiveness of the monitoring system.

Comment EPA #10

In addition, the Corps and Massport should commit to use the data generated by the buoy listening and monitoring system and contract specifications should require that barges and other construction equipment are equipped with the proper communication equipment to receive the updates.

[4] http://www.listenforwhales.org/NetCommunity/Page.aspx?pid=467

Specific comments

DSEIS page 2-25: States that monitoring of the habitat enhancement sites for several years would be important to document colonization rates and provide information for future projects. Yet, there is no commitment in the DSEIS from the Corps or Massport to fund or carry out this monitoring. We believe that if the habitat enhancement (rock reef) efforts advance, the Corps and/or Massport should fund a monitoring plan that is commensurate with the ultimate size of the reefs and is consistent with the input of the working group established to explore this issue (see above).

Comment EPA #11

Comment EPA #12

DSEIS page 3-23: EPA staff have observed European oysters within Boston Harbor along the Winthrop and East Boston shorelines.

Comment EPA #13

DSEIS page 3-83: The DSEIS notes that only transient marine mammals are found in Boston Harbor. We believe that some marine mammals (harbor seals and harbor porpoise) are regular seasonal visitors into the harbor.[5] Harbor porpoise are routinely observed around the Charles River dam in the spring during anadromous fish inward migration. They have also been observed in Chelsea Creek. Harbor seals have been observed year round throughout the harbor.

Comment EPA #14

The FEIS discusses a change in the size and number of vessels projected to come to the port as a result of the development of the project. The FEIS should calculate the change in water usage (for cooling water intake, ballast, etc.) associated with the projected fleet change.

Comment EPA #15

Comment EPA #16

Comment EPA #17

Cumulative Impacts

The FEIS should look at the cumulative impacts of additional barge traffic to MBDS to the risk of vessel collision with whales. Also, this project will cause a conversion of between 1100-1300 acres of soft-bottom to hard substrate. The FEIS should also analyze the cumulative impact to benthic habitat (from both temporary and permanent conversion) from this project and the large number of other projected projects in the harbor.

Air Quality

General Conformity

Comment EPA #18

EPA disagrees with the approach to general conformity described in the DSEIS which leaves the decision on satisfying the Clean Air Act requirements of general conformity to the design phase of the project (see page 4-51 under "Emission Credits" and page 4-75 under "Mitigation"). We believe that under NEPA the Corps has an obligation to include in the EIS the information about how general conformity requirements will be met. The general conformity provisions at 40 CFR 93.150 mandate that the Corps must make a determination that its action conforms prior to engaging in, supporting, providing financial assistance for, licensing or permitting, or approving it. We believe this requires satisfying conformity prior to issuing a Record of Decision for the project. Therefore, we

[5] Dave Wiley, PhD, personal communication, 5-16-2008.

strongly encourage the Corps to work closely with the EPA and other state and federal agencies as appropriate to develop an approach to general conformity, in a fashion that can be presented in the FEIS. We believe that leaving a determination on the use or viability of emission credits until the design phase is inappropriate.

The Corps position on its general conformity obligations presented in the DSEIS is unclear and leads to confusion, as evidenced by the statement on page 5-5 under "Environmental Compliance," which states: "*Clean Air Act, as amended, 42 U.S.C. 7401 et seq*. Compliance: The 'general conformity' requirements of Section 17[6 *sic.*] (c)(1) of the Clean Air Act, 42 U.S.C. 7506(c)(1), will be adhered to by limiting construction and using 'clean' equipment to avoid exceeding air quality standards [general conformity emission applicability thresholds *sic.*] or by purchasing emission credits."

Should the Corps ultimately adopt either Alternative 1 or 2 with Emission Reduction Option 2 (which includes replacement of older equipment with new equipment[6] and increased/spread-out dredging schedule[7]) with enforceable environmental commitments that insure the use of new equipment with more stringent EPA emissions standards, and enforceable dredging schedule, then general conformity would be satisfied by the action falling below emission thresholds. However, should the Corps select not to use equipment with more stringent emission standards and/or shorten the construction schedule, then a general conformity analysis is required. Once project emissions exceed the *de minimis* threshold all emissions of the exceeded pollutant would have to be offset or otherwise accounted for in the state implementation plan.

Comment EPA #18

Should an alternative or construction process be chosen that triggers a general conformity analysis (an alternative without emission reduction option # 2), we point out that a draft conformity analysis must undergo a public review process and a final conformity determination issued by the Corps before issuance of the Record of Decision. We are willing to work closely with the Corps to address these issues.

EPA is concerned that the Corps' has focused more emphasis on efforts to avoid triggering the offset requirements of the general conformity regulations than the need for an analysis of the relative costs and benefits of that avoidance against the other project impacts that may be worsened by stretching the construction schedule out over more years. Those impacts include but are not limited to increased aquatic impacts or

Comment EPA #19

[6] Replace all non-road equipment with newer equipment that would meet EPA Tier 2, 3 and 4 emission standards that would be required for equipment model years 2011 and beyond. (Page 4-50 and 4-51; "This environmental commitment requires replacing all non-road equipment with newer equipment that would meet EPA Tier 3 and 4 emission standards that would be required for equipment model years 2011 and beyond. The clamshell and backhoe engines would need to meet Tier 4 emissions standards and support equipment would need to comply with Tier 3 and Tier 4 emission standards, depending on the equipment category and engine size. Table 4-12 presents the Tier 3 and Tier 4 emission limits based on engine size, in horsepower. In addition, the tugboats would also have to be equipped with engines that meet EPA's Tier 2 marine engine emissions standards presented in Table 4-12."

[7] Alternative One, 45-Foot MLLW Alternative would increase the dredging six months (from 36 to 42 months) while Alternative 2, 50-Foot MLLW Alternative would increase the dredging four years (from 48 months to 73 months over eight calendar years). Air quality shutdown periods would occur every other winter.

increased costs from multiple re-deployments of equipment. EPA requests that the Corps take a hard look at these comparisons before any final decision is made to avoid one impact at the expense of increasing another. With respect to general conformity, EPA notes that offsets for a time-limited project such as this construction may be supplied using time-limited discrete emission reduction credits. The Agency is aware of at least two recent projects that have successfully secured such credits to offset emissions from construction projects. It is possible that such credits may be available in the open market, and it would be important to weigh the cost of such credits against the potential impacts and costs of an extended schedule. In addition, the analysis in Appendix O of the DSEIS does not appear to explore the option of excluding emissions of ozone precursors that occur outside the ozone season from the conformity analysis. The options for a construction schedule presented in Appendix O, Attachment A, Part 4 suggest that a substantial portion of the construction operations will occur during the winter under most of the options. If the project proponent is prepared to accept enforceable commitments that require a portion of its operations to occur outside the ozone season, those emissions attributable to non-ozone season operations may be excluded from the conformity analysis and reduce the emissions subject to the offset requirement.

Comment EPA #20

Comment EPA #21

Emission Reduction and Mitigation

EPA strongly encourages the Corps to require the use of new non-road equipment that would meet EPA Tier 2, 3 and 4 emission standards. As specified in the DSEIS's "Environmental Commitments," section 4.8.4, page 4-50, the clamshell and backhoe engines would meet Tier 4 emissions standards and support equipment would need to comply with Tier 3 and Tier 4 emission standards, depending on the equipment category and engine size. The DSEIS also notes that tugboats would be equipped with engines that meet EPA's Tier 2 marine engine emissions standards.

Comment EPA #22

EPA recommends including an enforceable commitment in the Record of Decision and specifying this environmental commitment in the contract specifications with enforceable provisions to reduce impacts on air quality, consistent with CEQ's NEPA regulations which require that the Record of Decision include mitigation as conditions in the approvals and funding for the project. 40 CFR 1505.3(a) and (b).

National Ambient Air Quality Standard Nonattainment Areas, and Attainment Areas with an Ongoing Maintenance Plan

The DSEIS identifies the project area as located in the Metropolitan Boston Interstate Air Quality Control Region (AQCR), [40 CFR 81.19]. While this is a true statement, it is more relevant in determining applicable Clean Air Act requirements to indicate that the project is in an area that has been designated nonattainment or is subject to a maintenance plan. The relevant areas for the project are the Boston-Lawrence-Worcester (E. Mass), MA moderate eight-hour ozone nonattainment area and the Boston area carbon monoxide attainment area with an associated maintenance plan.

Comment EPA #23

Table 3-11 & Table O-1 Ambient Air Quality Standards

These tables should be updated to reflect recent revisions to the ozone standard. On March 12, 2008, EPA Administrator Stephen L. Johnson signed the final rule revising the National Ambient Air Quality Standards (NAAQSs) for eight-hour ozone to a level of 0.075 parts per million (ppm), specifying the level of the primary standard to the nearest thousandth ppm. EPA also revised the secondary eight-hour ozone standard by making it identical to the revised primary standard. The Federal Register was published March 27, 2008 (73 FR 16436 — 16514) making the revised eight-hour ozone standards effective on May 27, 2008. NAAQSs can be found on EPA's web site at URL address: http://www.epa.gov/air/criteria.html.

Comment EPA #24

Eight-Hour Ozone SIP

Page 3-94 identifies the eight-hour ozone demonstration State Implementation Plan as under development. Please note that the Massachusetts Department of Environmental Protection submitted its eight-hour ozone Reasonable Further Progress (RFP) State Implementation Plan, as well as its eight-hour ozone Attainment Demonstration State Implementation Plan to EPA on January 31, 2008.

Comment EPA #25

General Conformity Regulations

On Tuesday, January 8, 2008, EPA proposed revisions to the general conformity Regulations (73 FR 1402 — 1428). Depending on the timing of the FEIS and the Corps general conformity determination, the Corps may be able to take advantage of the flexibility and benefits offered by a revised final general conformity rule.

Comment EPA #26

CD-ROM disk provided in Attachment B

Page O-11 references a marine vessel MS Excel emissions calculation spreadsheet developed by CDM which was to be included in the CD-ROM disk provided in Attachment B. Our copy of the DSEIS did not include a copy of the CD-ROM. Please submit a copy of the MS Excel spreadsheet for marine vessel emissions to EPA for review.

Page O-14 references a non-road emissions spreadsheet which was to be included in the CD-ROM disk provided in Attachment B. As noted above, our copy of the DSEIS did not include a copy of the CD-ROM. Please submit a copy of the MS Excel spreadsheet for non-road emissions. Page O-14 also references a MS Excel spreadsheet developed by CDM to calculate the on-road annual emissions, which is presented in Attachment A. Please submit a copy of the MS Excel spreadsheet for on-road annual emissions.

Finally, page O-14 references the MOBILE6.2 model input and output files which was to be included on a CD-ROM disk provided in Attachment B. Page O-18 also makes reference to the CD-ROM disk containing MOBILE6.2 input and output files. Because the CD-ROM was not included in our review copy of the DSEIS we respectfully request a copy of all MOBILE6.2 input and output files for review.

Comment EPA #27

We will review the new information contained in the spreadsheets and the CD-ROM and supplement our comments on the DEIS as appropriate based on our review of that information.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

JUN 2 2008

Colonel Curtis L. Thalken
Attn: Michael Keegan
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Ian A.Bowles, Secretary
Attn: Deirdre Buckley, MEPA Analyst
Executive Office of Energy and Environmental Affairs
Suite 900
100 Cambridge Street
Boston, MA 02114

Re: Boston Harbor Deep Draft Navigation Improvement Dredging Project, Feasibility Report and Draft Supplemental Environmental Impact Statement; Draft Environmental Impact Report

Dear Colonel Thalken and Secretary Bowles:

The National Marine Fisheries Service (NMFS) has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) and the Commonwealth of Massachusetts' Draft Environmental Impact Report (DEIR) for the Boston Harbor Deep Draft Navigation Improvement Dredging Project. This project involves the improvement dredging of approximately 12.1 million cubic yards (cy) of material from the Broad Sound entrance channel, the Main Ship channel, the Reserved channel, the Mystic River channel, and the Chelsea River channel. Dredged material from the proposed project will be placed at Massachusetts Bay Disposal Site (MBDS). In addition, approximately 1.2 million cy of rock will be removed from the Broad Sound entrance channel, Main Ship channel, and the Chelsea River channel by blasting.

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act require federal agencies to consult with one another on projects such as this. Insofar as a project involves essential fish habitat (EFH), as this project does, this process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure. While the EFH assessment contained in the DSEIS/DEIR addresses many of the issues associated with this project, specific information necessary to evaluate anticipated impacts has not been received. This information, as described below, is necessary for NMFS to fully evaluate anticipated

Comment
NMFS #1

Comment NMFS #1

impacts on fishery resources and habitat. Upon receipt of additional information, NMFS will provide specific EFH conservation recommendations, as appropriate.

Presence of Fishery Resources in Boston Harbor

Boston Harbor provides habitat for a variety of living marine resources, including, but not limited to, the commercially and recreationally important winter flounder (*Pseudopleuronectes americanus*), rainbow smelt (*Osmerus mordax*), alewife (*Alosa pseuodoharengus*), blueback herring (*Alosa aestivalis*), and American lobster (*Homarus americanus*). There is ample evidence that winter flounder utilize the proposed project area for spawning and juvenile development habitat. According to the NOAA Technical Memorandum NMFS-NE-138 (EFH Source Document), winter flounder generally spawn over sand, silt, and mud substrates in nearshore habitats from less than five meters deep, as well as offshore areas at depths of up to 90 meters on Georges Bank (Pereira et al. 1999). With the exception of Georges Bank and Nantucket Shoals populations, mature winter flounder spawn in the shallow waters of inshore bays and estuaries (Pereira et al. 1999). Because winter flounder eggs are demersal and adhesive in nature and larval and young of year winter flounder also prefer shallow inshore waters, spawning, egg development and early juvenile development habitat tend to be close together (Pereira et al. 1999). According to the EFH Source Document, winter flounder eggs and larvae have been collected at temperatures ranging from 0 to about 20.5 degrees Celsius. As such, it is anticipated that winter flounder eggs and larvae would be present within Boston Harbor during the winter, spring, and early summer. In addition, NOAA's Estuarine Living Marine Resources Program has identified winter flounder eggs and larvae as being abundant in Boston Harbor during this portion of the year (US Department of Commerce 1994).

The 2004-2005 final report for the Mystic Power Generating Station along the Mystic River in Everett, Massachusetts contains detailed information regarding the impingement and entrainment of fishery resources as a result of operations. This power station is located upstream of the proposed dredging footprint. As noted within the final report, approximately 16 million winter flounder larvae were entrained into the facility in this 12-month period (Shaw 2006). While this facility is located upstream of the proposed project footprint, this study suggests that inner portions of Boston Harbor are currently being utilized for winter flounder spawning and juvenile development.

The May 1995 Finfish Sampling and Description Report prepared by Normandeau Associates for the Army Corps of Engineers (ACOE) 1995 improvement dredging project of the inner Boston Harbor identified substantial winter flounder presence in the project area. This study included sampling at stations located within the inner and outer harbor. The trawl data identify winter flounder as being the most numerous finfish at each station, and winter flounder catch per unit effort (CPUE) as the highest of all species for all stations combined (Normandeau 1995). In view of these data provided in the reports and publications provided above, NMFS maintains that Boston Harbor and the Mystic and Chelsea Rivers support populations of winter flounder that utilize the area for spawning and juvenile development.

In addition to winter flounder, anadromous rainbow smelt, alewife, and blueback herring currently utilize Boston Harbor, the Mystic River, and the Chelsea River as a migratory pathway between upstream spawning locations and Massachusetts Bay. The 1995 Normandeau study associated with the improvement dredging of Boston Harbor found use of the area by alewife, blueback herring, and rainbow smelt through gill net sampling. Over all stations combined, blueback herring (26%), rainbow smelt (25%), and alewife (15%) were found to be the most abundant species sampled using gill nets (Normandeau 1995). Entrainment studies within the Mystic Station final report for 2004-2005 found that approximately 1.8 million rainbow smelt larvae were entrained in the facility (Shaw 2006). Further, this study found that 497 alewife and 27,379 blueback herring juveniles and adults were subject to impingement resulting from operations (Shaw 2006). As such, NMFS maintains that this area is being utilized by anadromous fish, including blueback herring, rainbow smelt, and alewife. It is important to note that due to the low populations of alewife and blueback herring throughout the Commonwealth of Massachusetts, the Massachusetts Division of Marine Fisheries has prohibited all harvest of these species. In addition, rainbow smelt has been identified as a "species of concern" by NMFS, who is assessing whether the species warrants listing under the Endangered Species Act. These actions underscore the importance of these species in Massachusetts and New England as well as the need for measures which avoid and minimize impacts on anadromous fishery resources.

Comment NMFS #2

The substrate found within the project area also serves as habitat for benthic organisms, such as shellfish and other invertebrates living within and on the surface of the sediment. These organisms contribute to the productivity of the federally managed species as a food source for both juvenile and adult life stages of finfish. The commercially important American lobster has been documented extensively within Boston Harbor by the Massachusetts Division of Marine Fisheries through the 1990-2002 Massachusetts Bay Lobster Trawl Sampling Program.

Issues associated with dredging

The proposed dredging and the resulting suspended sediment and deposition may result in adverse effects to fishery resources and habitats. The EFH Source Document states that winter flounder eggs range in size from 0.74-0.85 mm in diameter, and are demersal and adhesive (Pereira et al. 1999). The eggs have been shown to be adversely affected by minimal levels of sediment deposition. Research conducted at the NMFS Northeast Fisheries Science Center's Milford Lab found that sediment deposition at depths of ½ the egg diameter (~0.5 mm) resulted in reduction in hatch of eggs (David Nelson, personal communication, 2003). In addition, a recent study found that deposition of suspended sediments can have adverse effects on winter flounder eggs at approximately 1.0 mm (Walter Berry, personal communication, 2006). While this study found that deposition at greater than 3mm reduced hatch significantly, there was also a reduction in hatching success (approximately 60 percent down to 35 percent) at deposition levels of 0.5mm-1.0mm (Berry et al. 2006). It is important to note that this study dealt solely with total hatch success, and did not deal with sublethal effects, such as developmental deformities, which may result from burial. There is also evidence that egg burial of approximately 1.0 mm results in increased time for winter flounder eggs to hatch, which results in a greater

Comment NMFS #3

risk of predation (Berry et al. 2006). Furthermore, it has been indicated that larval stages of winter flounder may be susceptible to impacts from suspended sediment due to abrasion (Walter Berry, personal communication, 2006).

As stated above, Boston Harbor, Mystic River, and Chelsea River serve as habitat for a number of anadromous fishery resources. These anadromous fishery resources serve as prey for a number of federally managed species and are considered a component of EFH pursuant to the MSA. In addition, these are NOAA trust resources that are covered under the Fish and Wildlife Coordination Act. NMFS remains concerned that dredging activities and associated plumes of contaminated sediment have the potential to impair migration of anadromous species. Chiasson (1993) found an increase in swimming activity of rainbow smelt when suspended sediments were present. Such alarm reactions have been found to disrupt schooling behavior of fishes (Wildish and Power 1985). In a laboratory study, Wildish and Power (1985) found that rainbow smelt avoided suspended sediment when concentrations were in excess of 20 Mg/L. Furthermore, sublethal effects to estuarine fishes can include decreased feeding, impacts from lowered oxygen levels, as well as impacts on gills and associated respiratory impacts (Wilber and Clarke 2001).

Comment NMFS #4

Comment NMFS #5

The DSEIS/DEIR states that the sediment plume from the dredging is expected to be contained within the vicinity of the proposed dredge area. The primary means for this determination was the use of the SSFATE model for the 2004-2005 Outer Boston Harbor maintenance dredging project, as well as the plume tracking performed for the construction of the CAD cell within Boston Harbor during the previous improvement dredging project in 1998-2002. During the review of the Boston Harbor Inner Harbor Maintenance Dredging project in 2006, NMFS raised concerns regarding the applicability of the SSFATE model used in the suspended sediment dispersion analysis, as described in our May 12, 2006 letter to the ACOE. In a letter dated February 22, 2007, the ACOE developed a water quality monitoring plan for the inner harbor maintenance dredging project to be performed in 2008. This plan includes a real-time dredge plume tracking effort in order to identify the extent of suspended sediment dispersion resulting from dredge operations. Results of this effort should be utilized, in part, to develop a dredge sequencing plan to avoid and minimize adverse effects to fishery resources in certain areas and times when they would be most susceptible to adverse impacts.

Comment NMFS #6

Issues associated with blasting

The DSEIS/DEIR contains limited information regarding anticipated effects resulting from the proposed blasting. Specifically, the DSEIS/ DEIR and EFH assessment does not include an analysis of the location, timing, and methods of the proposed blasting and the anticipated impacts on living marine resources. NMFS acknowledges the need to advance the project, however, this blasting impact information is important in order to fully anticipate adverse effects to fishery resources and to identify suitable minimization techniques. This detailed assessment of impacts should be incorporated into the proposed blasting plan.

Comment NMFS #7

The recent blasting events associated with the Boston Harbor Maintenance Dredging project resulted in a series of fish kills. As noted in the DSEIS/ DEIR, the ACOE is

currently in the process of preparing an "after action report" to provide information and determine what lessons can be learned from the 2007 fish kill events, and to identify corrective measures that can be used to avoid and minimize impacts on fishery resources during the proposed deep draft improvement project. This "after action report" should be incorporated into the recommended blasting plan.

Comment NMFS #8

The DSEIS/DEIR discusses the formation of an interagency underwater blasting technical working group in order to discuss construction sequencing and potential constraints as well as operational procedures and equipment for the proposed blasting. NMFS believes that this can be an effective approach in the development of a comprehensive blasting plan. In addition to an assessment of impacts, the blast plan should address potential operational impact minimization measures, sequencing options, impact thresholds, and an adaptive management protocol. This blasting plan should be developed and approved by the interagency technical working group prior to any blast operations.

Beneficial uses of rock as artificial reefs

Comment NMFS #9

According to the DSEIS/DEIR, the ACOE is considering the utilization of the blasted rock to create artificial reefs over an area of approximately 220-530 acres of soft bottom habitat within Broad Sound. The DSEIS/DEIR discuss three alternatives considered as beneficial reuse, including the use of rock for upland construction purposes, use for ongoing shore protection projects, and use of rock as artificial reefs. The document states that upland alternatives and shore protection alternatives were eliminated from consideration due to uncertainty. Due to recent discussions with MassPort regarding the potential use of the Marine Terminal as a transfer facility, NMFS maintains that the upland alternatives should be more fully explored.

Comment NMFS #10

In the context of the beneficial reuse of blasted rock for creating artificial reefs, the DSEIS/DEIR assumes that hard bottomed habitat is preferable to soft bottom habitat. Although less structurally complex, soft bottom habitats serve as habitat for a variety of resources. As noted in the DSEIS/DEIR, soft bottom areas of the Broad Sound preferred reef site are utilized by benthic invertebrates, lobster, and fishery resources such as flounder, red hake, and sculpin. As the Broad Sound reef site contains areas of both hard and soft substrates, the FSEIS/FEIR should consider the loss of soft bottom habitats as a result of the creation of artificial reefs relative to the overall ecosystem functions and values.

Capping of the former Industrial Waste Site

Comment NMFS #11

As noted in the DSEIS/DEIR, the ACOE is considering the use of dredged material to cover potential hazardous and radioactive waste located within the former Industrial Waste Site (IWS) located adjacent to the MBDS. In order to test a methodology for capping of the IWS, a demonstration project is planned for the dredged material disposal in the MBDS associated with the upcoming Boston Harbor Maintenance Dredging project. While the results of the demonstration project will be unavailable for the FSEIS/FEIR, information should be presented to federal and state resource agencies in order to determine if this method is acceptable for use for the IWS capping project.

Essential Fish Habitat Assessment

As noted in the EFH assessment included in the DSEIS/DEIR, this portion of Boston Harbor serves as EFH for 23 federally managed species, including, but not limited to, Atlantic cod, haddock, pollock, whiting, red hake, white hake, winter founder, yellowtail flounder, windowpane flounder, American plaice, ocean pout, Atlantic mackerel, and summer flounder. As noted above, our ability to assess potential impacts on EFH and associated marine resources was complicated by insufficient information in the document. Section 305(b)(2) of the MSA requires all federal agencies to consult with NMFS on any action authorized, funded, or undertaken by that agency that may adversely affect EFH. Included in this consultation process is the preparation of a complete and appropriate EFH assessment to provide necessary information on which to consult. NMFS recommends that the following additional information regarding project impacts and issues relative to fishery resources and habitats be provided in order for us to fully assess the adverse effects of the proposed project. Upon receipt of this information, NMFS will provide specific EFH conservation recommendations, as appropriate.

Comment NMFS #12

1) A sequencing plan should be developed for dredging activities. This plan should avoid and minimize adverse impacts on winter flounder and anadromous fish resulting from increased levels of suspended sediment and deposition. This sequencing plan should be coordinated with federal and state resource agencies.

2) A comprehensive blasting plan should be developed by an interagency underwater blasting technical working group. As noted above, this plan should have a detailed discussion of anticipated impacts on fishery resources, and should address potential operational impact minimization measures, sequencing options, impact thresholds, and an adaptive management protocol. This blasting plan should be approved by the interagency technical working group.

3) Alternative beneficial reuse options that avoid and minimize adverse impacts on biologically productive soft bottom habitats should be evaluated more fully within the FSEIS/FEIR.

4) In order to assess potential impacts resulting from the proposed capping at the IWS, the results of the upcoming demonstration capping project within MBDS should be presented to federal and state resource agencies.

Endangered Species Act

Three species of federally threatened or endangered sea turtles and three species of endangered whales may be found in Massachusetts waters. The sea turtles in Massachusetts nearshore waters are typically small juveniles with the most abundant being the federally threatened loggerhead (*Caretta caretta*), followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*). Loggerheads and Kemp's ridleys have been documented in waters as cold as 11°C, but generally migrate northward when water

temperatures exceed 16°C. These species are typically present in Massachusetts waters from June through November. Federally endangered leatherback sea turtles (*Dermochelys coriacea*) are located in New England waters during the warmer months as well. While leatherbacks are predominantly pelagic, they may occur close to shore, especially when pursuing their preferred jellyfish prey. Green sea turtles *(Chelonia mydas)* may also occur sporadically in New England waters, and any occurrence in Massachusetts waters is likely to be rare. Sea turtles are known to occur on Stellwagen Bank and in Massachusetts Bay. While no surveys for sea turtles have been conducted in Boston Harbor, suitable forage and habitat exists in this area and it is likely that sea turtles occasionally are present in Boston Harbor.

Federally endangered North Atlantic right whales (*Eubalaena glacialis*) and humpback whales (*Megaptera novaeangliae*) are also found seasonally in Massachusetts waters. North Atlantic right whales have been documented in the nearshore waters of Massachusetts from December through June. Humpback whales feed during the spring, summer, and fall over a range that encompasses the eastern coast of the United States, including Massachusetts Bay. While these whale species are not considered residents of the Boston Harbor area, transients occasionally enter the area as they complete seasonal migrations in nearby Massachusetts Bay. For example, in April 1996 a right whale was documented in Boston Harbor, and in the fall of 2000, a humpback whale was documented in Boston Harbor. Fin (*Balaenoptera physalus*), Sei (*Balaenoptera borealis*), and Sperm (*Physter macrocephalus*) whales are also seasonally present in New England waters, but are typically found in deeper offshore waters and are not likely to occur in Boston Harbor.

Comment NMFS #13

The ACOE requested consultation pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, as amended, regarding the Boston Harbor Deep Draft Navigation Improvement Project in 2005. In a letter dated September 6, 2005, NMFS concurred with the ACOE's determination that the project was not likely to adversely affect listed species. However, at that time, the ACOE had indicated that the removal of 2-6 million cy of material was likely and the ACOE did not indicate to NMFS that blasting would be necessary. As such, the consultation only considered the effects of dredging 2-6 million cy of material, as opposed to the 12.1 million cy currently proposed for removal, and did not contemplate the effects of the currently proposed blasting operations.

Reinitiation of consultation is required and shall be requested by the federal agency or by the Service, where discretionary federal involvement or control over the action has been retained or is authorized by law, and: (a) if new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered in the consultation; (b) if the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the consultation; or (c) if a new species is listed or critical habitat designated that may be affected by the identified action. As the action has been modified from the action considered by NMFS in the September 6, 2005 letter, reinitiation of consultation is necessary. As such, the ACOE will need to provide NMFS with a determination of effects to listed species that analyzes the potential for impacts of the

Comment NMFS #14

additional dredging as well as from the proposed blasting. In order to determine the likely effects of blasting on listed species, additional information on the underwater noise resulting from the project as well as information on timing, sequencing, and monitoring is necessary. Should you have any questions about these comments, or the reinitiation of consultation, please contact Julie Crocker in NMFS' Protected Resources Division at (978) 281-9300 ext. 6530, or by e-mail (Julie.Crocker@Noaa.gov).

Comment NMFS #15

Conclusion

In summary, NMFS requests additional information be provided in order to fully evaluate potential impacts on listed species, fishery resources, and habitats. Specifically, we recommend that a dredging sequencing and comprehensive blasting plan be developed for this project. Further, we recommend that alternative beneficial reuse options for blasted rock be explored. Finally, NMFS recommends that further coordination regarding the capping demonstration project and proposed capping at the IWS should occur. Upon receipt of this information, NMFS will provide specific EFH conservation recommendations, as appropriate. Additionally, as noted above, section 7 consultation must be reinitiated to consider the effects of the additional dredging as well as the effects of blasting on listed species. Should you have any questions regarding these comments, please contact Christopher Boelke of my staff at (978) 281-9131.

Sincerely,

Peter Colosi

Peter D. Colosi
Assistant Regional Administrator
for Habitat Conservation

cc: US ACOE - Michael Keegan, Cathy Rodgers
US EPA - Robert Varney, Phil Colarusso
US FWS – Vern Lang, Maria Tur
MA DMF - Paul Diodati, Kathryn Ford
MA CZM - Leslie Ann McGee, Bob Boeri
MA DEP - Lealdon Langley, Ken Chin
MassPort Maritime Department - Deb Hadden
MEPA - Deerin Babb-Brott
Boston Conservation Commission – Chris Busch
NOA/PPI – Steve Kokkinakis

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United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, NH 03301-5087
http://www.fws.gov/northeast/newenglandfieldoffice

May 14, 2008

Reference: Project: Draft feasibility report/SEIS, deep draft navigation improvement project
Location: Boston Harbor, MA

Curtis L. Thalken
Colonel, Corps of Engineers
Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Thalken:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Comment FWS #1

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

In order to curtail the need to contact this office in the future for updated lists of federally-listed or proposed threatened or endangered species and critical habitats, please visit the Endangered Species Consultation page on the New England Field Office's website:

www.fws.gov/northeast/newenglandfieldoffice/EndangeredSpec-Consultation.htm

In addition, there is a link to procedures that may allow you to conclude if habitat for a listed species is present in the project area. If no habitat exists, then no federally-listed species are present in the project area and there is no need to contact us for further consultation. If the above conclusion cannot be reached, further consultation with this office is advised. Information describing the nature

and location of the proposed activity that should be provided to us for further informal consultation can be found at the above-referenced site.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Anthony P. Tur
Endangered Species Specialist
New England Field Office

United States Department of the Interior
OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
408 Atlantic Avenue – Room 142
Boston, Massachusetts 02210-3334

June 2, 2008

(ER 08/415)
(9043.1)

Colonel Curtis L. Thalken
District Engineer
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Thalken:

The Department of the Interior (Department) has reviewed the Draft Environmental Report/Draft Supplemental Environmental Impact Statement (DEIR/DSEIS) for the Boston Harbor Deep Draft Navigation Improvement Project, Boston, Massachusetts, and offers the following general and specific comments.

General Comments

The draft feasibility report (DFR), DSEIS, and supporting documentation for the proposed navigation improvement project. These documents contain a significant amount of information on the proposed navigation improvements, as well as on other water resource developments in Boston Harbor. Nonetheless, due to the nature of the proposal, the Department has concerns regarding potential secondary and cumulative effects, and from direct construction-related effects. We are also concerned about the potential for information in the DEIR/DSEIS to become outdated if construction is not initiated for some period of years, perhaps as long as a decade from now.

Specific Comments

Boston Harbor Islands National Recreation Area

Boston Harbor Islands National Recreation Area includes 34 islands and peninsulas, ranging in size from less than 1 acre to 270 acres. Together, they encompass 1,600 acres of land and nearly 1,600 acres of intertidal habitat within an area of 50 square miles. This unit of the national park system is charged with protecting the islands as a resource of national significance for present and future generations. Sensitive park resources that may be of particular relevance to the analysis in the DEIR/DSEIS include the following:

Intertidal habitats. The large mean tidal range within Boston Harbor creates an extensive intertidal zone that encompasses an area almost equal to the terrestrial area of the park. It includes a diversity of habitats such as bedrock outcrops, tide pools, rock, cobble and gravel beaches, small sandy barrier beaches, mud and sand flats, salt marshes and others. Rich assemblages of macroalgae, vascular plants, invertebrates, fishes, birds, and mammals are associated with and dependent upon these habitats. Direct impacts to these resources from deep dredging are not expected. However, indirect impacts are not fully addressed, such as those from altered wave energy or sediment transfer dynamics due to increased shipping traffic with larger vessels.

Maritime cliff and beach communities. Maritime erosional cliffs, maritime rock cliffs, maritime dunes, and beach strand communities are close to the shoreline and periodically subject to salt spray and storm flooding. All are considered rare in Massachusetts and are tracked by the Natural Heritage and Endangered Species Program. They support a diversity of migrating and nesting birds, including least terns (*Sterna antillarum*) and common terns (*Sterna hirundo*), both listed in Massachusetts as Species of Special Concern. American oystercatchers (*Haematopus palliates*), a Species of High Concern in the U.S. Shorebird Conservation Plan, also nest widely in the park beach strand communities. Rare Massachusetts plants, such as seabeach dock (*Rumex pallidus*), seaside angelica (*Angelica lucida*), and Rich's sea-blite (*Suaeda richii*) are maritime species within the park. These communities and associated species are particularly vulnerable to impacts from increased wave energy. Park management is concerned with both direct and indirect effects of the project that may influence erosion rates and patterns in the Harbor.

Comment DOI #1

Air quality. Management seeks to perpetuate the best possible air quality to safeguard park resources from the adverse impacts of air pollution. Short-term impacts to air quality are expected from the project.

Natural soundscape and lightscape. While the park is located in an urban environment containing human-generated noise and light, it offers a relatively natural soundscape and natural darkness that the park seeks to protect. The production of excessive noise caused by mechanical devices and of artificial lighting affects visitor experience and degrades park habitats, impacting wildlife and other biota.

Comment DOI #2

Viewshed. Scenic attributes of the park, such as natural island landscapes and open water, are considered important resources and contribute to the visitor experience. Dredging operations will likely impact this resource.

Comment DOI #3

Archeological sites. The Harbor Islands have a rich human history. Artifacts have been found dating from the Early Archaic period (8000 B.C. to 6000 B.C.). Twenty-one islands have been designated within an archeological district listed on the National Register of Historic Places. While all islands have not been surveyed, archeologists assume that they all potentially have prehistoric or pre-contact sites. These sites are subject to indirect impacts from the project that may influence erosion rates and patterns in the harbor.

Historic structures. Structures currently on the National Register that may be sensitive to impacts from dredging and increased shipping traffic include Fort Warren, a National Historic Landmark located on Georges Island, Long Island Head Light, and Nixes Mate. Historic sea walls can be found on Georges Island.

Comment DOI #4

The Final EIS include the potential for long term improvements in water quality. Increasing the dimensions of the Boston Harbor entrance channel (Presidents Roads Channel) will reduce tidal friction and enhance the tidal flow and the resulting tidal prism. The greater tidal exchange will improve tidal flushing and water quality within the harbor.

We also note that much of the sediment to be dredged consists of poorly sorted coarse to fine-grained sand and sand and gravel. This bottom sediment type extends from sample location A to P (Figure 3-3a; Table 3-1). Of these 16 sites, only five contain a mud content greater than 10% (ranging 12 to 26%).

The Final EIS should also provide information addressing the following questions:

Comment DOI #5

- What are the volumes/rates of suspended sediment that will not be contained during dredging operation?
- What are the trajectories of these suspended sediments under varying wind, wave and tidal conditions?

Comment DOI #6

- What were the results of the sediment chemistry performed on composite samples? This is important as the potential contaminants could be released in the water column and transported within Boston Harbor to fishing and shellfishing grounds. It is important to note that contaminants preferentially attach to the mud size fraction, which is most easily mobilized and least easily contained during dredging operations.

Comment DOI #7

- What is meant by the statement in the report that sediment disposal will not disrupt navigation? This could simply mean that they will not discharge in federal channels. Much recreational navigation is outside of federal channels.

Comment DOI #8

DFR page 16, *Sediment Characteristics and Quality*, paragraph 1, attempts to describe the sedimentary environments of Boston Harbor and Massachusetts Bay. It does not, however do so in a clear or meaningful way, other than saying that the sediments are variable. Although the end of the paragraph states that there a number of existing field investigations have been conducted in this area, the preparers did not describe the sediment characteristics in any useable way. This paragraph should be revised for the Final Feasibility Report.

Comment DOI #9

Feasibility Report Appendix K, Sediment sampling, represents a data compilation with no discussion or synthesis of the results. The final document should be revised to include a synthesis of the results.

Comment DOI #10

Feasibility Report Appendix J, Regional Geology, is generally accurate, but includes several minor errors. For example, the lower till may be Wisconsinian or pre-Wisconsinian. The younger till is not post-Wisconsinian, as stated. This Appendix should be subject to further review prior to finalization.

Fish and Wildlife Resources

The Department is concerned that if the proposed -48/-50-foot deep navigation project is approved for Boston, other New England states, delegations, and ports will seek similar treatment and projects for their areas as has happened sequentially over the past 100 or more years. In our view, the analysis of potential port development alternatives in New England, and

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perhaps the Northeast, is too narrow due to the focus on Boston Harbor while making some reference to the Ports of New York and New Jersey (PONYNJ), and lesser attention to the remaining New England ports. While the Congressionally-authorized feasibility study could arguably focus on Boston Harbor, the EIS process for this study has a much broader mandate and purpose. Among other things, NEPA requires that all reasonable alternatives be evaluated and their likely direct, secondary, and cumulative effects must be identified and disclosed. The Department believes that these other New England ports should be considered as stand-alone alternatives to deep draft navigation in Boston, not only as alternatives under the non-structural alternatives section, as was done in the feasibility report. Most importantly, and in keeping with the history of port development in New England, these other New England ports should be considered as being in addition to Boston, not just as alternatives to deep draft navigation in Boston. From an environmental perspective, the cumulative dredging and disposal volume from deepening all of New England's -40-foot draft navigation channels would likely be multiples of the approximately 12 mcy estimated for deepening the 40-foot draft channels in Boston to -48/-50 feet. This is a significant issue that should be fully evaluated and vetted for inclusion in the Final EIS.

Comment DOI #11

Another issue the Department has identified relates to the evaluation of environmental effects based on the knowledge and assumptions of present-day physical and biological resources in areas to be affected by dredging and/or disposal activities. We think it is possible that the review, approval, authorization, and funding process for this project may take a decade or longer before any construction would occur. Environmental conditions could change dramatically in a shorter time frame of perhaps three to five years. The DFR and DSEIS clearly establish that all of the channels proposed for improvement dredging will also complete full maintenance dredging by 2008/9. Completion of maintenance dredging will effectively reset the recolonization clock for benthic and related resources in these channels. We believe it is reasonable to expect that benthic recolonization would occur over a two-to-five-year period and that the pioneer or early successional stage communities would shift to more diverse and stable communities where conditions and time would allow. In a similar manner, areas at the Massachusetts Bay Disposal Site and other areas where rock or soft sediments have been proposed as beneficial use, shore protection, landfill or other uses will likely have different resource values a decade from now as compared to today or at the end of the full maintenance cycle in 2008/9.

Comment DOI #12

Resource decisions made today regarding a dynamic system such as Boston Harbor may or may not be appropriate or acceptable a decade from now. Accordingly, procedural safeguards need to be incorporated into the feasibility report and EIS such that when the project is authorized by Congress, the safeguards become an integral component of the authorized plan. The Department recommends that the feasibility report and EIS include a "look back" requirement consistent with the Council on Environmental Quality's *NEPA's Forty Most Asked Questions* (question 32, "Supplements to Old EISs") that an environmental review of the project take place in coordination with other agencies as a prerequisite to the release and expenditure of construction funds. This safeguard would help ensure that the environmental review of the project would be reasonably contemporaneous with project construction and provide for better, more informed decision-making related to alternatives, impact avoidance, minimization, and compensatory mitigation.

We note on page 191 of the DFR that the Corps proposes to undertake hydrographic surveys of the areas proposed for dredging primarily for the purpose of verifying the volume of material

Comment DOI #13

removed and for related contractual purposes. The Department believes that the hydrographic surveys can serve other useful purposes as well. These other purposes include monitoring of the channels and adjacent areas to determine if these adjacent areas or channels would be subject to erosion or accretion as a consequence of deepening the navigation channels beyond the current -40-foot depth. Adjacent areas being eroded or accreted would be likely candidate areas to conduct biological monitoring to establish a fuller understanding of these secondary effects of channel deepening. Accordingly, the Department recommends that the DFR and DSEIS be modified to include an expanded hydrographic survey of all portions of any channel deepened beyond the present -40-foot depth and the adjacent areas on either side of such channel or anchorage area extending perpendicular from the channel or anchorage limits 1,000 feet in distance or until landfall. These expanded hydrographic surveys would be conducted 1) immediately prior to dredging, 2) immediately after dredging, 3) one year post-dredging, and then 4) at three-year intervals for the next nine years. The data from # 3 and # 4 should be analyzed to show change from the baseline condition, # 2 above. This data should be presented in color-coded maps and tables to show changes in the survey area expressed in square feet/acres, cubic yards, and depth.

Comment DOI #13

Geological Survey

The link provided in the reference on page 8-25 for USGS (2005) is no longer accurate; the new link is: http://woodshole.er.usgs.gov/operations/modeling/index.html.

Comment DOI #14

* * *

Thank you for providing the Department with the opportunity to comment on the DFR/DSEIS. For questions regarding comments on park and recreational resources, please contact Sheila Colwell, National Park Service, at 617-223-8566. For questions regarding comments on fish and wildlife resources, please contact Mr. Vernon Lang, U.S. Fish and Wildlife Service, at 603-223-2541. For questions concerning Geological Survey comments, please contact Lloyd Woosley at 703-350-8797. Please also feel free to contact me at 617-223-8565 if I can be of further assistance.

Sincerely,

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June 13, 2008

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
DRAFT SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT/
DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	: Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP)
PROJECT MUNICIPALITY	: Boston, Chelsea and Revere
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 12958
PROJECT PROPONENT	: Massport
DATE NOTICED IN MONITOR	: April 23, 2008

Pursuant to the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and Section 11.08 of the MEPA regulations (301 CMR 11.00), I hereby determine that the Draft Supplemental Environmental Impact Statement(SEIS)/Draft Environmental Impact Report (EIR) submitted on this project **adequately and properly complies** with MEPA and its implementing regulations. The proponent may prepare and submit the Final EIR for review.

The Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP) proposes navigation channel improvements within Boston Harbor to increase the commercial viability of this working port. The Port of Boston is the largest port in New England for bulk and container cargoes and an important economic engine within the local and regional economy. The Massachusetts Port Authority (Massport) indicates that the Port handles approximately 22 million tons of cargo worth approximately $2.4 billion annually to the regional economy. Its growth is limited due to existing channel depths. This $307 million dollar project will increase the ability of the port to attract larger, deeper draft vessels and thus ensure its continued use by the shipping industry. Comments from resource agencies reflect support for the selection of the

Preferred Alternative while emphasizing the significant amount of work required in the Final EIR to ensure that improvements are planned and implemented with adequate consideration and protection of other interests in the harbor, including fisheries and recreation.

Comment EOEEA #1

As with the Boston Harbor Navigation Improvement and Berth Dredging Project (BHNIP) (#8695), the ACOE has formed a Technical Working Group (TWG) consisting of resource agencies, environmental advocates, scientists and others, to help advise the proponent through the design, permitting and construction phases of the project. The TWG will develop conditions for the Water Quality Certificate, evaluate disposal alternatives and modify construction and monitoring techniques as necessary to ensure adequate environmental protection.

Project Description

Massport is the local sponsor for this project that will be conducted by the US Army Corps of Engineers (ACOE). The purpose of the project is to meet shipping industry needs by providing access for deeper draft bulk and container vessels to enter the harbor without experiencing tidal delays. The primary goal of the project is to provide deeper access to the Massport Conley Container Terminal; however, additional port improvements in the Main Ship Channel, the Mystic River and Chelsea River are also under consideration. Based on the draft feasibility study included with the Draft SEIS/EIR, the Preferred Alternative includes the following elements:

- deepen the Broad Sound North Entrance Channel to -50 feet mean lower low water (MLLW);
- deepen the President Roads Anchorage and Main Ship Channel to -48 feet MLLW;
- deepen the Main Channel 2,600 feet above the Turning Basin to the Massport Marine Terminal to -45 feet MLLW;
- widen the Main Ship Channel to 900 feet between President Roads Anchorage and Castle Island;
- widen the Main Ship Channel to 800 feet above Castle Island to the Reserved Channel;
- widen the channel bends at Spectacle Island and Castle Island to 1,050 feet;
- widen the Reserved Channel Turning Area to a minimum of 1,500 feet;
- deepen the Mystic River Channel to the Medford Street Terminal to -40 feet MLLW;
- deepen the Chelsea River Channel and Turning Basin to -40 feet MLLW;[1]
- widen the Chelsea River Channel at the bridge approaches, the bend between the two bridges and the area through the Chelsea Street bridge opening;
- deepen the two existing deep berths at Conley Terminal to -42 MLLW to -45 MLLW to allow vessels to employ tidal assistance to enter the Terminal; and
- deepen the Massport Marine Terminal to -45 feet MLLW.

[1] Deepening project depends upon replacement of the Chelsea Street Bridge and removal and relocation of the Keyspan gas siphon.

In addition, channel and anchorage areas not maintained in the past dredging projects may be dredged during the improvement dredging to provide alternative routes for shallow-draft traffic. Areas under consideration include the Broad Sound South Entrance Channel, the 35-foot northern lane of the Broad Sound North Entrance Channel, the Nubble Channel, and the 35-foot West Anchorage at Presidents Road. Approximately 264,000 cubic yards (cy) of maintenance material would be dredged and disposed.

The project will alter approximately 22 acres of previously undisturbed Land Under the Ocean and it could convert approximately 1,100 to 1,300 acres of soft-bottom to hard substrate. The project will take two years to design and from three to five years to complete, with construction estimated to begin in 2011. The ACOE will conduct most of the actual dredging and related mitigation while Massport may implement discrete elements of it. Channel deepening associated with the Preferred Alternative will require blasting and use of a mechanical bucket dredge. It will require removal and disposal of approximately 1,032,000 cy of rock and 11.7 million cy of dredged spoils.[2] Dredged material will consist of glacial parent material and rock ledge that is suitable for disposal at the Massachusetts Bay Disposal Site (MBDS). The glacial materials are composed primarily of Boston blue clay and mixed tills with compacted sands, gravel and cobble. Any silty material not suitable for disposal at the MBDS site will be disposed of in one of the previously permitted Confined Aquatic Disposal (CAD) Cells developed as part of the Boston Harbor Navigation Improvement Project (BHNIP). Although the material may be disposed at the MBDS, the proponent has analyzed and proposed beneficial uses. ACOE proposes to create an extensive artificial reef with the rock material and to cap the EPA Industrial Waste Site (IWS), located adjacent to the MBDS, with the parent material.

Permits and Jurisdiction

The project is undergoing MEPA review and requires the preparation of an EIR pursuant to Section 11.03 (a)(1)(a) because it requires a state permit and will alter more than ten acres of wetlands. The project requires a 401 Water Quality Certification from the Department of Environmental Protection (DEP) and it may require an 8(m) permit from the Massachusetts Water Resources Authority (MWRA). It requires an Order of Conditions from the Boston, Chelsea and Revere Conservation Commissions. Also, it will require Federal Consistency Review by Coastal Zone Management (CZM).

Comment EOEEA #2

The project requires review under the National Environmental Policy Act (NEPA). The proponent requested that the MEPA/NEPA review processes be coordinated. Accordingly, the proponent submitted a joint Draft SEIS/EIR review document and coordinated the comment period. Although the Draft SEIS/EIR addresses both the federal and state scopes, I am issuing a determination of adequacy only for those portions of the document required in the state scope.

[2] This estimate is based on Table 2-2. This estimate assumes a 2-foot overdepth allowance and a 1:3 side slope for ordinary material. It assumes an additional two feet where ledge is encountered and a 1:1 side slope for rock removal.

Comment EOEA #3

Because the proponent is a state agency and, under a cost sharing agreement, is responsible for providing a significant percentage of the project costs, MEPA jurisdiction extends to all aspects of the project that may cause significant Damage to the Environment including air quality, water quality, threatened and endangered species, marine habitat, fisheries and historic and archaeological resources.

Review of the Draft EIR

The Draft SEIS/EIR provides a thorough description of the project and all project elements. It provides a description of existing environmental conditions and resources, includes an alternatives analysis, identifies associated environmental impacts and identifies measures to avoid, minimize and mitigate project impacts.

Review of the BHNIP, the Inner Harbor Maintenance Dredging Project (IHMDP) and the Outer Harbor Maintenance Dredging Project (OHMDP)

As required, the Draft SEIS/EIR includes a section on the previous improvement dredging and maintenance dredging projects. The BHNIP included the maintenance and improvement dredging of the main shipping channels and berths within Boston's Inner Harbor. Over 784,850 cubic yards of dredged material deemed unsuitable for open-water disposal was placed within nine Confined Aquatic Disposal (CAD) cells constructed within the dredging footprint of navigation channels. The planning and permitting process for the BHNIP addressed a number of issues that are directly relevant to the design and implementation of this project. The BHNIP, which was completed in late 2002, provided a framework for creating an environmentally acceptable dredging and disposal plan. It furthered understanding of dredging operations and techniques, provided information about baseline conditions within Boston Harbor, and resulted in the development of guidelines for permitting and constructing CAD cells for disposal of contaminated materials. The recommendations included in the EIR, including water quality monitoring methodology, are informed by the experience developed during the BHNIP.

Although the BHNIP, the Inner Harbor Maintenance Project (IHMDP) and the Outer Harbor Maintenance Project (OHMDP) project provide useful framework for decision-making and baseline environmental information, this project differs from previous projects in two significant respects – the scale of the project and the type of material to be dredged. The improvement and maintenance dredging consisted primarily of dredging significant amounts of contaminated silty material for disposal at the MBDS or within CAD cells. These projects required only a relatively small amount of rock removal, the majority of which could be removed with an excavator, compared to this project. The amount of parent material to be dredged for the BHDDNIP is approximately 3 to 6 times greater than the BHNIP. The Draft SEIS/EIR identifies four fish kill events associated with 13 blasting events during the maintenance project. In light of these events, the amount of rock removal and the blasting associated with its removal is a significant concern.

Comment EOEA #4

Alternatives Analysis

The Draft SEIS/EIR includes a draft feasibility study and an alternatives analysis that addresses the Port of Boston's current and future role in maritime commerce and identifies potential levels of future vessel traffic and commerce. The analyses explore options for accommodating increased deep draft vessel traffic in Boston Harbor, including No Action, Non-Structural Alternatives, and Structural Alternatives/Navigational Channel Depths and it includes a cost-benefit analysis for the range of alternatives. In addition, it analyzes alternative dredging methods, dredged material disposal alternatives and beneficial use alternatives for dredged material.

Non-Structural Alternatives include measures that allow for greater unit-loading of vessels without deepening (e.g. use of tides, light-loading of vessels, and lightering), alternative sites for cargo transfer and alternative means of cargo transport. The analysis concludes that management measures are already being employed to the extent feasible and are not sufficient to support deeper draft vessels expected to be employed by the shipping industry. It indicates that there are no other ports within New England with sufficient facilities and depths to provide a viable alternative to Boston Harbor. The analysis indicates that alternative means of cargo transport consist of truck transportation of containers which increase the cost of shipping and add traffic to existing highways with associated increases in emissions of air pollutants.

Structural Alternatives examine channel deepening at a range of depths including deepening the Entrance Channel, Main Anchorage and Main Ship Channel from – 40 feet MLLW up to – 50 feet MLLW, the Mystic River Channel from –35 feet MLLW up to – 40 feet MLLW and the Chelsea River Channel from – 38 MLLW up to – 40 feet MLLW. Improvements were examined in one-foot increments. Three segments in the Main Ship Channel were selected for presentation of costs and impacts (Plan A – 45 foot, Plan B – 48 feet and Plan C – 50 feet). Improvements to support bulk cargo terminals and petroleum terminals were also examined and include: Plan D – extend Main Ship Channel above Reserved Channel to the Massport Marine Terminal to a depth of -45 feet MLLW; Plan E – deepen a small area of the Mystic River Channel up to – 40 feet MLLW to access the Massport Medford Street Terminal in Charlestown to divert smaller bulk cargo operations from the Marine Terminal; and Plan F-deepening the entire Chelsea River Channel to -40 feet to benefit the four active petroleum terminals along this waterway.

The Draft SEIS/EIR estimates dredge quantities associated with each alternative which will range from 6.4 to 15.0 million cy of parent material and 450,000 to 1.5 million cy of rock.[3] The Preferred Alternative, which is described in the introduction to this Certificate, is based on providing the highest net economic benefits while meeting the objectives of the ACOE and Massport. The Draft SEIS/EIR indicates that the Preferred Alternative will evolve based on Congressional authorizations, updated shipping trends and economic information and completion of related projects (e.g Chelsea River project is dependent upon replacement of the Chelsea Street Bridge and removal of the Keyspan gas siphon).

[3] This estimate is also based on Table 2-2.

The Draft SEIS/EIR indicates that use of a mechanical dredge is the only feasible dredging method for rock, tills, stiff clays and other glacial deposits. In addition, because low levels of turbidity are associated with dredging of hard pack Boston blue clay, the proponent asserts that water quality standards will be maintained. The Draft SEIS/EIR identified disposal alternatives evaluated during the BHNIP and indicates that MBDS was the only practical alternative for non-contaminated material and CAD cells for disposal of contaminated material. Consistent with the policy of the ACOE to use dredged material, where practicable, for beneficial use, the Draft SEIS/EIR, evaluates several alternatives to disposal at the MBDS including: use of parent material for lining landfills or capping of the EPA IWS and use of rock for creation of an artificial reef, shore protection or construction. The Draft SEIS/EIR asserts that costs and logistical challenges render use of material for lining landfills, shore protection and/or construction purposes infeasible.

The alternatives analysis is adequate for MEPA purposes. Comment letters from state agencies support the Preferred Alternative, acknowledge that the Preferred Alternative may be revised, and agree that the majority of material will be suitable for disposal at the MBDS.

Comment EOEEA #5

Although material is suitable for disposal in the MBDS, most commentors agree that evaluation of beneficial reuse alternatives for rock was not thorough and should be re-assessed prior to the filing of the Final EIR. I understand that CZM is developing an alternative for reuse of rock material by a materials handling company that would provide a beneficial reuse while minimizing project costs associated with transport and disposal of dredged material. In addition, the Final EIR should address whether any of the material would be appropriate for beach nourishment at Winthrop Beach. Although general support is expressed for habitat restoration through creation of an artificial reef, significant concern is expressed with the siting and scale of the proposed reef. If the artificial reef is intended to serve as a major mitigation commitment, the proponent will need to consult closely with state and federal agencies and, in particular, DMF and NMFS, to identify a site and develop a design that meet the project objectives.

Comment EOEEA #6

Comment EOEEA #7

Environmental Conditions and Impacts – Marine Resources

The Draft SEIS/EIR includes a section on existing environmental conditions and environmental impacts of dredging and dredged material disposal including water quality issues, biological resources, threatened and endangered species, and historic and archaeological resources. Information on benthic resources was compiled from data collected by ACOE, MWRA and Massport. Information on lobsters, fisheries and marine mammals is based on data collected by DMF, MWRA and from previous dredging projects. The document addresses resources and impacts related to the dredging sites, the MBDS/IWS and the artificial reef sites. In addition, it addresses the secondary impacts of the deepening project including increased ship traffic and an increase in the size of ships entering the harbor. Although the Draft SEIS/EIR generally characterizes impacts as insignificant and/or temporary in nature, it indicates that the dredging project will alter approximately 22 acres of previously undisturbed bottom and may convert more than 1,100 acres of soft-bottom to hard substrate. In addition, the project will follow over ten years of maintenance and improvement dredging in the harbor that were conducted from 1998 – 2002 (BHNIP), 2004 – 2005 (OHMDP) and the current IHMDP that will extend from 2008 to 2009. The Draft EIS/EIR indicates that, cumulatively, these dredging

Comment EOEEA #8

projects will result in temporary and permanent impacts to approximately 3,600 acres (although portions of the projects overlap).

The proponent indicates that it will use dredging protocols developed during the BHNIP to minimize turbidity and migration of dredged sediments during dredging and disposal. Measures used during blasting to minimize impacts to fisheries included an independent fisheries observer, side scan sonar fish finder and fish startle system. The Draft SEIS/EIR identifies four fish kill events associated with 13 blasting events as part of the maintenance project (ledge pinnacle removal) that occurred despite implementation of protective measures. The Draft SEIS/EIR does not provide the "After Action Report" referenced in the ENF or identify revisions to protocols or additional mitigation necessary to avoid and minimize these impacts. Although blasting presents the most significant source of risk for impacts to marine resources, the Draft SEIS/EIR does not include an analysis of the location, timing and methods of proposed blasting and anticipated impacts on marine resources. It does indicate that the project will be sequenced to minimize impacts to fisheries but it does provide a schedule that supports this or indicate what factors will be considered for sequencing. Appendix D of the Draft SEIS/EIR provides a schedule (Table D2-30) that projects blasting for a 15-month period from May of 2011 to August 2012 within the Broad Sound North Entrance Channel. Additional blasting would occur in the Chelsea River in May, 2011, in the Presidents Road Anchorage from August to September of 2012, in the Lower Reserved Channel and Turning Basin from April to August of 2013, in the Main Ship Channel Roads to Reserved Channel from August to October 2013, and in the Main Ship Channel Extension to the Massport Marine Terminal from November to December, 2013. Further, the Draft SEIS/EIR indicates that, development of more detailed data, including more extensive borings to characterize the type and quantities of rock to be removed, will not be conducted until the final design phase.

Comment EOEEA #9

Comment EOEEA #10

To assist the permitting agencies in their evaluation of the potential impacts of this project within the context of a growing and active harbor, the Draft SEIS/EIR includes a qualitative cumulative impacts analysis that identifies completed, ongoing and planned projects within Boston Harbor and Massachusetts Bay, including the Hubline Submarine Natural Gas Pipeline project and Everett Extension (EEA #12355) and the use of an offshore borrow site (NOMES I) by the Department of Conservation and Recreation (DCR) as a sand source for the Winthrop Shores Reservation and Restoration Program (EEA #10113). It includes a summary of the project impacts, individually and cumulatively, including the size of the impacted area, the resources impacted by the projects, and the duration of the impacts. In addition, it includes a timeline that shows when the projects are planned to occur in relation to the dredging project. This analysis underscores the amount of activity ongoing and planned within Boston Harbor with the potential to impact up to 18% of Boston Harbor. This analysis demonstrates that the BHDDNIP, HubLine and the the Winthrop Shores Reservation Restoration Program are associated with the vast majority of potential impacts (temporary and permanent).

Comment letters express significant concern with three issues – the timely development of additional data to adequately characterize sediment types and affected resources, development of mitigation to adequately avoid, minimize and mitigate impacts to fisheries, in particular from blasting impacts, and additional consideration of beneficial reuse opportunities. EPA comments indicate that the duration and magnitude of blasting described in the Draft SEIS/EIR is of a scope

that has the potential for serious and significant impacts to fish and marine mammals and is the most significant source of risk for impacts to marine resources associated with the project. Comments from DMF and NMFS stress the importance of this ecosystem to fisheries and indicate the grave status of some species within Boston Harbor. DMF identifies the importance of the project site to several species of shellfish and finfish, including lobster (*Homarus americanus*), soft shell clam (*Mya arenaria*), mussels and winter flounder (*Pseudopleuronectes americanus*). In addition, several diadromous species utilize the area including rainbow smelt (*Osmerus mordax*), Atlantic tomcod (*Microgadus tomcod*), white perch (*Morone Americana*), and river herring (*Alosa spp.*). Comments from NMFS also highlight the presence of alewife (*Alosa pseuodoharengus*) and blueback herring (*Alosa aestivalis*). Boston Harbor is classified as Essential Fish Habitat (EFH) for 23 federally managed species including winter flounder and Atlantic cod. DMF has banned fishing for river herring due to population concerns and rainbow smelt is listed as a "species of concern" by NMFS. Commentors indicate that the Final EIS/EIR should include a sequencing plan, blasting plan and pre- and post-monitoring plan to ensure adequate provisions are made to avoid, minimize and mitigate project impacts.

Environmental Impacts – Air Quality

The Draft SEIS/EIR includes an air quality analysis and discusses alternatives for establishing consistency with the federal Clean Air Act (CAA) General Conformity provisions (section 176(c)(1)). MassDEP's role in a general conformity determination under federal regulation is to review and provide comments on conformity determinations. Federal actions must support the goals of the Massachusetts State Implementation Plan (SIP) and be shown not to:

- Cause or contribute to new violations of any national ambient air quality standard (NAAQS) in any area;
- Increase the frequency or severity of any existing violation of any NAAQS or interim emission reductions;
- Delay timely attainment of any NAAQs or interim emission reductions.

The Draft SEIS/EIR includes an air quality analysis for the No Build, Plan A and Plan C. The analysis indicates that emissions associated with both alternatives would exceed the general conformity deminimis thresholds.

The proponent has identifies two approaches to address general conformity. It can structure the project to ensure its emissions are below identified thresholds or it can offset the total emissions of the projects through emission reductions projects or through the purchase of emission reduction credits. The Draft SEIS/EIR indicates that, without a work stoppage, the project will likely be subject to the General Conformity provisions of the CAA. The EIR indicates that sufficient emission reductions credits are available to offset project emissions and that the costs of this alternative are equivalent to those associated with the cost of one mobilization and demobilization of the project.

The EIR identifies two options (Alternatives 1 and 2) to reduce emissions below the general conformity review thresholds. Both alternatives propose the replacement of older, higher emitting equipment with newer and cleaner burning equipment in 2011 and beyond and extend the dredging schedule to reduce annual emissions associated with the project. Alternative 1 would increase the dredging schedule by 6 months and Alternative 2 would increase the dredging project by four years. Extension of the dredging schedule through work stoppages will not reduce actual emissions associated with the project. The use of cleaner burning equipment will provide a relatively small decrease in overall emissions. Nitrogen Oxide (NO_x) emissions associated with these alternatives would remain close to the deminimis level under the general conformity requirements.

Comments from MassDEP indicate that the proponent should explore additional mitigation strategies, including the use of emission reduction credits to offset emissions. MassDEP comments also express support of the use of lower emitting nonroad engines for the project and identify the need to verify how this strategy will be implemented and enforced. In addition, MassDEP notes that if the proponent chooses to delay the project schedule, it should consider targeting dredging operations in the pre-or post-ozone season.

Comments from EPA express concern with the approach to general conformity and, in particular, with the potential impacts to marine resources associated with an extended schedule which would increase the duration of impacts and therefore the recovery period. EPA indicates that the proponent should further consider the use of emission credits and/or offsets and that the approach to general conformity be fully vetted for public review as part of the environmental review document rather than addressed during the final design process. They note that a general conformity analysis requires a public review process and issuance of a final conformity determination prior to the issuance of the Record of Decision (ROD) and, therefore, draft conformity findings should be reviewed prior to the close of the NEPA process.

Comment EOEEA #11

Impacts to Historic and Archaeological Resources

The Draft SEIS/EIR identifies potential impacts to historic and archaeological resources. It indicates that, based on remote sensing surveys and vibracore investigations, significant cultural resources are unlikely to be encountered in the Main Ship Channel, the extension of the Main Ship Channel above the Turning Basin and in the Mystic River. It indicates that borings and remote sensing surveys should be conducted for the widening of the Chelsea River Channel to assess the presence of cultural resources. The Draft EIS/EIR indicates that the proponent will continue its consultations with the Massachusetts Historical Commission (MHC) and the Massachusetts Board of Underwater Archaeological Resources (BUAR).

Comment EOEEA #12

Conclusion

Review of the Draft SEIS/EIR, review of comment letters and consultation with state agencies indicate support for the proposed project. Although additional review of alternatives is not warranted, there are significant outstanding issues that must be resolved regarding development of measures to avoid, minimize and mitigate project impacts. These outstanding issues can be addressed in the Final EIR and the proponent may prepare and submit the Final

Comment EOEEA #13

EIR for review. I expect that the proponent will fully address the issues identified in the Scope below. In particular, I note that failure to adequately characterize resources could lead to requirement of more conservative mitigation measures in state permits.

Comment EOEA #14

In the event that the Final EIS does not fully address issues, the comment letter from EPA has noted that a supplemental NEPA process may be necessary to provide to agencies and the public supplemental information during the design phase of the project. I note that the MEPA regulations allow the filing of a Notice of Project Change (NPC) subsequent to the review of the Final EIR that can be used to provide public review of significant changes to the project and/or development of additional information/analysis.

SCOPE

The Final EIR should follow Section 11.07 of the MEPA regulations for outline and content, as modified by this scope. It should include a copy of this Certificate and of each comment received.

Marine Resources

Regulatory Consistency

The Water Quality Certificate, issued by MassDEP, will be the vehicle for establishing enforceable mitigation commitments. Adequate resource characterization and development of mitigation commitments will be necessary for CZM to issue a federal consistency statement.

Comment EOEA #15

The Final EIR should provide additional information on 401 Water Quality Certification standards and criteria and demonstrate how the project is being designed to ensure consistency with these requirements. MassDEP, as the permitting agency, will incorporate requirements for fisheries protection into the Water Quality Certificate based on consultation with DMF. As noted previously, provision of adequate resource characterization and mitigation developed in response to these findings will balance the need for more conservative mitigation approaches such as strict dredging windows. Best management practices will need to be developed based on available technology.

The ACOE has committed to convening an interagency underwater blasting technical working group with federal and state resource agencies to focus on construction sequencing for several areas of the harbor, constraints on work during certain tidal and weather conditions,

Comment EOEA #16

operational changes and equipment changes. As noted previously, the Final EIR must provide more information on sequencing including the location, timing and methods of proposed blasting and anticipated impacts on marine resources. The Final EIR should further illustrate how much hard bottom is impacted, how much will be converted to other habitat and how much may be created within the project site. In addition, a pre- and post-monitoring plan must be developed for the project as a whole, including the artificial reef if that remains as a project component.

The Final EIR should identify total impacts (permanent and temporary) to Land Under the Ocean. It should include a timeline and plans that clearly illustrate where and when the BHNIP, IHMDP, OHMDP and the BHDDNIP overlap. It should provide a plan that clearly delineates areas that BHDDNIP will alter that have not been disturbed by the BHNIP, IHMDP and OHMDP. The Final EIR should include maps that clearly delineate resource areas including eelgrass beds and shellfish habitat. In addition, the Final EIR should assess noise impacts associated with the blasting, in particular, for blasting associated with the Mystic River and Chelsea River.

Comment EOEEA #17

Comment EOEEA #18

Monitoring Program

Resource agencies identify the need for an environmental monitoring plan to assess the recovery period of impacted areas. The monitoring plan should be included in the Final EIR. Its scope and duration should be developed in consultation with the working group. It should include pre- and post-monitoring, real-time information on the impacts of blasting and reporting protocols. The Final EIR should identify the extent of suspended sediment dispersion resulting from dredge operations and indicate how the plume is modeled and verified.

Comment EOEEA #19

Resource Characterization

Comments from CZM and DMF indicate that additional information on shellfish, fish, benthic infauna and epifauna, and other species of decapod crustaceans is necessary to adequately evaluate baseline conditions and recovery. The lack of site specific data for the blast area is of particular concern due to potential impacts to relatively stable exposed bedrock seafloor habitat. A minimum of one year of fisheries data should be collected to support the development of a sequencing plan. The total amount of conversion of soft-bottom habitat to hard substrate should be identified and conversion should be identified on project plans.

Comment EOEEA #20

In addition, CZM notes that the Draft SEIS/EIR identifies the presence of scallops in the outer and lower harbor, with areas of coarser-grain material and encourages the development of additional resource characterization and monitoring to further characterize these resources. DMF notes particular concern with softshell clam habitat that will be impacted by dredging in the Chelsea River, including permanent loss through habitat conversion. The Final EIR should include a clear delineation of the shellfish habitat potentially impacted by dredging and assess the functional loss to other species. The Final EIR should identify measures to avoid, minimize and mitigate impacts to these resources. In addition, the Final EIR should identify any elements of the project that are located within the Cod Conservation Zone.

Comment EOEEA #21

Comment EOEEA #22

The proponent should consult with MassDEP, as the permitting agency, DMF and CZM regarding further characterization of resources prior to the filing of the Final EIR.

Sequencing Plan

The sequencing plan should include a plan for sequencing the most disruptive and potentially damaging aspects of the project (e.g. blasting) to avoid sensitive locations during

Comment EOEEA #23

Comment EOEEA #23 critical times of year. Additional resource characterization, including a minimum of one year of biological surveys to assess fisheries resources and use of habitat, should be completed to support a rational sequencing plan. It should identify the volumes of material that will be dredged in what time periods and it should consider timing of disposal (i.e. dredge contaminated in early phases so that it can be capped with clean material dredged in subsequent phases). The Proponent should consult with DEP, as the permitting agency, and DMF to determine what additional data is necessary to support the sequencing plan and the monitoring plan. As noted previously, the proponent may choose to more fully characterize the resources affected by the project or may be subject to a more conservative management approach including time-of-year restrictions.

Comment EOEEA #24

Comment EOEEA #25 The proponent should establish plans for communication with the fishing and lobstering communities regarding construction activities and timing to avoid impacts and conflicts.

Blasting Plan

The blasting plan should be included in Final EIR to understand impacts and potential recovery of the area and plan for modifications that may be necessary as the project proceeds. ACOE has indicated it will provide an "After Action Report" to provide information and determine what lessons can be learned from 2007 fish kills. This report must be included in the Final EIR and will inform development of the blasting plan. The blasting plan should consider avoidance measures such as shifting of channel limits and, where feasible, removal of rock with a large toothed bucket mounted on an excavator. It should consider additional technological approaches, sequencing and time of year restrictions. Technological approaches could include use of additional acoustic fish exclusion devices and consideration of bubble curtains. The proponent should commit to provide an independent third party observer that will consult with the TWG and ensure procedures are followed or modified on a real-time basis.

Comment EOEEA #26

Threatened and Endangered Species, Marine Mammals

Comments from NMFS indicate that its previous determination that the project is likely to have no adverse affect on marine mammals was based on removal of two to six cy of material and did not identify the need for blasting for rock removal. NMFS comments indicate the need to reinitiate consultation and provide additional information regarding the potential impacts of blasting on marine mammals.

Comment EOEEA #27 EPA has indicated that ACOE should evaluate the potential for impacts of blasting on the recently installed buoy listening and monitoring system. This system was designed to reduce the likelihood of ships colliding with whales by providing close to real time information regarding the presence of whales in the shipping channel.

Disposal and Reuse of Dredged Materials

The Draft EIS/EIR proposes to use dredged materials to cap the EPA IWS and to create an artificial reef. The Draft EIS/EIR indicates that five sites were evaluated for creation of an

artificial reef based on ACOE siting criteria. These were narrowed to two sites - one site in Massachusetts Bay and one site in Broad Sound. The Draft EIS/EIR indicates that, dependent upon the final alternative selected and the reef design, the project would alter 220 to 530 acres of soft bottom habitat.

As noted previously, comment letters indicate the need to re-assess beneficial uses for the rock material. Comments urge the proponent to reconsider upland disposal options as a first priority and creation of the proposed reef as a secondary consideration. The proponent should consult with CZM regarding an upland disposal alternative that is being developed by its staff and address its viability in the Final EIS/EIR. Comment EOEEA #28

Comment letters indicate that, based on the information provided in the Draft EIS/EIR, both sites support a diverse and abundant benthic community, include substantial hard bottom habitat and are productive for managed species such as winter flounder and red hake. Comments from DMF indicate that the proponent should use the DMF Artificial Reef Policy for developing site selection and monitoring and consider application of the site selection model used by DMF for creation of the Hub Line cobble reef. If the proponent wants to include an artificial reef alternative in the Final EIR, it should continue consultation with the TWG to develop alternatives that may better meet the identified goal of providing fish habitat. The Final EIR should define more precisely the potential for impacts associated with the project, assess the loss of soft bottom habitat and related impacts and include a monitoring program to document colonization rates and other indicators of habitat creation. Comment EOEEA #29

EPA and CZM support use of parent material to cap the IWS in Massachusetts Bay. EPA comments indicate that the capping of the site is an opportunity to further reduce the remaining risk associated with waste barrels that may still exist at the site. The results of the preliminary capping demonstration, which will be conducted as part of the OHMDP, should be reviewed by the TWG and included in the Final EIR. Comment EOEEA #30

The Final EIR should address whether any of the material that will be dredged is appropriate for placement on Winthrop Beach for its beach nourishment program (EEA #10113). The proponent should assess the compatibility of material with Winthrop Beach using the additional geotechnical investigations that will be conducted for the BHDDNIP. The proponent should consult with the DCR and the Town of Winthrop regarding this assessment. Comment EOEEA #31

Technical Working Group (TWG)

The EIR clearly states the proponent's commitment to ongoing participation in the project by the TWG. I expect the TWG will participate in the development of the Final EIR, as well as final design, to further develop monitoring and mitigation requirements. Close cooperation between the proponent and state and federal agencies during the design phase of the project must be built in to ensure that final plan meets goals of the proponent while avoiding, minimizing and mitigating project impacts. During dredging operations, the TWG should be convened on a regular basis to assess the success of control measures and review project progress. Comment EOEEA #32

CZM has suggested the creation of a technical advisory sub-committee, facilitated by an independent, third-party contractor, to manage unforeseen developments as they arise during the construction phase of the project. The contractor would coordinate with the independent fisheries observer during dredging operations to provide a rapid, coordinated response from agency and community representatives. The Final EIR should indicate whether the proponent will incorporate this measure into its management plan.

Comment EOEEA #33

Air Quality

I urge the proponent to provide a revised approach to conformity within the Final EIR and to consult with and EPA and MassDEP regarding this approach. As noted previously, comment letters, including letters from MassDEP and EPA, indicate that the proponent should explore additional mitigation strategies, including the use of emission reduction credits to offset project related emissions. The Final EIR should identify how use of lower emitting nonroad engines and extension of the dredging schedule will implemented and enforced and should consider targeting dredging operations in the pre-or post-ozone season. In addition, the Final EIR should identify impacts to marine resources associated with an extended schedule. Consistent with EPA's comment that draft conformity findings should be reviewed prior to the close of the NEPA process and issuance of the Record of Decision (ROD), the Final EIR should provide additional information regarding measures for establishing consistency with general conformity and include a general conformity finding. Consistent with comment letters, I urge the proponent to commit to the purchase of emission reduction credits.

Comment EOEEA #34

Historic and Archaeological Resources

Comments from MHC indicate that it anticipates continued consultation with ACOE regarding the methodology and results of its cultural resource surveys. Comments from BUAR indicate that it has consulted with ACOE regarding mitigation for previous dredging projects and has been satisfied with findings and recommendations of archaeological surveys conducted to date. BUAR concurs with the recommendation that a remote sensing archaeological survey should be conducted for the areas of potential affect in the Mystic River and Chelsea River channels.

Comment EOEEA #35

Harbor Infrastructure

The EIR identifies potential conflicts with existing harbor infrastructure including tunnels and utility crossings. It identifies a potential conflict with the 115 Kv Submarine Power Cable that extends from the Reserved Channel to Deer Island and is the primary source of power to the Deer Island Treatment plant. The cable construction, operation and maintenance and associated substations is borne entirely by the MWRA and its ratepayers. The proposed limit of the project may deepen the Reserved Channel at or deeper than the current location of this cable. NSTAR documents indicate that the cable was installed at approximately -50 feet MLLW with variations higher and lower along its course. The permit for the cable required it to be buried at -60 feet MLLW to avoid conflicts with deepening projects. The Draft SEIS/EIR indicates that the

Comment EOEEA #36

ACOE, which issued a Section 10 permit for the cable, has referred the matter to the U.S. Attorneys' office as an enforcement action. The U.S. Attorney's office is negotiating with MWRA and NSTAR to address the conflict with the BHDDNIP.

Comment EOEEA #36

MWRA comments express significant concern with the impacts of blasting and dredging on this cable and identify the need for additional survey work to determine the precise location and depth of the cable.

The Final EIR should provide an update on negotiations, indicate who will be responsible for identifying actual locations and depths of existing infrastructure that could be directly affected by the project's construction, who is responsible for related costs, and asses the feasibility and cost of relocating the cable.

Comment EOEEA #37

MWRA comments also note that work within the Chelsea River must be carefully coordinated with the MWRA to avoid impacts to its 36" water main and three wastewater crossings. In addition, the comments note that this element may require a 8(m) permit.

Mitigation

The Draft SEIS/EIR identifies the following measures to avoid, minimize and mitigate project impacts:

- Sequencing to minimize impacts on fish and shellfish populations;
- Preparation of an "after action report" to provide information on all of the blasting events associated with fish kills;
- Establishment of an interagency underwater blasting technical working group comprised of federal and state resource agencies;
- Use of a fisheries observer, side scan sonar fish finder and fish startle system to minimize impacts to fisheries during blasting;
- Prohibition on blasting when schools of fish, sea turtles or mammals are observed in the vicinity;
- For any disposal of contaminated material, proponent will follow protocol for disposal in CAD cells developed through BHNIP;
- Creation of artificial reef with rock material to preserve space in MBDS and provide mitigation for habitat impacts;
- Remote sensing surveys and borings of the northern portion of the Presidents Road Anchorage and area of the Chelsea River proposed for widening to identify historic resources and proposed rock reef sites;
- Remote sensing surveys of proposed rock reef sites to identify historic resources; and
- Development of a disposal plan at the MBDS and a capping plan at the IWS to avoid located shipwrecks;
- Development of a communications system to provide notice to lobstermen and fishermen prior to drilling, blasting and dredging operations; and

- Replacement of older, higher emitting equipment with newer and cleaner burning equipment in 2011 and beyond and extension of the dredging schedule to reduce annual emissions associated with the project.

Comment EOEEA #38

The Final EIR should include an updated and revised mitigation section including a summary of all mitigation measures to which the proponent has committed. It should include draft Section 61 Findings for the 401 Water Quality Certificate. Mitigation should address temporary, short-term and long-term impacts.

Comment EOEEA #39

It should indicate whether the proponent will develop compensatory mitigation plans for direct and indirect mortality of fisheries resources, delayed recovery of habitat and areas of habitat that are permanently lost or altered.

Response to Comments

To ensure that the issues raised by commentors are addressed, the Final EIR should include a response to comments. This directive is not intended to, and shall not be construed to, enlarge the scope of the Final EIR beyond what has been expressly identified in the initial scoping Certificate or this Certificate. The Final EIR should include a copy of this Certificate and a copy of each comment letter received. I defer to the proponent as it develops the format for this section, but it should provide clear answers to questions raised.

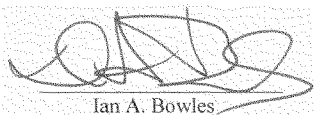
Comment EOEEA #40

I note the comment letter submitted by the Town of Winthrop expressing concern with the scale of the proposed project, impacts on fisheries habitat and potential changes to sediment transport patterns. I expect the ACOE will provide a response to those issues that are within the Scope of this Certificate and, in particular, address the potential of the project to affect long-term sediment transport patterns.

Circulation

The Final EIR should be circulated in compliance with Section 11.16 of the MEPA regulations. Copies should be sent to any state agencies from which the proponent will seek permits or approvals, to the list of "comments received" below, to the Conservation Commissions in Boston, Revere and Chelsea and copies should be provided to the public library in Boston, Revere and Chelsea.

June 13, 2008
Date



Ian A. Bowles

Comments received:

6/2/08	Board of Underwater Archaeology (BUAR)
5/28/08	Coastal Zone Management (CZM)
6/3/08	Department of Environmental Protection (DEP)
6/2/08	Division of Marine Fisheries (DMF)
5/5/08	Massachusetts Historical Commission
6/2/08	Massachusetts Water Resources Authority (MWRA)
5/23/08	U.S. Environmental Protection Agency (EPA)
6/2/08	National Marine Fisheries Service (NMFS)
6/2/08	City of Boston/The Environment Department
6/2/08	The Boston Harbor Association (TBHA)
6/2/08	Save the Harbor/Save the Bay
5/30/08	Town of Winthrop/Town Council

IAB/CDB/cdb

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
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June 2, 2008

Curtis L. Thalken, Colonel
U.S. Army Corps of Engineers
District Engineer
ATTN: Programs and Project Management Division (Mr. Michael Keegan)
696 Virginia Road
Concord, MA 01742-2751

RE: Feasibility Report and Draft Supplemental Environmental Impact Statement/Environmental Impact Report (Draft SEIS/EIR), Boston Harbor Deep Draft Navigation Improvement Project; Boston, Chelsea, Revere

Dear Colonel Thalken,

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the above-referenced Feasibility Report and Draft Supplemental Environmental Impact Statement/Environmental Impact Report (Draft SEIS/EIR) and recommends the preparation of a Final Environmental Impact Statement/Environmental Impact Report for the project.

Project Description

The U.S. Army Corps of Engineers, in partnership with the Massachusetts Port Authority, are proposing to deepen the Port of Boston to allow deeper draft bulk and container vessels to enter without experiencing tidal delays in order to position the port to effectively meet current and future cargo needs of the shipping industry. The proposal recommends the deepening of the Broad Sound North Entrance Channel, the lower Main Ship Channel through President Roads to the Reserved Channel, the President Roads Anchorage Area, the lower Reserved Channel, and the Reserved Channel Turning Area to -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Entrance Channel (to -50 feet MLLW). The proposal also includes widening the Main Ship Channel to 900 feet through the reaches between President Roads and Castle Island and to 800 feet above Castle Island to the Reserved Channel; widening the Reserved Channel Turning Area to 1,600 feet; and further widening in the channel bends at Spectacle Island and Castle Island. The Main Ship Channel would be deepened for an additional distance of 2,600 feet above the expanded Reserved Channel Turning Area to -45 feet MLLW; the 9.1-acre, 35-foot channel lane approach to the Medford Street Terminal in the Mystic River would be deepened to -40 feet MLLW; and the 38-foot Chelsea River Channel and Turning Basin would be deepened to -40 feet MLLW, with accompanying widening of the bridge approaches, the bend between the two bridges, and through a new Chelsea Street bridge opening. These improvements would require the removal and disposal of between 6.6 and 14.8 million cubic yards of parent material and between 450,000 and 1.4 million cubic yards of rock.

Project Comments

CZM supports the proposed improvements to Boston Harbor included in the deepening project. Boston is the premier New England port for bulk and container cargoes, and the improvements will increase the ability of the port to attract larger, deeper draft vessels and thus improve the commercial viability of the port. As the project proceeds through the preparation of the Final EIS/EIR, the design phase, and the state permitting process, the proponents should provide additional information and discussion on the issues identified below.

Technical Working group/Technical Advisory Committee

CZM has participated in the Technical Working Group (TWG) for the completed Boston Harbor Navigation Improvement Project (BHNIP) and continues to believe that the ongoing participation of this group is critical to the success of the proposed project. Close cooperation between the project proponents and state and federal agencies during the design phase of the project must be built in to the process to ensure that the final plan both meets the goals of the proponents while avoiding or minimizing the potential environmental impacts. CZM also suggests the establishment of a smaller technical advisory sub-committee, facilitated by an independent, third-party contractor, to manage situations as they arise during the construction phase of the project. This model was employed during the BHNIP and was very successful in allowing the project to proceed with minimal delays.

Comment CZM #1

Outer and Lower Harbor Resources

The information provided on the general abundance and distribution of the American lobster was sufficient to understand the population characteristics of the project area. However, there was little or dated information on the other potentially impacted natural resources such as shellfish, fishes, benthic infauna and epifauna, and other species of decapod crustaceans (e.g. rock crabs). The lack of site-specific data for the blast areas is of particular concern due to the potential impacts to the relatively stable exposed bedrock seafloor habitat. The area to be blasted is largely different than the proposed dredging areas. The seafloor in the inner and lower harbor is largely comprised of relatively mobile soft sediments that support a dynamic community of benthic infauna and epifauna typical of highly disturbed environments. The area to be blasted in the outer harbor is in an area of hard bottom (bedrock and boulders) that is presumably very stable and not highly disturbed, potentially supporting a stable community. A pre- and post blasting/dredging monitoring program of the impacted areas, particularly the areas to be blasted and outer and lower harbor resources would allow for a sufficient description of the baseline characteristics and potential impacts, while facilitating the monitoring of recovery in the area.

Comment CZM #2

Comment CZM #3

The Draft EIS/EIR indicates the presence of scallops in the outer and lower harbor, with areas of coarser-grain material. Scallops are an important commercial resource and indicative of the presence of coarse-sand to cobble substrate. This substrate is also valuable habitat to a number of marine species, including early benthic phases of Atlantic cod and American lobster. The resource characterization and monitoring should include a variety of techniques to assess benthic habitats, as sediment profile imaging (SPI) is only suitable for collecting data on sessile infauna and epifauna in soft sediments. A combination of underwater observations (e.g., diver-based and/or underwater vehicle), benthic grabs, and SPI would be useful to fully describe the resources. Further details on the ecological characteristics of the outer and lower harbor natural resources would better allow an understanding of potential impacts and the development of mitigation measures and strategies.

Comment CZM #4

Environmental Consequences and Blast Plan

A comprehensive blast plan should be developed to better understand not only the impacts and potential recovery of the area, but to allow for any modifications of the plan that may be required as the project proceeds. The blast plan should include details regarding methods and materials to ensure that the minimum blast effect is generated. The blast plan should also include a

Comment CZM #5

detailed fish-startle system description to be developed in consultation with state and federal regulatory agencies. This system should include strict guidelines on implementation and review procedures to ensure the most effective protection to fishes and resources in the project area. An independent third party observer should also be present during the project to ensure that these procedures are followed or modified on a real-time basis with the TWG.

Comment CZM #6

Consideration should also be given to harvesting American lobsters and rock crabs from the blast areas as part of the plan to limit the impact to these valuable commercial fisheries. Substantial concentrations of attached shellfish such as mussels, encountered in the blast area should also be harvested and relocated as appropriate. These harvested resources could be transported to similar nearby habitat, helping to minimize the impacts associated with the removal of tbis valuable habitat.

Comment CZM #7

In order to make informed decisions regarding the potential impacts to demersal eggs, benthic invertebrates, or fishes, the pattern of sediment settling around the dredge as well as the concentration of total suspended solids in the sediment plume should be modeled. This information may have been already determined using the SSFATE model, however the data and associated maps were not presented. The only modeling presented in the Draft EIS/EIR relates to the increase in harbor currents upon completion of the deepening project.

Project Sequencing

Comment CZM #8

Boston Harbor is habitat to a number of managed and regulated fisheries. Both anadromous and catadromous species pass through the harbor and are species of concern for the project. Winter flounder use the area for both spawning and rearing. The determination of project sequencing should be addressed to avoid or minimize the effects on the species at different times during the year. Sequencing the most disruptive and potentially damaging aspects of the project (e.g. blasting) to avoid sensitive locations during the critical time of year, while continuing to work in less sensitive areas, would allow for a timely completion of the project. This sequencing should be developed with the input of the Massachusetts Division of Marine Fisheries and the National Marine Fisheries Service.

Beneficial Use

Comment CZM #9

A better understanding of the need for a rock reef using blasted rock in Massachusetts Bay is required to make an appropriate judgment on the proposal. In general, there is not a lack of hard bottom in the bay and it is not likely to be the limiting factor for American lobster populations. The creation of the proposed rock reef for the benefit of the American lobster may not be warranted and may simply replace an existing productive habitat with rocky material. Both sites that are proposed (Broad Sound and Massachusetts Bay) were found to support a diverse and abundant benthic community with numbers of organisms on the order of tens of thousands per square meter. The applicant found that these proposed conversion sites were productive habitat for managed species such as winter flounder and red hake. CZM suggests that rather than convert existing, productive soft bottom habitat to hard bottom, the proponent further evaluate the use of rock material as shore protection and for upland use. In previous correspondence, CZM has identified potential locations for the material.

Comment CZM #10

CZM supports the plan to use parent material, primarily composed of Boston blue clay, to cap the Industrial Waste Site in Massachusetts Bay. This project may result in the elimination of hazardous materials being dispersed to the water column or recovered during (illegal) commercial fishing operations. Results of a preliminary capping demonstration using material obtained from the present maintenance project should be reviewed by the TWG and used to design the capping project.

Federal Consistency

The proposed project is subject to CZM federal consistency review and must be found to be consistent with CZM's enforceable program policies. For further information on this process please contact Robert Boeri, Project Review Coordinator, at (617) 626-1050, or visit the CZM web site at www.state.ma.us/czm/fcr.htm.

Comment CZM #11

Sincerely,

Leslie-Ann McGee
Director
Massachusetts Office of Coastal Zone Management

LAM/bkc/tc/taw/rlb

cc: Karen Adams, U.S. Army Corps of Engineers
Mike Keegan, U.S. Army Corps of Engineers
Catherine Rogers, U.S. Army Corps of Engineers
Jacquelyn Wilkins, Massachusetts Port Authority
Deb Hadden, Massachusetts Port Authority
Brad Washburn, Massachusetts Office of Coastal Zone Management
Ben Lynch, Massachusetts Department of Environmental Protection
Ken Chin, Massachusetts Department of Environmental Protection
Alex Strysky, Massachusetts Department of Environmental Protection
Rachel Freed, Massachusetts Department of Environmental Protection
Christopher Boelke, National Marine Fisheries Service
Kathryn Ford, Massachusetts Division of Marine Fisheries
Tay Evans, Massachusetts Division of Marine Fisheries
Eileen Feeney, Massachusetts Division of Marine Fisheries
Mark Rousseau, Massachusetts Division of Marine Fisheries
Tim Timmermann, U.S. Environmental Protection Agency
Ed Reiner, U.S. Environmental Protection Agency
Phil Colarusso, U.S. Environmental Protection Agency

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EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
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TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

Ian A. Bowles, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston MA, 02114

RE: Boston Harbor Deep Draft Navigation Improvement Project
EOEA File No. 12958

Attn: MEPA Unit-Deirdre Buckley

Dear Secretary Bowles:

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the Feasibility Report and Draft Supplemental Environmental Impact Report/Environmental Impact Statement (DSEIR/EIS) for the Boston Harbor Deep Draft Navigation Improvement Project proposed by the U.S. Army Corps of Engineers and Massachusetts Port Authority (Massport). The purpose of the project is to allow access to Boston Harbor by deeper draft vessels without delays due to tidal cycles. The proposed project includes the following changes to the Main Channels, which would result in the removal of approximately 953,000 cubic yards (cy) of rock and 11.1 million cy of dredged material: deepening the 40-foot lane of the Broad Sound North Entrance Channel to 50 feet MLLW and widening it to allow turning of larger vessels; widening and deepening the Main Ship Channel from the Main Ship Channel to Reserved Channel to 48 feet MLLW; deepening the President Roads Anchorage to 48 feet MLLW to accommodate two large vessels at anchor; widening and deepening the lower reach of Reserved Channel; and widening and deepening the Reserved Channel Turning Basin. The project also includes: deepening a 2600 foot length the Main Ship Channel above the Reserved Channel Turning Area to 45 feet MLLW, requiring the removal of approximately 246,300 cy of dredged material and 78,400 cy of rock; deepening a 9 acre area of the Mystic River Channel to 40 feet, generating 67,100 cy of dredged material; and deepening and widening the Chelsea River Channel and Turning Basin to 40 feet MLLW, requiring the removal of 342,600 cy of dredged material and 500 cy of rock. Material unsuitable for disposal at the Massachusetts Bay Disposal Site (MBDS) is proposed to be placed in existing and proposed Confined Aquatic Disposal cells in Boston Harbor, or beneficially reused.

MassDEP generally supports the proposed improvements to support the working port areas of Boston Harbor. The project will require a s.401 Water Quality Certificate under 314 CMR 9.00 to ensure that the dredging and in-state disposal activities meet state Surface Water Quality Standards (314 CMR 4.00). In addition, MassDEP, as noted below, MassDEP will perform an Air Quality General Conformity Determination. Comment DEP #1

Dredging comments

Beneficial Reuse

The DSEIR/EIS proposes to beneficially reuse some of the clay parent material to use as a cap over contaminated material at the Industrial Waste Site (IWS) in Massachusetts Bay. MassDEP recommends that the proponent explore additional options to reuse the material to be generated by this project. Specifically we recommend that the FEIR explore the following:

- The proponents should perform a community outreach effort to provide coastal communities with an opportunity to use the material for projects addressing shoreline erosion, beach renourishment, and other needs. Comment DEP #2
- As sequencing allows, clean material may function as a suitable cap over material to be disposed of in a Confined Aquatic Disposal (CAD) cell. Comment DEP #3
- Rocky material may provide suitable habitat in some instances. MassDEP recommends that the proponents continue to consult with the Division of Marine Fisheries and other resource agencies to develop a suitable habitat enhancement project. Comment DEP #4

Project sequencing:

The FEIR should further develop, to the greatest extent possible, a sequence of the proposed activities. MassDEP believes that appropriate sequencing can serve to minimize or avoid some of the impacts associated with this project. In particular, performing blasting activities should be performed so as to avoid times that may result in impacts to fish spawning. Comment DEP #5

Refinement of the sequence of project activities may also result in environmental benefits during disposal activities. For example, MassDEP generally recommends that the most contaminated dredged material be placed at the bottom of a CAD cell to maximize the separation of such materials from aquatic habitats. Ideally, dredging of the most contaminated material should occur early so that it will be the first to be disposed of in the CAD cell. Similarly, dredging of suitably clean material at an appropriate time could facilitate its use as a cap over the CAD cell. Comment DEP #6

Technical Working Group

MassDEP believes that because of the scale and duration of the project, the Technical Working Group (TWG) will play a critical role in the success of the project. For longer-term design issues, the TWG can provide input on minimizing impacts through the use of Best Management Comment DEP #7

Practices based on Best Available Technology. The proponents should also continue to develop a framework for providing the TWG with regular updates during the construction period, particularly for communicating unexpected occurrences that require a rapid, coordinated response from agency and community representatives. To facilitate the timely response by the TWG, the proponent should provide a third-party contractor that reports to the group. The proponents should also use the TWG to help develop means of communicating with affected users of Boston harbor, particularly fishermen and recreational and commercial boaters.

Air Quality General Conformity Determination

The requirements for General Conformity are contained in section 176(c)(1) of the federal Clean Air Act and in the General Conformity regulations promulgated by EPA in 1993 (40 CFR Part 51, Subpart W, and 40 CFR Part 93). In general, federal actions must support the goals of the State Implementation Plan (SIP) and be shown to not:

- Cause or contribute to new violations of any national ambient air quality standard (NAAQs) in any area;
- Increase the frequency or severity of any existing violation of any NAAQs; or
- Delay timely attainment of any NAAQs or interim emission reductions.

The General Conformity regulations apply to nonattainment areas where the estimated emissions from the action meet or exceed specified emission rates for each NAAQs. Eastern Massachusetts is currently classified as a moderate nonattainment area for the eight-hour ozone standard and, therefore, the emission rates below that are contained in the General Conformity regulations apply to the proposed Boston Harbor Navigation Improvement Project (BHNIP). However, it should be noted that the U.S. Environmental Protection Agency adopted a more stringent eight-hour ozone standard in 2008 of 0.075 ppm. While MassDEP submitted an attainment demonstration to EPA under the eight-hour ozone standard adopted in 1997, additional reductions in ozone precursors may be needed to attain the 2008 standard.

- Volatile organic compounds (VOC) – 50 tons/year
- Nitrogen oxides (NOx)) – 100 tons/year
- Carbon monoxide (CO) – 100 tons/year

In summary, the criteria for determining conformity for ozone nonattainment areas are as follows (see 40 CFR Part 51.858):

- The total of the direct and indirect emissions from the project are included in the SIP;
- The total of the direct and indirect emissions from the project are fully offset within the same nonattainment area through revision to the SIP or a similarly enforceable measure that affects emission reductions so that there is no net increase in emissions of that pollutant;
- The state air agency makes a determination that the total of the direct and indirect emissions from the project would not exceed the emission budgets in the SIP;

- The state air agency makes a commitment to a SIP revision to achieve the necessary reductions prior to the federal action.

The DSEIR/EIS includes a general conformity analysis and presents an emissions analysis for the no action alternative and two additional build alternatives: Alternative 1 – 45 foot deep MLLW navigation channel; and Alternative 2 – 50 foot deep MLLW navigation channel. Both build alternatives show that the emissions would exceed the general conformity deminimus review thresholds. (See Tables 4-4 and 4-7 for Alternatives 1 and 2, respectively.) To address the exceedances and to reduce emissions below the general conformity review thresholds, the DSEIR/EIS proposes two primary emission reduction options for Alternatives 1 and 2 – the replacement of older, higher emitting equipment with newer and cleaner burning equipment in 2011 and beyond and extending the dredging schedule to spread out peak year emissions over the dredging schedule.

Comment DEP #8

MassDEP supports the use of lower emitting nonroad engines for the project and notes that this strategy will significantly reduce ozone precursor emission (VOC and NOx) as well as particulate matter emissions. The proponent should verify how this strategy will be implemented and enforced (e.g., through contract specifications). MassDEP also suggests that the proponent explore whether there are any possible engine retrofit opportunities to further reduce emissions.

The extension of the dredging schedule, while it will reduce yearly emissions, will still result in NOx emissions close to the deminimus level under the general conformity requirements. Without this strategy, the proponent would be required to fully offset the increase in NOx emissions. MassDEP suggest the proponent explore additional mitigation strategies including the use of emission reduction credits to avoid these additional emissions. Finally, the proponent should present more detailed information on the dredging schedule within each year and explore targeting dredging operations in the pre- or post-ozone season. As noted above, additional reductions in ozone precursors may be needed to attain the more protective eight-hour standard adopted by EPA earlier this year.

Sincerely,

Philip Weinberg
Associate Commissioner

Cc: Paul Diodati, DMF
Tim Timmermann, EPA
Bob Boeri, CZM

The COMMONWEALTH OF MASSACHUSETTS
BOARD OF UNDERWATER ARCHAEOLOGICAL RESOURCES
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
251 Causeway Street, Suite 800, Boston, MA 02114-2136
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June 2, 2008

Curtis L. Thalken
Colonel, District Engineer
New England District
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: *Boston Harbor, Massachusetts Navigation Improvement Project - Draft Feasibility Report and Supplemental Environmental Impact Statement and Massachusetts Draft Environmental Impact Report* (EOEA #12958)

Dear Colonel Thalken:

The staff of the Massachusetts Board of Underwater Archaeological Resources has completed its review of Appendix M (Cultural Resources Investigations and Coordination) of the above referenced report and offers the following comments.

Comment BUAR #1 The Board has been in regular consultation with the Corps in developing a satisfactory research design and methodology to locate and identify potential submerged archaeological resources that could be impacted by this project. The Board has concurred with the findings and recommendations of the archaeological surveys conducted to date in support of this project (as detailed in the Board's correspondence of 26 August 2002, 18 July, 9 September 2003 and 22 June 2006), specifically for the Main Ship Channel, Reserved Channel and its Turning Area, President Road Channel Reach and Anchorage, and the North Entrance Channel from Broad Sound.

Comment BUAR #2 The Board also concurs with this report's recommendation that a remote sensing archaeological survey should be conducted for the areas of potential affect in the Mystic River and Chelsea River Channels, should proposals to deepen these areas be implemented. The Board looks forward to working with the Corps and its consultants in developing a successful surveying strategy for these areas.

Should you have any questions regarding this letter, please do not hesitate to contact me at the address above, by telephone at (617) 626-1141 or by email at victor.mastone@state.ma.us.

Sincerely,

Victor T. Mastone
Director

Cc: Brona Simon, MHC
Marc Paiva, USACE-NED
Bob Boeri, MCZM
Brad Washburn, MCZM
Deirdre Buckley, MEPA
Ellen Berkland, City of Boston

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May 5, 2008

The Commonwealth of Massachusetts
William Francis Galvin, Secretary of the Commonwealth
Massachusetts Historical Commission

Curtis L. Thalken
Colonel, District Engineer
New England District
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Boston Harbor Deep Draft Navigation Improvements Project, Boston, Chelsea, Everett, MA.
MHC #RC.323. **EEA#12958.**

Dear Mr. Thalken:

Thank you for seeking the comments of the Massachusetts Historical Commission, the office of the Massachusetts State Historic Preservation Officer, for the project referenced above, in regards to the filing of a Draft Supplemental Environmental Impact Statement/Report.

Review of MHC's files indicates that the Corps (COE to Massachusetts Board of Underwater Archaeological Resources, 10/4/2007) proposed to conduct additional identification surveys for historic properties that may be affected by the project. Comment MHC #1

MHC looks forward to reviewing the scope of the proposed identification efforts, continuing to consult on the methodology and results, and to review of the Corps determinations in accordance with 36 CFR 800.

These comments are provided to assist in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (36 CFR 800) and MEPA (301 CMR 11). Should you have any questions, please feel free to contact Edward L. Bell of my staff.

Sincerely,

Brona Simon
State Historic Preservation Officer
Executive Director
State Archaeologist
Massachusetts Historical Commission

xc:
Marc Paiva, COE-NED
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June 2, 2008

Colonel Curtis L. Thalken
U.S. Army Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742

Re: Boston Harbor Deep Draft Navigational Improvement
Project - EOEEA #12958
Feasibility Report and Supplemental Environmental Impact Report

Dear Colonel Thalken:

The Massachusetts Water Resources Authority (MWRA) appreciates the opportunity to review the Draft Feasibility Report and Supplemental Environmental Impact Report on the Boston Harbor Deep Draft Navigational Improvement Project. The Reports prepared by the U.S. Army Corps of Engineers (Corps) in partnership with the Massachusetts Port Authority (Massport) discuss proposed channel and associated navigation feature improvements to the Port of Boston. The Massachusetts Water Resources Authority (MWRA) is represented on the Dredging Technical Working Group created by Massport and the Corps in an effort to stay informed and participate in the review of this project in Boston Harbor.

The purpose of the Boston Harbor Navigation Improvement Study is to identify, formulate, evaluate and screen potential alternatives for channel deepening and related improvements at the Port of Boston. The recommended plan proposes to deepen the harbor's main channels and the lower portion of the Reserved Channel at the Conley Terminal from their existing - 40 foot depth at mean lower low water (MLLW) to a depth of between - 48 and - 50 feet MLLW. Additional minor port improvements in the Mystic and Chelsea Rivers and in the Main Ship Channel above the Reserved Channel are also under consideration. In all areas an overdepth dredging allowance of two feet is required, and in addition, in areas where ledge is encountered, (as is the case in the Reserved Channel) an additional two feet of required rock removal will be performed for vessel safety which would bring the Reserved Channel to a finished depth of not less than -52 feet MLLW.

Comment MWRA #1

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MWRA's comments are focused upon the need to protect existing infrastructure in the project area, specifically NSTAR's cable in the Reserved Channel, and MWRA water and sewer lines that may be impacted by the project located in the Chelsea River.

Reserved Channel: NSTAR Cable

MWRA commented on the Environmental Notification Form filed (ENF) in 2003, and at that time raised concerns specifically related to the potential impacts to NSTAR's existing cross-harbor electric cable located in the Reserved Channel that provides power to the MWRA's Deer Island Treatment plant serving over 2.5 million people in the metropolitan Boston area. While the cable is owned by Harbor Electric Energy Corp., a wholly owned subsidiary of NSTAR, the cost of construction, operation and maintenance of the cable and associated substations is borne entirely by MWRA and its ratepayers. The cable and substations were installed at a cost of approximately $40 million and provided power for construction of the $3.5 billion federal court-mandated Boston Harbor Project and presently provides power for the operation of the Deer Island Treatment Plant (DITP).

It appears that the proposed limit of this project will seek to achieve channel depths at or deeper than the current location of NSTAR's 115Kv Submarine Power Cable which feeds the MWRA's Treatment Plant. NSTAR's documents indicate that this cable was installed at approximately –50 feet with variations higher and lower along its course, and that the new dredging project proposes to increase the cut from the existing channel depth of – 40 to a new depth of -50 to -52. The permit required the cable to reach a depth of -60 MLLW which, based upon the "as-built" data of NSTAR's contractor, was not achieved. MWRA has the same concerns now as it did when it commented upon the ENF -- the proposed depths of a newly-deepened channel directly threaten the current location of the cable.

Comment MWRA #2

Comment MWRA #3

Comment MWRA #4

MWRA's primary concern is that any blasting and dredging as part of this proposal near the cable in the Reserved Channel cannot help but pose a direct threat of damage to the cable which would result in the long-term loss of a vital energy link to its Deer Island facility and, in the process, cause a release of insulating oil in the cable to the waters of the harbor, the same waters which have seen dramatic improvement in quality precisely because of the contributions of that wastewater treatment facility. The potential for disruption of this primary source of power to the treatment plant servicing over 43 cities and towns in metropolitan Boston would be catastrophic for MWRA over the lengthy period which would be required to replace that cable. It should be noted that even in the short term, any disruption in the use of the cable would require that MWRA depend upon and use its own generating capability which given today's fuel costs, could result in millions of dollars in annual additional expenditures charged to MWRA's ratepayers, whose municipal budgets are already substantially over-burdened. Additionally, should MWRA's sole source of back-up power fail for any reason, the environmental impacts would be disastrous.

Staff at MWRA have attended meetings with the Corps, NSTAR and the US Justice Department over the past several years in response to the Corps' claim raised in 2005 that NSTAR's cable, in certain stretches, was not laid by its contractor as deeply below the channel floor as required by its permit and in response to the Corps' insistence that corrective work be undertaken to bring the cable's location into compliance with that permit. While NSTAR has, over the past several years, identified and examined several alternative protection strategies that it believes would protect its submarine cable, no concrete progress has been made toward finding a solution that will assure that the cable could survive the channel-deepening project. Of the alternatives considered, NSTAR's preferred option for placing protective mats over the cable cannot be expected to work if the cable's current location is already at or above -52 MLLW. Until additional survey work is completed to determine the precise location and depth of the cable, it is impossible to define a protective measure that NSTAR could reliably employ. MWRA does not believe that consensus has been reached which will assure that channel-deepening to the depths desired by the project can be attained while guaranteeing that no damage will be caused to the infrastructure that is critical to MWRA's operations.

Comment MWRA #5

MWRA has worked with the proponents to try to assure that MWRA's electric source is not jeopardized and equally as important, to assure that any costs associated with the protection or deepening of NSTAR's cable are not passed on to MWRA ratepayers. It is hoped that a reasonable solution will be realized to satisfy MWRA's operational and economic issues. MWRA, as a co-permittee of the Corps' cable permit, is already one of the entities targeted for litigation by the Justice Department if the permit conditions are not met. MWRA can ill afford to expose its ratepayers to the costs of replacing a damaged cable, which cannot be repaired via splicing, to the magnitude of the diesel fuel costs which will become necessary during the multiple years that will be required to replace the cable, if damaged, or worst of all, to the prospects of operating DITP with only a single source of power when the plant was designed to operate with a back-up source.

Chelsea River: Section 38 Water Main and Three Sewer Crossings

It appears that the proposed dredging may impact MWRA's Section 38, a 36" water main that crosses under the Chelsea River. The proposed dredging plan calls for the deepening and widening of the Chelsea River Channel to - 40 feet. Section 38 is located at an approximate elevation – 44, so any future dredging and/or blasting in this area should be carefully coordinated with MWRA.

Comment MWRA #6

In addition to the Section 38 water main, there are three wastewater crossings located under the Chelsea River. These include an abandoned siphon, Section 10, an active deep tunnel Section 101, and an active siphon Section 37.5. Various elevation scales have been used by MDC, MWRA's predecessor, and will need to be researched to assure accuracy prior to dredging. We suggest that the proponent coordinate with MWRA permitting staff to identify specific elevations to determine whether or not there will be an impact to these facilities as an MWRA 8 (m) permit will be required for work in this area.

Comment MWRA #7

Comment MWRA #8

Questions regarding 8 (m) water permitting and MWRA's need to protect our water infrastructure should be directed to Ralph Francesconi at 617 305-5827. Permitting issues related to the wastewater crossings should be directed to Kevin McKenna at 617 305-5956.

MWRA understands that the deepening of the Chelsea River beyond the current -38 foot depth is based on the assumption that the Chelsea Street Bridge would be replaced by the Massachusetts Highway Department and that the Keyspan gas siphon would be removed and relocated. MWRA will continue to monitor progress of these projects and work with the Project Proponents to assure that MWRA's infrastructure is protected as all the alternatives are evaluated during the environmental review process.

Comment MWRA #9

Please contact me at 617 788-1165 if you have questions, need additional information or agency coordination to review MWRA engineering plans. Thank you for the opportunity to comment.

Yours truly,

Marianne Connolly

Marianne Connolly
Program Manager, Regulatory Compliance

cc: Deb Hadden, Massport
Michael Keegan, US Army Corps of Engineers

C: MEPA12958BosHarEIRcomments.doc

Commonwealth of Massachusetts
Division of Marine Fisheries
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(617)626-1520
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Paul J. Diodati
Director

Deval Patrick
Governor
Ian A. Bowles
Secretary
Mary B. Griffin
Commissioner

June 2, 2008

Ian A. Bowles, Secretary
Executive Office of Environmental Affairs
Attention: MEPA Office, Deirdre Buckley
100 Cambridge Street
Boston, MA 02114-2150

Re: The Boston Deep Draft Project, EEA #12958

Dear Secretary Bowles:

The Division of Marine Fisheries has reviewed the Draft Feasibility Report and Draft Supplemental Environmental Impact Statement/Draft Environmental Impact Report (DEIR) prepared by the U.S. Army Corps of Engineers (the Corps) in partnership with the Massachusetts Port Authority (Massport) for additional dredging in Boston Harbor, Mystic River, and Chelsea River. The DEIR builds on two previous documents: the Final EIR prepared in 1995 for dredging to improve navigation in Boston Harbor and the DEIR prepared in 2006 for maintenance dredging that is occurring now. We offer the following comments for your consideration and recommendations for fisheries habitat concerns that should be more specifically addressed in the Final EIR (FEIR).

Background and resource information

Comment DMF #1

This project continues work begun in 1995 dredging for navigation improvements, and continued through the 2007 maintenance dredging efforts. For operational reasons, work has proceeded for nearly this entire period, often during critical periods for fish spawning and passage. We acknowledge that Boston Harbor is an industrial harbor and a Designated Port Area. However, that designation should not devalue the fisheries resources and habitat found at the proposed work sites, particularly since significant efforts have been made to improve water quality in Boston Harbor. The status of some fisheries that use this ecosystem is considered grave or dire,[1] and requires the utmost consideration for management.

Comment DMF #2

Since virtually every estuarine waterway in Massachusetts is impacted by dredging, there is considerable concern regarding cumulative impacts on the overall ecosystem. Also, because of continuous dredging, these projects change from a potential acute, short-term impact to the fisheries resources, to an impact that is chronic and considerably different in nature. It is clear by the paucity

[1] *MarineFisheries* has banned fishing for river herring due to population concerns. Also, rainbow smelt is listed as a "species of concern" by NMFS.

of impact reports from Boston Harbor and the Providence River that limited lessons have been learned regarding the environmental impacts of previous dredging projects, let alone how a chronic impact would differ from an acute impact.

The wide geographic area of this proposed project supports several species of shellfish and finfish, including lobster (*Homarus americanus*), soft shell clam (*Mya arenaria*), mussels, and winter flounder (*Pseudopleuronectes americanus*). In addition, several diadromous species utilize the area including rainbow smelt (*Osmerus mordax*), Atlantic tomcod (*Microgadus tomcod*), white perch (*Morone americana*), and river herring (*Alosa* spp.) (Chase, 2008). Boston Harbor is classified as Essential Fish Habitat (EFH) for winter flounder by the New England Fisheries Management Council (NEFMC) and the ASMFC classifies spawning areas such as these as Habitat Areas of Particular Concern (HAPCs).

General Comments

This DEIR relies primarily on information collected and examined for previous efforts. This level of information was deemed insufficient in the past, and in many cases did not address the questions being asked. As such, the proponents have not conducted a sufficient impact assessment. Since there is a long history of dredge projects in Boston Harbor, we would anticipate a more directed and comprehensive effort to address specific environmental concerns. Instead, the DEIR provides only a review of previous documents and we are concerned about the precedent this sets. Comment DMF #3

Many decisions regarding this project are being left to the discretion of the technical working group (TWG) and are promised during the design phase. We commend the open process that Massport and the Corps have established to date. However, given the experience of these proponents in the project location, the significant resources that exist within the Corps to study the impact of dredging on marine habitats, and a recent history of impacts to marine resources resulting from the current and ongoing dredge activities in Boston Harbor, a more concerted effort could have been made to examine potential impacts of this new project. Comment DMF #4

Direct mortality of fisheries resources

This past year, several fish kills occurred during blasting events in Boston Harbor. This was not addressed in the DEIR. The FEIR should include a full assessment of the reasons behind the fish kills, and a reasoned response to avoid such impacts in the future. A multi-pronged approach is necessary to avoid impact to valuable fisheries resources: Comment DMF #5

- We recommend the proponents **generate a sequencing plan**. Based on available information, *MarineFisheries* routinely provides recommendations for time-of-year (TOY) work windows to minimize impacts on fisheries resources. However, specific project sequencing should be based on biological surveys (ideally three years) to assess fisheries resources, annual trends, and their use of the affected habitat areas. Comment DMF #6
- We recommend the proponents **generate a blast plan**. This must include an analysis of the previous fish kills and the efforts being proposed to avoid such impact (e.g. use of additional acoustic fish exclusion devices, standards for their use, consideration of bubble curtains, and adherence to time of year recommendations). Sample plans and standards have already been provided to the proponents, but were not included in the DEIR. Comment DMF #7
- Since early benthic phase (EBP) lobsters are present year-round in hard bottom habitats (Glenn, 2008), impact to this resource is unavoidable. Therefore, we recommend the proponents **clarify how much hard bottom is impacted, how much is removed, and how much is created by the project within the project site**. The proposed addition of off-site hard bottom habitat as a beneficial use should not be included in this assessment. Comment DMF #8
- We recommend a specific examination of the recovery time of hard bottom habitats that **includes sampling of EBP lobsters**. Comment DMF #9

The DEIR notes that softshell clam habitat will be impacted by potential work in the Chelsea River (p. 3-23). *MarineFisheries* expects that the proposed dredging will result in a permanent loss of this habitat by direct removal of shallow water and resulting conversion to an environment that may not support shellfish. The ecosystem function of these shellfish beds, which include softshell clam, razor clam, and blue mussels, may be significant to other fish and invertebrate species foraging in this area. Nevertheless, this habitat impact is not addressed in the DEIR. Therefore, we recommend the following:

Comment DMF #10

- The FEIR should include **a clear delineation of the shellfish habitat potentially impacted by dredging and an assessment of the functional loss to other species.**
- We recommend that the applicants coordinate with the State and Federal resource agencies to address **avoidance, minimization and mitigation options for this lost habitat in the FEIR.**

Beneficial use of dredge material

We applaud the Corps continued efforts to explore beneficial uses of dredge material. However, upland reuse and disposal options have not been given due attention.

Comment DMF #11

- We recommend that the proponents **revisit upland disposal options in the FEIR.** Only after upland disposal options have been exhausted should subaqueous habitat conversions be considered.

Comment DMF #12

- If a subaqueous disposal is required, we recommend the proponents **revisit the site selection model** for the habitat enhancement in conjunction with the TWG. The currently proposed preferred subaqueous sites, Broad Sound and Massachusetts Bay, already have significant habitat value and substantial hard bottom habitat. Edge habitat and habitat heterogeneity are crucial, so these sites may not be appropriate for disposal of all (or any) of the rock material. We are concerned the proponents are making the assumption that hard bottom habitat is always considered of higher value than supplanted habitat and that artificial reefs have the same ecosystem function as natural reefs.
- We encourage the proponents to use the guidance provided by *MarineFisheries*' Artificial Reef Policy for site selection and monitoring. Application of the site selection model used by *MarineFisheries* for creation of the HubLine cobble reef would also improve the evaluation process.

Invasive Species

Dredge barges are in the harbor for many months. They typically travel at low speeds so eliminating hull fouling organisms is not a primary maintenance objective. As such, the barges pose a significant threat to the Boston Harbor environment via the introduction of invasive species. Eradication of marine invasive species has rarely been successful and has been enormously costly,[2] therefore,

Comment DMF #13

- We recommend the **proponents identify measures to prevent the spread of invasive species** in the FEIR. For example, the proponents could require regular inspection of the barges. Such inspection should occur when a barge enters the harbor from use in foreign harbors or those known to have species invasive to New England. The inspection should follow a protocol approved by the technical working group.

Monitoring

[2] The cost of eradicating the seaweed, *Caulerpa taxifolia,* from California lagoons ran over $4 M and monitoring continues (Anderson, 2005). Failed attempts at eradication include the green crab, *Carcinus maenas,* on the west coast (Grosholz, 2000), the tunicate, *Didemnum* from barges and pilings in New Zealand and Washington state (Coutts, 2007), and the sea star, *Asterias amurensis* from a bay in Australia (Thresher, 2001).

As previously mentioned, improvement or maintenance dredging has been occurring since 1998 in Boston Harbor. Improvement dredging, by its very definition, is designed to alter the environment as permanently as possible. It is also inaccurate to identify impacts from maintenance dredging as temporary since they are chronic in nature and will result in permanent functional changes of the habitat. We recommend that the chronic impacts associated with ten plus years of dredging be fully addressed. Comment DMF #14

- We recommend the proponents **include an environmental monitoring system, specifically designed to evaluate the recovery period of impacted areas** should the project move forward. Comment DMF #15
- We request a **delineation of areas where habitat conversion will take place** due to dredging and/or blasting activities. Comment DMF #16
- We request that the applicant **provide an estimate of the time needed for recovery** of all impacted habitats. Comment DMF #17

Mitigation

Even after appropriate avoidance and minimization measures are applied in the project design and sequencing, the proposed project may still result in unavoidable impacts, including habitat conversion and direct and indirect mortality of fisheries resources.

- We recommend that the applicant begin developing **compensatory mitigation plans** for direct and indirect mortality of fisheries resources, delayed recovery of habitat, and areas of habitat that are permanently lost or altered. Comment DMF #18

Thank you for considering our comments. If you have any questions about this review or require more information please contact Kathryn Ford in our New Bedford office at (508) 990-2860, ext. 145.

Sincerely,

Paul J. Diodati
Director

Cc: M. Keegan, ACOE
C. Boelke, NMFS
B. Boeri, CZM
P. Colarusso, US EPA
C. Bush, Boston Conservation Commission
K. Chin, DEP
T. Evans, M. Rousseau, E. Feeney, F. Germano, DMF
R. Lehan, DFG

References

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CITY OF BOSTON
THE ENVIRONMENT DEPARTMENT

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June 2, 2008

Ian A Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, MA 02114
Attention: Deirdre Buckley, MEPA

Colonel Curtis L. Thalken, District Engineer
United States Army Corps of Engineers, New England District
696 Virginia Road
Concord, MA 01742-2751
Attention: Michael Keegan, Project Management Division

Re: Boston Harbor Deep Draft Navigation Improvement Project - Draft Feasibility Report and Supplemental Environmental Impact Statement/Environmental Impact Report

Dear Secretary Bowles and Colonel Thalken:

The City of Boston Environment Department and staff of the City of Boston Conservation Commission have reviewed the Draft Feasibility Report (DFR) and joint Draft Supplemental Environmental Impact Statement/Environmental Impact Report (DSEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project (Deep Draft Project) and offers the following comments.

The U.S. Army Corps of Engineers (ACOE) and the Massachusetts Port Authority (Massport) have proposed the Deep Draft Project which will include increased navigation access to Massport's Conley Container Terminal on the Reserved Channel in South Boston by dredging to a depth of at least -45 feet mean lower low water (MLLW) and improvement dredging in the Mystic and Chelsea Rivers, Main Ship Channel, the Presidents Roads Anchorage and the Broad Sound North Entrance Channel. The project proponents note that the Deep Draft Project is necessary due to existing delays to container ships and bulk carriers caused by insufficient tidal depths; the light loading of vessels, or partial loading or unloading of vessel cargo to meet tidal windows; and the bypassing the Port of Boston by carriers to meet arrival schedules at other East Coast Ports. Other stated reasons for the project include carriers that add larger vessels to their fleets may not include Boston on their itineraries, and recent shipping trends indicating cargo being shifted increasingly from the Port of New York/New Jersey to Boston Harbor.

The Department supports the project and is aware of the need for the proposed improvement dredging due to the limitations that existing drafts place upon current and future vessel traffic, and the importance of Port of Boston's shipping activity to the local and regional economy. Given the

size and scope of this project, and the disruptive nature of dredging upon marine habitat, and impacts on water and air quality, the project environmental mitigation requirements should be thoroughly detailed in the Final SEIS/EIR. The proponents should also continue to work with state and local resource conservation agencies in the development and implementation of mitigation measures and protocols to ensure the protection of the harbor's environmental resources.

Comment BED #1

The Deep Draft Project will be one of the most significant dredging projects in Boston Harbor, involving the dredging of between 6.6 and 14.8 million CY of parent material and between 450,000 and 1.4 million CY of rock, affecting over 1,140 acres of harbor bottom. Parent material will either be placed at the Massachusetts Bay Disposal Site (MBDS), and/or utilized for beneficial uses such as the capping of the Industrial Waste Site overlapping MBDS. Beneficial uses or dredged rock may include creation of hard bottom habitat in Massachusetts Bay and Broad Sound (and the armoring of seashore areas within Boston Harbor with problematic coastal erosion). Some unsuitable dredge material may be disposed of in existing or previously permitted Confined Aquatic Disposal (CAD) cells within the harbor.

Comment BED #2

The blasting of rock is of particular concern given the four fish-kill events that occurred in the fall of 2007, associated with the Boston Inner Harbor Maintenance Dredge Project (BIHMDP). These events have illustrated the limitations of the blasting mitigation measures, which included insert delays, shock wave attenuation measures, a fish startle system, side scan sonar, and a fisheries observer. A complete review of the adequacy of these measures should be addressed in the ACOE "after action report" on the fish kill events, and discussed with the interagency blasting technical working group, once it is convened. The findings of this report, the mitigation measures used to date and potential new mitigation technologies must be reviewed prior to the completion of the development of a blasting plan for the Deep Draft Project. The project blast plan should require a stoppage of blasting in the event of a fish kill and assessment of possible causes and changes to blast methodology prior to re-commencement of blast activities. The blasting technical working group should also be informed and consulted on all marine mammal or fish kill event. Non-blasting options should also be discussed such as a closed dredge bucket, impact devices, or a large tooth bucket on an excavator, which have been previously employed for ledge removal. The non-blast methodologies should be assessed for the types of impacts they may have on marine species and whether they are viable methods of removing the different types of rock and ledge material found in the harbor.

Comment BED #3

Comment BED #4

The Beneficial Use Alternatives section of the DSEIS/EIR notes several possible applications of dredged parent material, including the capping of the Industrial Waste Site (IWS) in Massachusetts Bay and creation of new rock reef habitat in Broad Sound and Massachusetts Bay. It is our understating that a pilot study is to be conducted with parent material from the BIHMDP to assess the feasibility of using such material to cap the IWS. The findings of this study should be provided and utilized to inform the Deep Draft Project final design. If unsuitable silt material needs to be disposed of into CAD cells within the harbor, disposal activities should not delay the capping of cells utilized for the BIHMDP.

Comment BED #5

Comment BED #6

The DSEIS/EIR states that Broad Sound and Mass Bay are the most suitable sites for creation of hard bottom habitat after assessing and ranking five possible habitat enhancement sites.

However, the site ranking and Hard Bottom Habitat Report rate the Mass Bay site as fourth, it ranks last in benthic habitat quality. The DSEIS/EIR references depth and location constraints as the rationale for selecting Mass Bay. Given the extent of disturbance the project will cause to marine habitat, the beneficial use sites must be selected based upon locations where the greatest enhancement of bottom habitat will occur. The proponent should further substantiate the rationale for not selecting the Magnolia site as a preferred enhancement location. Whether all or a portion of the rock will be used for beneficial use, as well as the size and type of rock most appropriate for bottom habitat should also be addressed. Additionally, the final design should be coordinated with state and federal resource agencies to ensure that the rock is suitable and its placement is properly configured and located in areas where existing rock and cobble habitat is not currently present.

As noted in the DSEIS/EIR, multi-year monitoring of the habitat creation sites is necessary to determine if colonization occurs and if such rock disposal options serve as a beneficial use. The Department is also aware of the need for armoring stone for several coastal areas within Boston Harbor and the Harbor Islands. Use of removed rock for shoreline protection should be discussed further as it may serve to benefit the project proponent as well as state and local landowners within the harbor. Comment COB #7

The Environmental Consequences section (4.0) should include a discussion of possible impacts of dredge material transport and disposal at the IWS and MBDS upon the adjacent Stellwagen Bank National Marine Sanctuary. With the recent issuance of a Draft Management Plan for the sanctuary, there has been renewed focus on the lack of effective management of the ecosystem, resulting in serious decline of the sanctuary's marine life. The transport of dredge spoil and its disposal must be reviewed to ensure that such activities are not contributing to a decline in viability of sanctuary and the numerous marine species that inhabit the area. Comment COB #8

Turbidity from dredge activities has the potential of affecting harbor water quality in the vicinity of dredge equipment and adversely impacting important life stages of fish and shellfish. The DSEIS/EIR notes that the means by which the dredge equipment is operated can have an impact upon suspension of sediments and turbidity than the type of bucket used. The proponent should discuss how operational techniques and parameters such as dredge cycle-time, and practices such as scow washing, will be managed to limit turbidity. The document also references prior field monitoring results of dredge buckets and associated turbidity levels, noting greater turbidity associated with conventional buckets, and less with Cable Arm and environmental buckets. The proponent should employ to the greatest extent practicable the use of Cable Arm or environmental dredge buckets during the project to minimize water quality impacts. Closed buckets should be used for dredging of all silty material. Turbidity is problematic for eelgrass beds in particular, which provide important habitat to finfish and shellfish. The Biological Environment section (3.3.1) references eelgrass beds only located in small areas within Hull and Hingham Bay. The Final SEIS/EIR should update the section to include eelgrass beds located along the northwest shoreline of Long Island which have been established as part of the MA Department of Marine Fisheries Eelgrass Restoration Project. Comment COB #9 Comment COB #10

The Biological Resource Impacts section of the DSEIS/EIR notes that benthic communities within the navigation channel will be destroyed as a result of dredging and blasting, and that such communities are expected to recover and return to pre-dredge conditions within a short period of

time after the project, citing a 1977 Oregon study. The document also states that if significant areas of blue clay are exposed through dredging the number and type of organisms may be reduced. Given the scope of impacts the project will have on benthic habitat, the lack of specific study information on Boston Harbor benthic communities and uncertainty over such communities' ability to reestablish, a biological monitoring program should be developed to adequately assess whether benthic species actually re-colonize in dredged areas within Boston Harbor, and if so, to what extent. Such results can better inform project mitigation measures and provide more accurate information on the environmental impacts of dredge projects in Boston Harbor.

Comment COB #11

Comment COB #12 As with prior and current dredging projects, prior to the start of dredging operations and barge transport of dredged materials, work areas and barge routes should be coordinated with the Boston Harbor Lobstermen's Cooperative and the Massachusetts Lobstermen's Association. To facilitate coordination the contractor should prepare a weekly schedule of dredging and disposal activities and forward it to these organizations at least 48 hours prior to the scheduled work.

Comment COB #13 The Air Quality section (4.8), notes that mitigation measures will need to implemented during the project to avoid exceeding annual air quality emissions thresholds for Carbon Monoxide (CO), Nitrogen Oxide (NOx), and Volatile Organic Compound (VOC) emissions. Specifically, utilizing newer, cleaner burning off-road equipment (model year 2011 and beyond), and extending the three year dredge schedule. The shut down periods are proposed to occur in six month periods every two years from October to March. As NOx and VOC's are pre-cursers to ozone, an air pollutant most problematic during the summer months, the proponents should provide more detail as to why dredging is not occurring during the winter months.

Comment COB #14 The proponent should ensure that the Technical Working Group continues to meet regularly throughout the duration of the dredge project to review and address any problems and operational changes that may be suggested by the dredge contractor.

Thank you for the opportunity to offer comment.

Sincerely,

Bryan Glascock
Director

BHDDNIP DFR.SDEIS.EIR 6.08.doc.DBG:CB.cb

TOWN OF WINTHROP
TOWN COUNCIL
Town Hall
1 Metcalf Square
Winthrop, Massachusetts 02152

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Carla Vitale
Council Clerk

May 30, 2008

Dear Mr. Keegan,

Attached is a report sent to the Town of Winthrop by a concerned constituent. Please accept it as our comments on the Boston Harbor Deep Draft Navigation Improvement Project. The Town of Winthrop is extremely concerned that the Army Corps of Engineers inappropriately denied the long anticipated and critically necessary share protection on Winthrop Shore Drive.

If the rationale utilized in its Winthrop Beach decision is consistently applied, then the Boston Harbor project should also be denied. If the Boston Harbor project is approved, then we expect that the Army Corps of Engineers will reconsider and reverse its denial of the Winthrop Beach project.

Comment
TOW #1

Very truly yours,

Thomas E. Reilly
Council President

May 7, 2008

U.S. Army Corps of Engineers – New England District
District Engineer
696 Virginia Road
Concord, MA 01742-2751
ATTN: Programs and Project Management Division (Mr. Michael Keegan)

and

Secretary Ian A. Bowles
EOEA, Attn: MEPA Office
[Deirdre Buckley], EOEA No.12958
100 Cambridge Street, Suite 900
Boston MA 02114

RE: Comments on the DSEIS/DEIR for the Boston Harbor Deep Draft Navigation Improvement Project

Dear Secretary Bowles:

The Town of Winthrop is very concerned about the substantial adverse environmental impacts associated with the proposed Boston Harbor deepening project. Specifically, a large portion of Broad Sound and the North Channel areas are designated Essential Fish Habitat (EFH) for cod and American lobster. This designation is based on the oceanographic conditions (basically, water temperature in this case), bottom type, and presence/absence data used by the National Marine Fisheries Service (NMFS) in accordance Magnuson-Stevens Fishery Conservation and Management Act.

Comment TOW #2

As described in detail below, the NMFS will be required to determine that the seaward portion of the proposed Boston Harbor Deep Draft Navigation Improvement Project is an Aquatic Resource of National Importance (ARNI) to be consistent with their conservation recommendations for identical bottom type and EFH concerns at the proposed NOMES Site I borrow site (8 miles offshore of Boston Harbor). Moreover, the SDEIS/DEIR acknowledges that the proposed Boston Harbor project will cause a change in bottom substrate, resulting in a permanent impact to EFH and the associated ARNI. In an attempt to ensure consistent regulatory assessment, we request that both the "technical" personnel responsible for the ARNI determination from the U.S. Army Corps of Engineers and the NMFS be required to perform a scientifically-defensible comparison of EFH impacts associated with the outer harbor dredging and the NOMES Site I dredging prior to the preparation of a FEIS/FEIR. Once reviewed by qualified outside technical experts, this assessment should serve as the basis for EFH conservation

Comment TOW #3

Comment TOW #4

recommendations and hopefully ensure consistent regulatory decision-making for projects impacting cod and American lobster EFH in Massachusetts Bay.

In a recent decision, the U.S. Army Corps of Engineers recently denied the long anticipated shore protection project along Winthrop Shore Drive. The project was denied primarily because of one agency's (the National Marine Fisheries Service or NMFS) opinion regarding the value of offshore sand and gravel habitat to the "sustainability" of the cod population throughout the Northeastern U.S. In a letter from Louis A. Chiarella of NMFS to Christine Godfrey of the U.S. Army Corps New England District (NED) dated December 7, 2006,

NMFS maintain[ed] that gravel and cobble habitats (2mm - 256 mm) are an Aquatic Resource of National Importance [ARNI] due to its role in providing habitat essential to the sustainability of Northeast fisheries..

It is clear from this statement that the NMFS has determined that all gravel and cobble habitats in the Northeast U.S. are in an ARNI and this determination is not restricted to a 100-acre area 8 miles offshore of Boston Harbor. Areas designated as an ARNI prohibit activities that would impact the habitat such as dredging (including the proposed Boston Harbor navigation improvements), cable laying, and port development, but apparently not the equally damaging fishing-related impacts (e.g. bottom trawling and scallop dredging).

A review headed by Dr. Douglas Clarke of the U.S. Army Engineer Research and Development Center in Vicksburg, Mississippi indicated that "the NMFS case is primarily based on previous existing knowledge, presence/absence data, and assessments of critical habitat functions." They concluded that the sand, gravel, and cobble "habitat in question is of sufficient rarity with adequate evidence of significance to justify a high threshold of protection." The U.S. Army Corps North Atlantic Division (NAD) utilized this opinion as confirmation of the NMFS position and denied the use of NOMES Site I as a borrow source for Winthrop Beach.

Since the NMFS conclusions and the Army Corps denial were based strictly on the sediment comprising the ocean floor and whether the area was designated as an Essential Fish Habitat (presence/absence data), an area within Massachusetts Bay that has identical bottom habitat and EFH concerns should be afforded identical treatment and protection by the U.S. Army Corps of Engineers.

The geotechnical data presented in the Draft EIR for the Boston Harbor Deep draft Navigation Improvement Project clearly determined that the "sediments consist mostly of sand, gravel, and rock [cobble and boulder]" within the outer harbor. This information from the DEIR indicates that the sediments within the Boston outer harbor are as coarse as or coarser than the sediments at NOMES Site I. In addition, the DEIR acknowledges that the outer channel is EFH for most of the same species as NOMES Site I, most notably cod and American lobster.

One possible difference is the water depth at NOMES Site I, where the proposed borrow site is located at depths in excess of 80 ft MLLW that likely make it unsuitable for early benthic phase lobster (as proven by the extensive benthic sampling). However, the Boston outer harbor area where deepening is proposed consists of water depths that are highly conducive to early benthic phase lobsters and, therefore should receive a higher level of protection than the NOMES Site I habitat.

As described above, the NMFS has already designated gravel and cobble habitats within the Northeast as an ARNI, based upon EFH and bottom type considerations. Since this ARNI by default includes the Boston outer harbor channel (it has the same bottom type and EFH concerns as NOMES Site I), it will not be possible for the U.S. Army Corps of Engineers to issue a permit on the proposed dredging of the outer harbor channel.

To ensure consistency with recent previous habitat evaluations that have impacted regulatory decisions, the Town of Winthrop requests the following:

- The NMFS and DMF should be required to provide an analysis of the EFH and bottom type of the outer harbor channel relative to NOMES Site I and portions of the approved Hubline that crossed similar habitat. Using objective scientifically-defensible criteria, NMFS and DMF should be asked to develop fisheries conservation recommendations for the Boston outer harbor channel, supported by a clear concise reasoning for these recommendations in relation to the concerns they raised for NOMES Site I.
- Dr. Clarke's team at the Army Corps should review this NMFS/DMF analysis to determine whether they still agree with the ARNI designation for NOMES Site I and, if so, whether it is appropriate to impact one portion of the ARNI (the Boston outer harbor channel) and mandate protection of a different portion (NOMES Site I). This Army Corps team should justify their opinion with sound scientific arguments.
- An independent outside technical review of the analysis and Army Corps review should be performed to corroborate the conclusions and/or results of these other analyses. If this objective outside review should indicate that there is not clear scientific evidence supporting differences between the EFH, as well as bottom type, of NOMES Site I and the Boston outer harbor channel, the Army Corps should adopt this opinion as part of their regulatory decision and deny this portion of the harbor deepening project to protect the ARNI.

All of these analyses and reviews should be funded by the project proponent that has proposed the Boston Harbor deepening. In addition, the Town of Winthrop should be allowed to select the consultant to perform the independent technical review, subject to Army Corps approval based on the consultant's qualifications.

Comment TOW #5

Regardless of the ARNI concerns for the Boston outer harbor, the DEIR lacks the level of geotechnical investigation appropriate for a project of this magnitude. For example, the NMFS indicated that 15 cores at NOMES Site I was not sufficient to characterize the post-dredging substrate of an approximate 100-acre site (~1 core per 7 acres of dredged

area). However, the density of coring performed for the Boston Harbor deepening project is not nearly as dense as the NOMES Site I project. This is especially concerning, since the DEIR acknowledges a high variability in bottom sediments throughout the project footprint. This level of sampling may be sufficient for a dredging contractor to perform the work, but clearly (according to NMFS) is inadequate to characterize the fisheries and benthic habitat that will exist once the deepening project is completed. In addition to these geotechnical concerns, we have the following specific comments regarding the DEIR:

).

- The DEIR does not indicate that the proposed project is within the DMF designated "Cod Conservation Zone". According to the recent Army Corps denial of the Winthrop Beach project, the importance of the "Cod Conservation Zone" to the sustainability of the cod population in the northeast was an important consideration. Since the proposed dredging activities will have a substantial spatial and water quality (turbidity) impact on the "Cod Conservation Zone", the FEIR, Feasibility Report, and FEIS should provide a full assessment of these impacts. Winter flounder may be the primary concern within the upper portion of the Boston Harbor estuary; however, the outer portion of the system is prime American lobster and cod habitat. Turbidity impacts to EFH near the dredge footprint, any proposed mitigation sites, and at the offshore or nearshore dump sites should be included in this analysis. According to the recent Winthrop Beach decision, the discharge of dredged material was deemed to "cause or contribute to substantial degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values." The FEIR and FEIS needs to show how the proposed dredging activities, as well as any disposal activities, will not degrade the waters of the U.S. in a similar fashion, especially considering that many of the dredge-related activities will be performed within areas with the same EFH concerns and the disposal areas will create suspended sediment that will directly impact or migrate into areas of gravel and cobble bottom that have been designated an ARNI by the NMFS.

Comment TOW #6

Comment TOW #7

- The FEIR should clearly delineate areas that have previously been dredged versus areas of proposed new dredging/mining (including increased channel area associated with side slopes). In addition, maps clearly indicating bottom type within each of these areas, as well as EFH concerns. Although the DSEIS and DEIR indicate that two very different benthic environments exist within the project footprint, the document does not adequately evaluate these areas as distinct habitats relative to potential impacts associated with the proposed deepening project. For clarity, it would be more appropriate to evaluate the "soft bottom" and "hard bottom" benthic communities and fisheries resources in separate sections. For example cod is an important species of concern for the "hard bottom" associated with the outer harbor channel (Broad Sound and North

Comment TOW #8

Comment TOW #9

Channel); however, the Feasibility Study does not even mention the species as a primary interest. The evaluation of the "hard bottom" habitat, its importance to the fisheries of the Northeast U.S., and the impacts to this habitat associated with the proposed improvement dredging need to be evaluated in significantly more detail.

- The DMF and the NMFS required an intensive one-year fish trawl and benthic survey to evaluate the resources at Since Figure 3-33 clearly indicates that no fisheries data exist within the project area, the fisheries analysis contained within the DSEIS and DEIR is incomplete. We recommend that the project proponent seek guidance from the DCR and or the Sconset Beach Preservation Fund to develop an adequate fisheries evaluation plan. This requirement would be consistent with other recent dredging proposals in Massachusetts state waters, since dredging improvement projects are regulated using the same guidelines as sand/gravel mining.

Comment TOW #10

- The DEIR and DSEIS acknowledge that early benthic phase lobsters presently are (a) prevalent in the project area, primarily adjacent to the existing channel, and (b) would lose substantial habitat if the outer channel footprint is increased as proposed. Presumably this destruction of habitat would have similar impacts to the early life stages of the cod population that utilize similar habitat. The FEIR needs to assess the direct impacts associated with this loss of habitat. Unlike the recently denied Winthrop Beach project, it is highly unlikely that this area of "hard bottom" will recover, since it will be within the channel footprint and, therefore maintenance dredging will be allowed to continuously damage the habitat. Due to this concern, compensatory mitigation will be required for this loss of habitat functions and values. Since the Winthrop Beach project was denied because of the "concern" over potential for permanent impacts to identical habitat, it is unclear how the regulatory agencies are going to permit an acknowledged permanent impact to this same habitat.

Comment TOW #11

Comment TOW #12

In addition to the fisheries concerns, the Town of Winthrop is very concerned about the proposed dredging project relative to potential changes to wave energy and/or wave direction that could impact the shoreline.The historic navigation channel significantly deepened an area offshore of Winthrop and Yirrell Beaches likely leading to a significant increase in wave energy and the associated alteration of sediment transport patterns. These alterations have directly led to increased erosion at Winthrop Beach and the existing public safety hazard to the residents of Winthrop. Therefore, as part of the environmental review process for the proposed Boston Harbor deepening project, we request that the Army Corps evaluate the long-term impacts of the present North Channel on coastal sediment transport patterns relative to the pre-channel conditions (Figure 2). In addition, this analysis should include an evaluation of the wave climate associated with the proposed channel improvements relative to existing conditions.

Comment TOW #13

Due to the inherent bias and/or conflict of interest of the Corps in this situation, we further request that the Corps fund an independent external technical review of this effort by appropriate consultants selected by the Town of Winthrop. As the Army Corps is well aware, independent technical reviews have been performed to address concerns related to

other controversial projects (e.g. Canaveral Inlet in Florida). In these cases, the technical experts are selected by the affected party (in this case, the Town of Winthrop). If the historical or proposed navigation improvements cause any alteration in nearshore wave climate to the Winthrop shoreline, the Town will seek damages from the Army Corps in the form of beach nourishment and/or structural improvements as compensatory mitigation.

Comment TOW #14

. In our view, it is not possible for the Army Corps to issue the needed 404 permit based on their recent denial of the NOMES borrow site. Unfortunately, there does not appear to be consistent leadership at the Corps decision-making level(s), which is likely one of the primary reasons for the needless delay and costs associated with the Winthrop Beach project. To be consistent with the NOMES decision, the proposed dredging of the outer channel should be denied with prejudice by the U.S. Army Corps of Engineers.

Very Truly Yours,

Organized 1742 Incorporated 1754

BOSTON MARINE SOCIETY

Oldest Marine Society in the World

June 1, 2008

Colonel Curtis L. Thalkin
District Engineer
United States Army Corps of Engineers
New England District
696 Virginia Road
Concord, Massachusetts 01742-2751

Attention: Programs and Management Division

Dear Colonel Thalkin,

The Boston Marine Society was founded in 1742; it is the oldest association of sea captains in the world. Since its establishment the society has been instrumental in sponsoring measures to improve navigation in the Commonwealth of Massachusetts. In 1791 John Foster Williams, a member of the Society, commanded America's first revenue cutter, the predecessor to the Coast Guard, and took as his special task the drawing of an accurate chart for Cape Cod Bay. Of particular concern to the Society has been the appointment of pilots to see to the safe passage of vessels in and out of the Port of Boston. Since their beginning and continuing through the present, the Society through its Trustees is vested with the authority to appoint Pilot Commissioners, who in turn appoint Boston Harbor pilots. Aids to Navigation, the construction of lighthouses and placement of buoys and markers, have often been accomplished with the advice of the Society.

The proposed dredging project, Boston Harbor Deep Draft Navigation Improvement Project (Deep Draft Project) is of particular interest to the society that features: the 40-foot lane of the Broad Sound North Entrance Channel would be deepened to 50 feet and widened through the bend at Finn's Ledge.

National Historical Park, Building 32, Charlestown Navy Yard, Boston, Ma 02129
www.bostonmarinesociety.org
Tel: (617) 242-0522 Fax (617) 241-0505

The 40-foot lane of the Main Ship Channel from the Broad Sound North Entrance Channel upstream through President Roads to the Reserved Channel would be deepened to 48 feet and its 600-foot wide reaches widened to between 800 and 900 feet, with additional width in the bends. The 40-foot lower reach of Reserved Channel and it turning area would be deepened to 48 feet, with turning area also widened to 1600 feet. The 40-foot President Roads Anchorage would be deepened to 48 feet.

The Harbor Committee of the Boston Marine Society recognizes the importance of the President Roads anchorage for ships entering and exiting the Port of Boston. Being the only protected deep draft anchorage; it provides a safe haven consistent with the Main Ship Channel. The proposal to deepen the channel therefore necessitates the deepening of the anchorage in order to maintain the functionality of the anchorage. In-bound petroleum laden deep draft vessels invariably have need to anchor and wait for suitable transit conditions – visibility, wind and tide. The ability of the United States Coast Guard to effectively administer security checks as part of their Domain Awareness would be enhanced by the anchorage allowing them options for inspection. Deep draft vessels experiencing mechanical problems would have a safe area to anchor and effect repairs.

Comment BMS #1

The Deep Draft Project improving President Roads channel will maintain safe commerce in the Port of Boston but it must be done in concert with improvements to the anchorage in order to provide an effective area of safety and security for deep draft vessels.

Respectfully submitted,

Captain Thomas Laird
Chairman of the Harbor Committee
Boston Marine Society

2 June 2008

Colonel Curtis Thalken
District Engineer
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751
ATT: Programs and Project Management

RE: Feasibility Report and Draft Supplemental Environmental Impact Statement, Boston Harbor Deep Draft Navigation Improvement Project

Dear Colonel Thalken:

The Boston Harbor Association is a non-profit, public interest organization founded in 1973 by the League of Women Voters and the Boston Shipping Association to promote a clean, alive, and accessible Boston Harbor. We have reviewed the April, 2008 Feasibility Report and Draft Supplemental Environmental Impact Statement for the Boston Harbor Deep Draft Navigation Improvement Project submitted by the Massachusetts Port Authority and the U.S. Army Corps of Engineers.

The Boston Harbor Association is a member of the proposed project's Technical Working Group, comprised of environmental representatives, scientists, city, state and federal representatives, and local stakeholders, and has

374 Congress Street, Suite 307 ■ Boston, Massachusetts ■ 02210-1807 ■ Telephone (617) 482-1722 ■ Fax (617) 482-9750 ■ www.tbha.org

been kept apprised of the project as well as the results of the prior maintenance dredging project.

Based on a review of the Draft Supplemental Environmental Impact Statement and briefings for the Technical Working Group, The Boston Harbor Association strongly supports the preferred alternative of the Deep Draft Navigation Improvement Project, which calls for deepening the Broad Sound North Entrance Channel of the Harbor to 50 feet, and the Main Ship Channel up to the Reserved Channel, the President Roads Anchorage, the Reserved Channel and its Turning Area to 48 feet.

The proposed alternative, known as Plan B, would allow existing companies calling on Conley Terminal in South Boston to use larger ships, and could potentially help attract additional container lines. During the past decade, the trend has continued where Boston is no longer a significant manufacturing center, but rather, a major distribution center for goods to the Northeast region. The Port of Boston will in the foreseeable future continue to receive extensive tonnage of imports (particularly from Asia) for distribution in the region, with some exports of raw materials such as scrap metal, paper, wood products, and some finished products.

Implementation of Plan B will allow deeper draft vessels into the Port of Boston. Two types of ships were modeled in the Draft Supplemental Environmental Impact Statement: a 4,700 TEU

(twenty-foot equivalent unit, the measurement size for cargo containers) Panamax ship that shippers believe will most likely call on the Port of Boston if deepened, and a larger 5,600 TEU ship which potentially may be used by existing companies if the channel is deepened (page 135, Draft SEIS). According to the Draft SEIS, a fully-loaded Panamax vessel requires 48 feet of water depth in the harbor channels and 50 feet of water depth in the entrance channel (page 135).

In addition, the Draft SEIS (page 71) examined the planned use of the Massport Marine Terminal in South Boston by larger ships. Expanded use of the Marine Terminal would be for bulk carriers with cement, salt, gypsum, frozen seafood, and/or manufactured goods, with larger vessels eventually requiring 45 feet depths (main ship channel deepening above the Reserved Channel Turning Area).

As the project proponents continue to secure the necessary environmental permits, we ask that the following issues be further addressed:

Beneficial Re-use of Dredged Materials: We highly commend Massport and the U.S. Army Corps of Engineers for including a detailed analysis of the potential beneficial re-use of the dredged materials to be generated by this project.

According to the DEIR, two types of the dredged materials may potentially be suitable for re-use. In the first instance, blasted ledge, cobble, gravel, and other stony materials may be suitable

for creation of hard bottom habitat favored by lobsters and other species in Boston Harbor and/or Massachusetts Bay (page 170 of Draft SEIS). Algonquin's Hubline project, for example, re-used some of its materials to create hard-bottom habitat, although on a much smaller scale than proposed for this project.

As indicated in the Draft SEIS, further evaluation needs to occur regarding two potential sites for hard-bottom habitat creation, and a plan needs to be developed for the placement of materials on the ocean floor. In addition, the final Environmental Impact Statement should detail an evaluation and monitoring program to determine how successful the habitat creation and colonization efforts are.

Comment BHA #1

In the second instance, Boston Blue Clay, a stiff impervious clay, will be removed from the President Roads Anchorage and upper channel reaches. The Boston Blue Clay and other unconsolidated materials may potentially be suitable for capping the former Industrial Waste Site in Massachusetts Bay.

The former Industrial Waste Site overlaps and extends north of the current Massachusetts Bay Disposal Site in the Stellwagen Basin, and was used for the disposal of chemical, medical, and radiological wastes from the 1940s to the 1970s (page 174 of the Draft Supplemental Environmental Impact Statement). The waters around the Site were also used for disposal of construction waste, demolition debris, and derelict vessels.

The area in and around the former Industrial Waste Site is currently trawled by fishermen, and capping of the Site would reduce the potential of catching the debris, some of which is quite contaminated, in fishing nets. We strongly support a proposed demonstration project suggested by the project proponents, with care taken to ensure that ambient sediment does not become re-suspended during the disposal process.

Comment BHA #2

Minimizing Impacts to Marine Life: In the past five years, thanks to the efforts of the Massachusetts Water Resources Authority, Boston Water and Sewer Commission, Department of Environmental Protection, City of Boston, and many others, Boston Harbor is cleaner than ever. A number of shellfish beds have re-opened near Logan Airport and Winthrop, and there are many more lobster traps in Boston Harbor.

Comment BHA #3

Consistent with environmental mitigation requirements imposed upon the Algonquin Hubline project, we ask that a communications system be established with the fishing and lobstering communities regarding construction activities and timing to avoid impacts to lobster gear, and/or a monetary fund to compensate lobstermen in the event of damage to lobster traps located outside of the federal navigation channel from dredging or mobilization activities. In the case of the Algonquin project, a $50,000 fund was established for damage to lobster gear outside of the federal navigation channel, which ultimately was not fully

utilized due to limited impact upon lobster traps from that project.

The Draft SEIS notes that four fish mortality events occurred in fall, 2007 during the ledge pinnacle removal project of the Boston Harbor maintenance dredging project. Subsequent to the first mortality event, the Army Corps of Engineers met with its contractor to identify ways to prevent other mortality events. In spite of these measures, three other mortality events occurred during blasting events by the contractor.

Comment BHA #4

We are concerned about the inability of the contractor to prevent fish mortality events during the Harbor maintenance dredging activities last year, and urge the permitting agencies to impose strict requirements upon the project proponents and their contractors to prevent any fish mortality events as part of this project.

Other Environmental Mitigation Measures: Because of adverse environmental impacts from the Algonquin Hubline project, the state permitting agency required, amongst other conditions, a $5 million contribution to the not-for-profit Island Alliance organization to support use of the Harbor Islands.

In the event that adverse environmental impacts are identified with this proposed project, we ask that consideration be given to requiring, amongst other conditions, a monetary contribution to support water transportation in Boston Harbor and Massachusetts Bay if water transportation service

Comment BHA #5

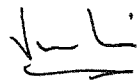
is impacted from construction activities of this project.

On-going Environmental Oversight: In additional to local, state, and federal regulatory oversight of this project, we ask that a Technical Advisory Group continue to meet regularly to review progress of the project, any monitoring data with the project's independent environmental observer, and to discuss prevention measures in the unlikely event of fish mortality events or other environmental incidences.

Comment BHA #6

Thank you for your consideration. We look forward to timely approval of this much-needed project.

Sincerely,



Vivien Li
Executive Director
The Boston Harbor Association

THE BOSTON HARBOR PILOT ASSOCIATION, LLC
256 Marginal St — Building #11
East Boston, Massachusetts 02128
June 2, 2008

Colonel Curtis L. Thalken
District Engineer
USACOE, New England District
696 Virginia Rd.
Concord, MA. 01742

Re: Boston Harbor Proposed Deepening Project DEIS/DEIR

Dear Colonel Thalken:

The Boston Harbor Pilot Association LLC is a group of professional mariners commissioned by the Commonwealth of Massachusetts to pilot large vessels into and out of the port of Boston. The pilots of this association have attained the highest level of licensure possible from the U. S. Coast Guard, Master Unlimited, coupled with years of local marine experience in order to qualify for a commission. The Association operates on behalf of the public; all in order to safely and securely navigate vessels over 350 gross tons in and out of the port. The Boston Harbor Pilots are charged with the safe flow of commerce since 1783.

The Pilots urge the approval of this project in its entirety. In particular, the Environmental Impact materials submitted are important in the continued safe free flow of commerce to the New England Region. The project proposes: the 40-foot lane of the Broad Sound North Entrance Channel would be deepened to 50 feet and widened through the bend at Finn's Ledge. The 40-foot lane of the Main Ship Channel from the Broad Sound North Entrance Channel upstream through President Roads to the Reserved Channel would be deepened to 48 feet and its 600-foot wide reaches widened to between 800 and 900 feet, with additional width in the bends. The 40-foot lower reach of Reserved Channel and it turning area would be deepened to 48 feet, with turning area also widened to 1600 feet. The 40-foot President Roads Anchorage would be deepened to 48 feet. The second improvement would deepen the existing 40-foot lane of the Main Ship Channel from the Reserved Channel Turning Area upstream to just below the Third Harbor Tunnel to a depth of 45 feet, to improve access to the Massport Marine Terminal in South Boston. The third improvement would deepen a portion of the 35-foot Mystic River Channel lane to 40 feet to improve access to Massport's Medford Street Terminal. The fourth and final improvement would deepen the 38-foot Chelsea River Channel to 40 feet, with minor widening in the bridge approaches and the bend between the bridges.

The pilot association participated in the development of the proposals in September of 2005 during simulation exercises held at the ERDC in Vicksburg, MS. Key factors include the expansion of the navigational channel to safely maneuver the larger container vessels expected to call on the port, the deepening of anchorage #2 in President Roads, and the deepening and widening of the Chelsea River.

The pilots are of particular concern of two key pieces of the project. 1- The dredging of #2 Anchorage. Not only is this important to the continued safe flow of commerce, but it also enhances the USCG options in Maritime Domain Awareness. Anchorage uses: safe for emergency use of deep draft vessels, repairs, protected safe boarding for law enforcement, improved harbor efficiency, lightering of petroleum and bulk cargoes, and bunkering of deep draft vessels.

Comment BHP #1

2- Chelsea River: Modern state of the art petroleum tankers are designed with 106 foot beam. The Chelsea Street Bridge (a well documented navigational hazard) restricts vessels to 90 foot beam. It has been reported that 70% of the regions petroleum needs originate from the Chelsea River. Failure to address the restrictions of the Chelsea River and the Chelsea Street Bridge affects three out of the four terminals along the River. That equates to 75% of the terminal capacity being restricted by a navigational hazard.

Comment BHP #2

A recently published GOA report 08-321 points to the surplus in the Harbor Maintenance Tax reaching $8 Billion by 2011. This report exemplifies the need to dredge our nation's ports and get it right the first time. NOAA also reports that as much as 90% of our nation's imports come through our ports. We urge the acceptance and prioritization of this project to the regions interest of the safe free flow of commerce, maritime safety, and its effects on the environment.

Comment BHP #3

Very Truly Yours,

Captain Gregg H. Farmer
President, Boston Harbor Pilot Association LLC

Cc: Mike Keegan, Project Manager USACOE
USCG
Massport

Save the Harbor
Save the Bay
For Everyone

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Travaglini Eisenberg Kiley

June 2, 2008

Colonel Curtis L. Thalken
District Engineer
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Attn: Michael Keegan, Programs and Project Management Division

Re: Boston Harbor Deep Draft Navigation Improvement Project

Dear Colonel Thalken:

As you know, Save the Harbor / Save the Bay supports efforts such as dredging to keep the Port of Boston competitive provided that appropriate safeguards are in place to protect the environment.

I am writing to you today with two serious concerns about the proposed Boston Harbor Deep Draft Navigation Improvement Project that we hope you will address as you consider the feasibility of the proposed project.

Our first concern is air quality: Based on what we have seen, the Corps of Engineers apparently believes that it is simply not feasible to proceed with this project as described and meet air quality standards on a daily basis. Rather than look for a real solution to reduce daily emissions to an acceptabl level and protect the public health and the environment, they appear to have chosen to "game" the numbers.

Comment STH/B #1

It is disingenuous to propose to "work dirty" for 9 months, then suspend work on the project for three or six months, and then average the numbers to artificially meet "annual" air quality standards. There has to be a better- or at least more honest –way.

We are also concerned about the impact of the extensive blasting that this project would require on forage fish such as herring, alewife, rainbow smelt, and menhaden, as well as on the lobster, striped bass, codfish, tautog, pollack and flounder that are so important to our region's fisherman.

Comment STH/B #2

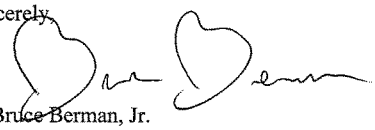
As you may recall, last year the Boston Globe reported that more than 2,000 fish were killed in four separate incidents related to blasting associated with routine maintenance dredging of the Harbor. To date, the Corps has yet to release a final report on the incidents.

Boston Fish Pier, 212 Northern Avenue, Suite 304 West, Boston, Massachusetts 02210
Phone: (617) 451-2860 Fax: (617) 451-0496 www.savetheharbor.org

As a result, we remain concerned that measures presently in place are insufficient to protect these and other marine species during even a "routine" project, and are clearly insufficient to protect the resource during the 18 months or more of daily blasting that the proposed project would require.

Boston Harbor and the Port of Boston are both remarkable resources. We hope that you will work with us to make certain that improvements to the port do not come at the expense of the health of the public, or of our $4.5 billion dollar investment in the harbor we have worked so hard to restore and protect.

Sincerely,



E. Bruce Berman, Jr.
Director of Strategy and Communications
Save the Harbor/Save the Bay

cc: I. Bowles/EOEEA
J. Wilkins/Massport

Boston Fish Pier, 212 Northern Avenue, Suite 304 West, Boston, Massachusetts 02210
Phone: (617) 451-2860 Fax: (617) 451-0496 www.savetheharbor.org

PART 4

DRAFT FEASIBILITY REPORT AND DRAFT SEIS/DRAFT EIR TRANSMITTAL DOCUMENTS

Public Notice

U.S. Army Corps
Of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Date: April 18, 2008

Comment Period Closes: June 2, 2008

Evaluation Branch, Engineering/Planning Division

BOSTON HARBOR, BOSTON, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT DREDGING

Interested parties are hereby notified that the U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) to examine improvements to deep-draft navigation channels in Boston Harbor, Boston, Massachusetts (see Figure 1). Comments are requested within 45 days of the date of this notice. This DSEIS/DEIR will build on a previous final EIS prepared in 1995 for navigation improvement in Boston Harbor.

Purpose of Work: The purpose of this Boston Harbor Federal Deep Draft Navigation Improvement Project (Deep Draft Project) is to evaluate the feasibility of channel deepening and related berth improvements at the Port of Boston, consistent with the goals of the study sponsor, Massport, and in response to direction from Congress in the authorizing resolution. Massport's goal is to provide deeper channel access to their Conley Container Terminal located on the Reserved Channel in South Boston at a depth at least equal to the -45 feet deep mean lower low water (MLLW) now available at that facility's berths. Additional minor port improvements in the Mystic and Chelsea Rivers and in the Main Ship Channel above the Reserved Channel are also under consideration. All depths are referenced to minus MLLW.

Without channel deepening, the containerships and bulk carriers currently using Boston Harbor will continue to experience tidal delays. Many vessels will continue to be light loaded or depart Conley Terminal without loading/unloading all of their cargo to ensure that they do not miss the tidal window. In some cases, vessels that would experience a tidal delay in Boston, would bypass Boston all together so as not to jeopardize their New York Harbor arrival schedule. As carriers add larger vessels to the services that currently include Boston, they may be forced to eliminate Boston from their rotation. Also, a large part of New England cargo will continue to be shipped in or out of the Port of New York/New Jersey (PONYNJ), increasing total transportation costs. Recent trends show cargo being shifted from the PONYNJ to Boston Harbor. This shift is due to the lower landside transportation costs for cargo shipped directly into Boston Harbor. However, the increased shift in cargo from the PONYNJ to the Port of Boston Harbor will cease once the carrying capacity of the ships has been maximized with the current 40-foot deep maintenance dredging.

Recommended Plan Description: Four separate improvements were developed for the Boston Harbor Deep Draft Project. The first examined deepening the outer and lower harbor's existing 40-foot deep channel system to provide deeper access to Massport's Conley Terminal in South Boston for containership traffic. Navigation channel depths of between 45 to 50 feet were examined, with a depth of 48 feet recommended; plus an additional two feet of depth in the entrance channel. Under this plan the following project features would be improved: the 40-foot lane of the Broad Sound North Entrance Channel would be deepened to 50 feet and widened through the bend at Finn's Ledge. The 40-foot lane of the Main Ship Channel from the Broad Sound North Entrance Channel upstream through President Roads to the Reserved Channel would be deepened to 48 feet and its 600-foot wide reaches widened to between 800 and 900 feet, with additional width in the bends. The 40-foot lower reach of Reserved Channel and its turning area would be deepened to 48 feet, with the turning area also widened to 1600 feet. The 40-foot President Roads Anchorage would be deepened to 48 feet.

The second improvement would be an incremental plan to deepen the existing 40-foot lane of the Main Ship Channel from the Reserved Channel turning area upstream to just below the Third Harbor Tunnel to a depth of 45 feet, to improve access to the Massport Marine Terminal in South Boston. The third improvement, also an incremental plan, would deepen a portion of the 35-foot Mystic River Channel lane to 40 feet to improve access to Massport's Medford Street Terminal. The fourth and final incremental improvement would deepen the 38-foot Chelsea River Channel to 40 feet, with minor widening in the bridge approaches and the bend between the bridges.

In conjunction with work in the Federal channels, Massport would deepen vessel berths at the Conley Terminal and Marine Terminal. Terminals on the Chelsea River would also deepen their berths to match the new channel depth. A total of about 12.1 million cubic yards (cy) of parent material, and 1.2 million cy of rock, would be removed by dredging and would be placed at the Massachusetts Bay Disposal Site (MBDS). The transportation of this dredged material for disposal in ocean waters is being evaluated to determine that the proposed disposal will not unreasonably degrade or endanger human health, welfare, or amenities or the marine environment, ecological systems, or economic potentialities. In making this determination, the criteria established by the Administrator, EPA pursuant to section 102(a) of the Marine Protection Research and Sanctuaries Act will be applied. In addition, based upon an evaluation of the potential effect which the failure to utilize this ocean disposal site will have on navigation, economic and industrial development, and foreign and domestic commerce of the United States, an independent determination will be made of the need to dispose of the dredged material in ocean waters, other possible methods of disposal, and other appropriate locations.

Coordination: The proposed work is being coordinated with Federal, State, and local agencies, including the following:

- U.S. Environmental Protection Agency
- National Marine Fisheries Service
- U.S. Fish and Wildlife Service
- Massachusetts Department of Environmental Protection
- Massachusetts Executive Office of Environmental Affairs
- Massachusetts Historic Commission
- Massachusetts Office of Coastal Zone Management
- State Natural Heritage Program
- Boston Conservation Commission

Environmental Impacts: A DSEIS/DEIR has been prepared for this Deep Draft Project. Temporary impacts to Essential Fish Habitat will occur by removing the benthic habitat in the Federal navigation channels. No water quality violations were recorded during monitoring of

the previous navigation improvement project in Boston Harbor; therefore no significant water quality impacts are expected from this proposed project. The base plan for disposal of dredged material is the MBDS. Beneficial use opportunities for the dredged material have been identified and would be evaluated further during final design of the project. Those beneficial use opportunities include: creation of rock reefs in Massachusetts Bay and Broad Sound, and using the non-rock material as cover at the former Industrial Waste Site, which overlaps the MBDS. Little or no disposal of unsuitable maintenance dredged material is expected to occur in the CAD cells located in the previously disturbed areas of the navigation channels. Disposal of unsuitable maintenance dredged material for Boston Harbor has been previously permitted and discussed in a previous SEIS published in June 2006.

Endangered Species: To protect the endangered right whale, whale observers will be on board the scows transiting to the MBDS from February to May 31 to avoid potential ship strikes

Cultural Resources: As this area has been previously dredged, no cultural resource impacts are expected to occur in the project area.

Clean Water Act: A draft Clean Water Act Section 404 (b)(1) Evaluation has been prepared as part of the draft SEIS/EIR. In addition, construction will not begin until a Water Quality Certification has been obtained from the Commonwealth of Massachusetts.

Coastal Zone Management Act: A determination that the proposed project is consistent with the State's coastal zone policies will be submitted to the Commonwealth of Massachusetts.

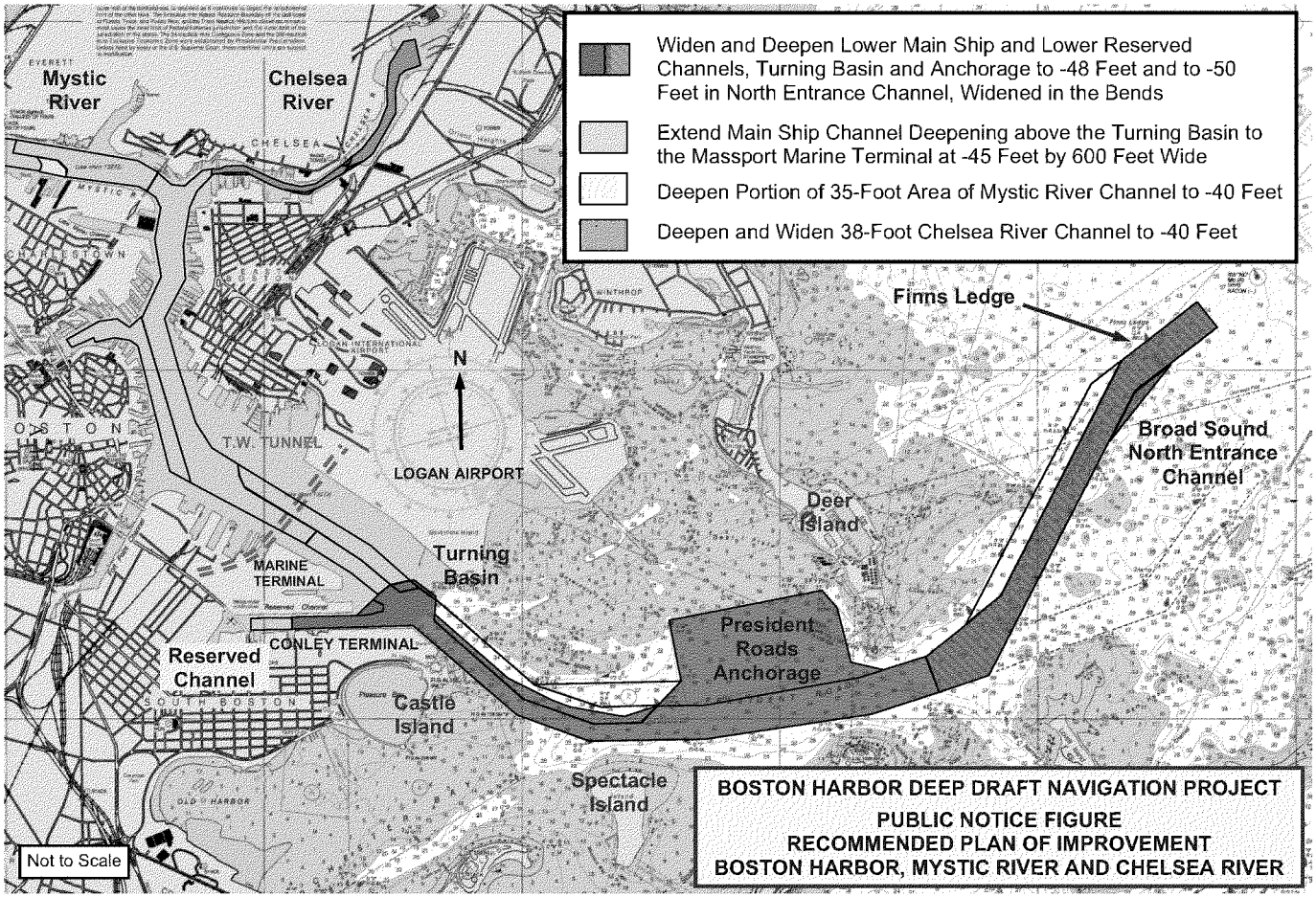
Compliance: This Public Notice is being issued in compliance with the environmental laws and regulations in Attachment A.

Additional Information: The project sponsor, Massport, will obtain appropriate State permits for the proposed project.

Any person who has an interest which may be affected by the disposal of this dredged material may request a public hearing. The request must be submitted in writing to the District Engineer within the comment period of this notice and must clearly set forth the interest which may be affected and the manner in which the interest may be affected by this activity. Please bring this notice to the attention of anyone you know to be interested in the project. Comments are invited from all concerned parties relating to this project and should be directed to the District Engineer at 696 Virginia Road, Concord, MA 01742-2751, ATTN: Programs and Project Management Division (Mr. Michael Keegan, 978-318-8087) within 45 days. A public meeting on the proposed project to solicit comments is scheduled for 1:00 pm on Tuesday May 20, 2008 at the Black Falcon Cruise Terminal, One Black Falcon Avenue, Boston, Massachusetts

4 April 2008
Date

for Andrew R. Nelson COL, EN Deputy Cdr
CURTIS L. THALKEN
Colonel, Corps of Engineers
District Engineer


Widen and Deepen Lower Main Ship and Lower Reserved Channels, Turning Basin and Anchorage to -48 Feet and to -50 Feet in North Entrance Channel, Widened in the Bends
Extend Main Ship Channel Deepening above the Turning Basin to the Massport Marine Terminal at -45 Feet by 600 Feet Wide
Deepen Portion of 35-Foot Area of Mystic River Channel to -40 Feet
Deepen and Widen 38-Foot Chelsea River Channel to -40 Feet
Mystic River
Chelsea River
Finns Ledge
N
LOGAN AIRPORT
T.W. TUNNEL
Broad Sound North Entrance Channel
Deer Island
Turning Basin
MARINE TERMINAL
CONLEY TERMINAL
Reserved Channel
President Roads Anchorage
Castle Island
Spectacle Island
Not to Scale
BOSTON HARBOR DEEP DRAFT NAVIGATION PROJECT
PUBLIC NOTICE FIGURE
RECOMMENDED PLAN OF IMPROVEMENT
BOSTON HARBOR, MYSTIC RIVER AND CHELSEA RIVER

Attachment A

Pertinent Laws, Regulations and Directives

American Indian Religious Freedom Act of 1978, 42 U.S.C. 1996.

Archaeological Resources Protection Act of 1979, as amended, 16 U.S.C. 470 et seq.

Clean Air Act, as amended, 42 U.S.C. 7401 et seq.

Clean Water Act of 1977 (Federal Water Pollution Control Act Amendments of 1972) 33 U.S.C. 1251 et seq.

Coastal Zone Management Act of 1982, as amended, 16 U.S.C. 1451 et seq.

Endangered Species Act of 1973, as amended, 16 U.S.C. 1531 et seq.

Estuarine Areas Act, 16 U.S.C. 1221 et seq.

Federal Water Project Recreation Act, as amended, 16 U.S.C. 4601-12 et seq.

Fish and Wildlife Coordination Act, as amended, 16 U.S.C. 661 et seq.

Land and Water Conservation Fund Act of 1965, as amended, 16 U.S.C. 4601-1

Magnuson-Stevens Act, as amended, 16 U.S.C. 1801 et seq.

Marine Protection, Research, and Sanctuaries Act of 1971, as amended, 33 U.S.C. 1401 et seq.

National Environmental Policy Act of 1969, as amended, 42 U.S.C. 4321 et seq.

National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470 et seq.

Native American Graves Protection and Repatriation Act (NAGPRA), 25 U.S.C. 3000-3013, 18 U.S.C. 1170

Preservation of Historic and Archaeological Data Act of 1974, as amended, 16 U.S.C. 469 et seq. This amends the Reservoir Salvage Act of 1960 (16 U.S.C. 469).

Rivers and Harbors Act of 1899, as amended, 33 U.S.C. 401 et seq.

Watershed Protection and Flood Prevention Act, as amended, 16 U.S.C. 1001 et seq.

Wild and Scenic Rivers Act, as amended, 16 U.S.C 1271 et seq.

Executive Order 11593, Protection and Enhancement of the Cultural Environment, May 13, 1971.

Executive Order 11988, Floodplain Management, May 24, 1977 amended by Executive Order 12148, July 20, 1979.

Executive Order 11990, Protection of Wetlands, May 24, 1977.

Executive Order 12114, Environmental Effects Abroad of Major Federal Actions, January 4, 1979.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994.

Executive Order 13007, Accommodations of Sacred Sites, May 24, 1996.

Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, April 21, 1997.

Executive Order 13061, and Amendments – Federal Support of Community Efforts Along American Heritage Rivers.

Executive Order 13175, Consultation and Coordination with Tribal Governments, November 2000.

Analysis of Impacts on Prime or Unique Agricultural Lands in Implementing NEPA, August 11, 1980.

White House Memorandum, Government-to-Government Relations with Indian Tribes, April 29, 1994.

before the BoV shall be in accordance with 41 CFR 102–3.140(c), section 10(a)(3) of the FACA, and this paragraph. The DFO and BoV Chairperson may, if desired, allot a specific amount of time for members of the public to present their issues for BoV review and discussion. Direct questioning of BoV members or meeting participants by the public is not permitted except with the approval of the DFO and Chairperson.

FOR FURTHER INFORMATION CONTACT: Or to attend this BoV meeting, contact Mr. Scotty Ashley, USAFA Programs Manager, Directorate of Airman Development and Sustainment, Deputy Chief of Staff, Manpower and Personnel, AF/A1DOA, 1040 Air Force Pentagon, Washington, DC 20330–1040, (703) 695–3594.

Bao-Anh Trinh,

Air Force Federal Register Liaison Officer.

[FR Doc. E8–8372 Filed 4–17–08; 8:45 am]

BILLING CODE 5001–05–P

DEPARTMENT OF DEFENSE

Department of the Army

Availability of the Record of Decision (ROD) for the Permanent Stationing of the 2/25th Stryker Brigade Combat Team (SBCT)

AGENCY: Department of the Army, DoD.

ACTION: Notice of availability.

SUMMARY: The Deputy Chief of Staff of the Army, G–3/5/7 has reviewed the Final Environmental Impact Statement (FEIS) for the Permanent Stationing of the 2/25th SBCT and has made the decision to proceed with all facets of Alternative A. Alternative A permanently stations the 2/25th SBCT at Schofield Barracks Military Reservation (SBMR) while conducting the required training at military training sites in Hawaii. This alternative is summarized in the Army's ROD and described fully in Chapter 2 of the FEIS.

ADDRESSES: The ROD can be accessed at *http://www.aec.army.mil.*

FOR FURTHER INFORMATION CONTACT: Public Affairs Office, U.S. Army Environmental Command, Building E4460, 5179 Hoadley Road, Attention: IMAE–PA, Aberdeen Proving Ground, MD 21010–5401; telephone: 410–436–2556; facsimile: (410) 436–1693. The Public Affairs Office is open during normal business hours Monday through Friday 9 a.m. to 5 p.m. Eastern time.

SUPPLEMENTARY INFORMATION: The FEIS assessed the potential environmental consequences of the alternatives on the biological, physical, and cultural environments. This decision incorporates analyses contained in the FEIS, comments provided during formal public comment and review periods, and an evaluation of the ability of each alternative to meet the Purpose and Need for the Proposed Action. Hawaii was selected primarily because it is best able to meet the Army's strategic defense and national security needs in the Pacific Theater. A fuller rationale for the decision can be found in the Record of Decision.

Dated: April 11, 2008.

Addison D. Davis, IV,

Deputy Assistant Secretary of the Army (Environment, Safety, and Occupational Health).

[FR Doc. E8–8296 Filed 4–17–08; 8:45 am]

BILLING CODE 3710–08–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of the Draft Feasibility Report and Supplemental Environmental Impact Statement and Draft State Environmental Impact Report for the Boston Harbor Deep Draft Navigation Improvement Project

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

ACTION: Notice of availability.

SUMMARY: The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Boston, MA. Four separate improvements were developed. The first examined deepening the outer and lower harbor's existing 40-foot channel system to provide deeper access to Massport's Conley Terminal in South Boston for containership traffic. All depths are referenced to minus mean lower low water (MLLW). Navigation channel depths of between 45 to 50 feet were examined, with a depth of 48 feet recommended, with an additional two feet in the entrance channel. Under this plan the following project features would be improved: the 40-foot lane of the Broad Sound North Entrance Channel would be deepened to 50 feet and widened through the bend at Finn's Ledge. The 40-foot lane of the Main Ship Channel from the Broad Sound North Entrance Channel upstream through President Roads to the Reserved Channel would be deepened to 48 feet and its 600-foot-wide reaches widened to between 800 and 900 feet, with additional width in the bends. The 40-foot lower reach of Reserved Channel and its turning area would be deepened to 48 feet, with the turning area also widened to 1600 feet. The 40-foot President Roads Anchorage would be deepened to 48 feet. The second improvement would deepen the existing 40-foot lane of the Main Ship Channel from the Reserved Channel Turning Area upstream to just below the Third Harbor Tunnel to a depth of 45 feet, to improve access to the Massport Marine Terminal in South Boston. The third improvement would deepen a portion of the 35-foot Mystic River Channel lane to 40 feet to improve access to Massport's Medford Street Terminal. The fourth and final improvement would deepen the 38-foot Chelsea River Channel to 40 feet, with minor widening in the bridge approaches and the bend between the bridges. In conjunction with work in the Federal channels, the Massachusetts Port Authority would deepen vessel berths at the Conley Terminal and Marine Terminal. Terminals on the Chelsea River would also deepen their berths to match the new channel depth. A total of about 12.1 million cubic yards (cy) of parent material, and 1.2 million cy of rock, would be removed by dredging and placed at the Massachusetts Bay Disposal Site (MBDS). Beneficial use opportunities for the dredged material have been identified and would be considered further during final design of the project. Those beneficial use opportunities include: creation of rock reefs in Massachusetts Bay and Broad Sound, and using the non-rock material as cover at the former Industrial Waste Site, which overlaps the MBDS. This joint Federal and State document builds on the lessons learned from the final EIR/S prepared in June of 1995 for the previous navigation improvement project in Boston Harbor.

DATES: Submit comments on or before June 2, 2008.

ADDRESSES: Comments should be submitted to Colonel Curtis L. Thalken, District Engineer, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742.

FOR FURTHER INFORMATION CONTACT: Ms. Catherine Rogers, (978) 318–8231.

SUPPLEMENTARY INFORMATION: The U.S. Army Corps of Engineers is authorized to conduct this Feasibility Study by a Senate Subcommittee on Public Works Resolution dated September 11, 1969.

The DSEIS/DEIR is available on-line on the New England District's Web page at *http://www.nae.usace.army.mil/projects/ma/BHNIP/BostonHarbor_draft_FeasibilitySEIS.zip* and at the following local libraries: Boston Libraries—25 Parameter Street, 20 City Hall Avenue, 18 Barnes Avenue, 666 Boylston Street, Boston City Hall, 179 Main Street, 646 West Broadway, 276 Meridan Street; Chelsea Library—569 Broadway; Revere Library—179 Beach Street; and the Winthrop Library—2 Metcalf Square. If you wish to receive a copy of the Executive Summary or an electronic copy of the DSEIS/DEIR, please contact Ms. Catherine Rogers, Ecologist, U.S. Army Corps of Engineers, New England District, Evaluation Branch, 696 Virginia Road, Concord, MA 01742.

A public meeting to solicit comments has been scheduled for 1 p.m. on Tuesday, May 20, 2008, on the second floor of the Black Falcon Cruise Terminal, One Black Falcon Avenue, Boston, MA.

Dated: April 8, 2008.

Curtis L. Thalken,

Colonel, Corps of Engineers, New England District.

[FR Doc. E8–8202 Filed 4–17–08; 8:45 am]

BILLING CODE 3710–24–P

DEPARTMENT OF DEFENSE

Department of the Army, Corps of Engineers

Notice of Availability for the Final Environmental Impact Report/ Environmental Impact Statement for the Carryover Storage and San Vicente Dam Raise Project (CSP), San Diego County, CA

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of availability.

SUMMARY: Pursuant to section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 (as amended), the U.S. Army Corps of Engineers, Los Angeles District (Corps) Regulatory Branch, in coordination with the San Diego County Water Authority (Water Authority), has completed a Final Environmental Impact Report/ Environmental Impact Statement (EIR/EIS) for the Carryover Storage and San Vicente Dam Raise Project (CSP). Four alternatives were co-equally analyzed in the EIR/EIS, including Alternative 1 (100,000 acre-feet of carryover storage at San Vicente), Alternative 2 (100,000 acre-feet of carryover storage at Moosa Canyon), Alternative 3 (50,000 acre-feet of carryover storage at San Vicente and 50,000 acre-feet of carryover storage at Moosa Canyon) and the No Action Alternative, as required by NEPA. As the project proponent and applicant, the Water Authority selected Alternative 1 as its preferred alternative. The proposed CSP requires authorization pursuant to section 404 of the Clean Water Act for approximately 0.34 acre of fill placement in jurisdictional waters of the United States, including wetlands, to construct an expansion of the existing San Vicente Dam to store approximately 100,000 acre-feet of carryover storage water.

FOR FURTHER INFORMATION CONTACT: Questions or comments concerning the Final EIR/EIS should be directed to Mr. Robert R. Smith, Jr., Regulatory Project Manager/Team Leader San Diego Field Office, U.S. Army Corps of Engineers, Los Angeles District, 16885 W. Bernardo Drive, Suite 300A, San Diego, CA 92127, (858) 674–6784. Alternatively, comments can be submitted electronically to: *robert.r.smith@usace.army.mil.*

SUPPLEMENTARY INFORMATION: Paper copies of the Final EIR/EIS will be made available to the public for review at the following: the San Diego County Water Authority offices at 4677 Overland Avenue, San Diego, CA 92123; the Lakeside Public Library, 9839 Vine Street, Lakeside, CA 92040; and the Valley Center Public Library, 29200 Cole Grade Road, Valley Center, CA 92082. A CD copy of the document may be obtained by contacting Ms. Kelley Gage at the San Diego County Water Authority at the address above, or by e-mailing Ms. Gage at *kgage@sdcwa.org.* A copy of the Final EIR/EIS is also available online at the Water Authority's Web site: *http://www.sdcwa.org/.* Interested parties are invited to provide their comments on the Final EIR/EIS, which will become a part of the official record and will be considered in the final decision. Written comments must be received on or before May 19, 2008 and should be submitted to the contact listed above. A Record of Decision (ROD) will be issued by the Corps no earlier than 30 days after the Notice of Receipt for the Final EIR/EIS is published in the **Federal Register.**

Dated: April 8, 2008.

Mark Durham,

Acting Chief, Regulatory Branch.

[FR Doc. E8–8282 Filed 4–17–08; 8:45 am]

BILLING CODE 3710–KF–P

DEPARTMENT OF DEFENSE

Department of the Navy

Notice of Availability of Finding

AGENCY: Department of the Navy, DoD.

ACTION: Notice.

SUMMARY: Pursuant to Section 102(2)(C) of the National Environmental Policy Act (NEPA) of 1969 and the Council on Environmental Quality regulations (40 CFR parts 1500–1508), implementing procedural provisions of NEPA, and Executive Order (EO) 12114, Environmental Effects Abroad of Major Federal Actions, the Department of the Navy (DON) gives notice that a combined Finding of No Significant Impact (FONSI)/Finding of No Significant Harm (FONSH) has been issued and is available for Carrier Strike Group Composite Training Unit Exercise (CSG COMPTUEX) April/May 2008.

DATES: The effective date of the finding is April 14, 2008.

ADDRESSES: Electronic copies of the combined FONSI/FONSH are available for public viewing or downloading at *http://www.navydocuments.com.*

FOR FURTHER INFORMATION CONTACT: Commander, Second Fleet Public Affairs, Commander Phillips, telephone: 757–443–9822 or visit *http://www.navydocuments.com.*

SUPPLEMENTARY INFORMATION: CSG COMPTUEX (April–May 2008) is a major Navy Atlantic Fleet training exercise proposed to occur in April and May 2008 in the offshore Jacksonville Operating Area (OPAREA) and adjacent military installations. The purpose of this exercise is to certify naval forces as combat-ready. Activities conducted during the exercise include air-to-ground (ATG) bombing at land ranges, Combat Search and Rescue (CSAR), Maritime Interdiction Operations (MIO), Naval Gunfire, Fast Attack Craft/Fast Inshore Attack Craft (FAC/FIAC), and Anti-Submarine Warfare (ASW), including use of mid-frequency active (MFA) sonar.

The FONSI is based on analysis contained in a Comprehensive Environmental Assessment (EA) addressing environmental impacts associated with land-based training for Major Atlantic Fleet Training Exercises on the East and Gulf Coasts of the U.S.

The FONSH is based on analysis contained in a Comprehensive Overseas Environmental Assessment (OEA) and Supplement to the Comprehensive OEA (SOEA) for environmental impacts associated with Navy's conduct of major

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Michael Leone, Port Director
Massachusetts Port Authority
Logan Office Center
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Dear Mr. Leone:

The New England District in partnership with Massport has completed the Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement - State Draft Environmental Impact Report examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed. These documents were reviewed by project staff from both Massport and the Corps and are being published for public review.

The Draft Feasibility Report recommends the following improvements to the Federal Navigation Project for Boston Harbor:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of 48 feet at mean lower low water, with an additional two feet of depth in the entrance channel from Broad Sound. Massport would also need to deepen the berths at the Conley Terminal.
- Improving access to Massport's Marine Terminal in South Boston. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to 45 feet, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to 40 feet. Massport has already cleared the site and deepened the berth to 40 feet.
- Improving access to the Chelsea River primarily for its petroleum terminals would deepen the existing 38-foot channel to 40 feet. Any improvement would be contingent on replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about 1 MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.

The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project, and a separate copy of the Executive Summary are also enclosed. Your staff has arranged for a public meeting for the project to be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
- Public Notice
- Executive Summary
- Draft Feasibility Report and DSEIS/DEIR
- A CDRom with DFR/DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Deval Patrick
Governor of Massachusetts
Massachusetts State House, Room 360
Boston, Massachusetts 02133

Dear Governor Patrick:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of 48 feet at mean lower low water, with an additional two feet of depth in the entrance channel from Broad Sound. Massport would also deepen the berths at the Conley Terminal. These improvement would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the big dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to 45 feet, and Massport would deepen the berth to that depth.
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replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

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These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships.

The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Timothy P. Murray
Lieutenant Governor of Massachusetts
Massachusetts State House, Room 360
Boston, Massachusetts 02133

Dear Mr. Murray:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of 48 feet at mean lower low water, with an additional two feet of depth in the entrance channel from Broad Sound. Massport would also deepen the berths at the Conley Terminal. These improvement would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
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- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to 40 feet. Massport has already cleared the site and deepened the berth to 40 feet.
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replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about 1 MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships.

The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Edward M. Kennedy
United States Senate
317 Russell Senate Office Building
Washington, DC 20510

Dear Senator Kennedy:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

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The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

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Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable Edward M. Kennedy
United States Senator
2400 JFK Building
Boston, Massachusetts 02203

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable John F. Kerry
United States Senate
304 Russell Senate Office Building
Washington, DC 20510

Dear Senator Kerry:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

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These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships.

The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

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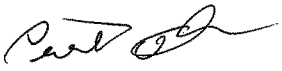
Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,



Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable John F. Kerry
United States Senator
One Bowdoin Square, 10th Floor
Boston, Massachusetts 02114

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Michael E Capuano
House of Representative
1232 Longworth House Office Building
Washington, DC 20515

Dear Mr. Capuano:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable Michael E Capuano
Representative in Congress
110 First Street
Cambridge, Massachusetts 02141

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable William D. Delahunt
House of Representative
2454 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Delahunt:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about 1 MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships.

The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable William D. Delahunt
Representative in Congress
146 Main Street
Hyannis, Massachusetts 02601

Honorable William D. Delahunt
Representative in Congress
1250 Hancock Street, Suite 802-N
Quincy, Massachusetts 02169

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Stephen F. Lynch
House of Representative
235 Cannon House Office Building
Washington, DC 20515

Dear Mr. Lynch:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of 48 feet at mean lower low water, with an additional two feet of depth in the entrance channel from Broad Sound. Massport would also deepen the berths at the Conley Terminal. These improvement would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the big dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to 45 feet, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to 40 feet. Massport has already cleared the site and deepened the berth to 40 feet.
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Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable Stephen F. Lynch
Representative in Congress
88 Black Flacon Avenue, Suite 340
Boston, Massachusetts 02210

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Edward J. Markey
House of Representative
2108 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Markey:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable Edward J. Markey
Representative in Congress
5 High Street, Suite 101
Medford, Massachusetts 02155

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable John F. Tierney
House of Representative
2238 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Tierney:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

Copy Furnished:

Honorable John F. Tierney
Representative in Congress
17 Peabody Square
Peabody, Massachusetts 01960

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Thomas M. Menino
Mayor of Boston
Boston City Hall, Suite 500
Boston, Massachusetts 02201-2013

Dear Mayor Menino:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
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Draft Feasibility Report and DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Honorable Thomas G. Ambrosino
Mayor of Revere
Revere City Hall
281 Broadway
Revere, Massachusetts 02151

Dear Mayor Ambrosino:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Jay Ash, City Manager
Chelsea City Hall
500 Broadway
Chelsea, Massachusetts 02150

Dear Mr. Ash:

The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures
Public Notice
Executive Summary
Draft Feasibility Report and DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

RADM Timothy S. Sullivan, Commander
First Coast Guard District
408 Atlantic Avenue
Boston, Massachusetts 02110

Dear Admiral Sullivan:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

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- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the big dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily for its petroleum terminals would deepen the existing -38-foot channel to -40 feet MLLW. Any improvement would be contingent on replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

Your agency has participated in the technical working group for this study and has provided significant information on port operations, safety and security for consideration in our project design. We are now requesting your comments on the draft report and the recommended improvements to the Federal Navigation Project. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

CURTIS L. THALKEN
Colonel, Corps of Engineers
Commanding

3 Encls
1. Draft Feasibility Report and DSEIS/DEIR
2. CD Rom with above documents
3. Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Robert Varney, Regional Administrator
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Varney:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
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These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

We are requesting comments under the U.S. Environmental Protection Agency's jurisdiction by law under the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, the Clean Air Act, and the National Environmental Policy Act.

As a cooperating agency in this study, your regional staff have assisted in the investigation and evaluation of the proposed beneficial use of dredged material from this project to cap the former Industrial Waste Site in Massachusetts Bay. Correspondence and other reference materials submitted by your regional staff have been included in the draft report. Your continued assistance and evaluation of the potential beneficial use of dredged material is essential now and through detailed project design over the next two years.

Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (2)
Draft Feasibility Report and DSEIS/DEIR
Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Michael Bartlett, Regional Administrator
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Bartlett:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

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These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

Your agency provided a final coordination act report under the Fish and Wildlife Coordination Act, on May 29, 2007, based on project plans and draft reports submitted earlier. We are now requesting your comments under the Endangered Species Act per the U.S. Fish and Wildlife Service's jurisdiction. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (2)
Draft Feasibility Report and DSEIS/DEIR
Public Notice

Copy Furnished:

Mr. Andrew Raddant
U.S. Department of the Interior
408 Atlantic Avenue, Room 142
Boston, Massachusetts 02110

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Ms. Patricia Kurkul, Regional Administrator
National Marine Fisheries Service, Northeast Regional Office
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Dear Ms. Kurkul:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
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These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

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We are requesting comments under the National Marine Fisheries Service's jurisdiction under the Fish and Wildlife Coordination Act, the Endangered Species Act, and the Essential Fish Habitat provisions under the Magnuson-Stevens Fishery Conservation and Management Act. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (2)
Draft Feasibility Report and DSEIS/DEIR
Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Bruce Jacobson, Superintendent
Boston Harbor Islands National Recreation Area
408 Atlantic Avenue, Suite 228
Boston, Massachusetts 02110

Dear Mr. Jacobson:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

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replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

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We are requesting comments on the draft report and recommendations. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (3)
Public Notice
Executive Summary
CDRom with the Draft Feasibility Report and DSEIS/DEIR

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Craig D. MacDonald, Superintendent
Stellwagen Bank National Marine Sanctuary
175 Edward Foster Road
Scituate, Massachusetts 02066

Dear Mr. MacDonald:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

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We are requesting comments on the draft report and recommendations. Please feel free call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 69 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (2)
Draft Feasibility Report and DSEIS/DEIR
Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Ian A. Bowles, Secretary
Massachusetts Executive Office of Energy and Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Dear Secretary Bowles:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

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We are requesting comments under the Commonwealth of Massachusetts' jurisdiction by law under the Clean Water Act, the Coastal Zone Management Act, and other Federal Acts such as the Endangered Species Act and the National Historic Preservation Act. Copies of the draft documents have also been sent under separate cover to the State officials listed below. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (4)
Draft Feasibility Report and DSEIS/DEIR
CD Rom with above documents
Executive Summary
Public Notice

Copies furnished:

Ms. Leslie-Ann McGee, Director
Massachusetts Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114

Ms. Laurie Burt, Commissioner
Massachusetts Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Ms. Brona Simon
Massachusetts Historic Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Mr. Vic Mastone
Board of Underwater Archaeology
251 Causeway Street
Boston, Massachusetts 02114

Mr. Thomas French
Natural Heritage/Endangered Species
Division of Fisheries and Wildlife
North Drive
Westborough, Massachusetts 01581

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Louis Elisa, Director
Massachusetts Seaport Council
40 Center Street
Fairhaven, Massachusetts 02719

Dear Mr. Elisa:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

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These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships.

The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

We are requesting the Commonwealth's comments on the draft report. Copies of the draft documents have also been sent under separate cover to the Governor, Lieutenant Governor and other Federal, State and municipal officials. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (4)
Draft Feasibility Report and DSEIS/DEIR
CD Rom with above documents
Executive Summary
Public Notice

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Planning Branch

Mr. Richard K. Sullivan, Commissioner
Massachusetts Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, Massachusetts 02114-2104

Dear Mr. Sullivan:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents are enclosed. A separate copy of the report's Executive Summary is also enclosed and more fully describes the study and the project being recommended.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the big dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily for its petroleum terminals would deepen the existing -38-foot channel to -40 feet MLLW. Any improvement would be contingent on

replacement of the Chelsea Street Bridge by the State, city and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

These improvements would cost approximately $308 million, of which about $272 million is to deepen the main channel improvements into the Conley Terminal. The project carries an annualized cost of about $16.3 million and produces annual benefits of about $28.4 million, yielding a benefit-cost ration of 1.74 to 1. All benefits derive from reducing the cost of carrying bulk and containerized cargo. Containerized cargo benefits come principally from shifting cargo now carried into the region by truck, to carriage by larger containerships.

The Massachusetts Port Authority is the Sponsor and cost-sharing partner for the Feasibility Study. The non-Federal share of costs for design and construction of the project is estimated at approximately $133.4 million, of which $1.7 million would be paid during project design, $101.4 million would be paid during construction, and $30.3 million following completion of construction.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

We are requesting the Commonwealth's comments on the draft report. Copies of the draft documents have also been sent under separate cover to Secretary Bowles, and other Federal, State and municipal officials. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (3)
CD Rom with Draft Feasibility Report and DSEIS/DEIR
Executive Summary
Public Notice

Copy furnished:

Ms. Martha King, Director
Office of Waterways
Massachusetts Department of Conservation and Recreation
349 Lincoln Street, Building #45
Hingham, Massachusetts 02043

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

April 10, 2008

REPLY TO:
ATTENTION OF:

Engineering/Planning Division
Evaluation Branch

Ms. Brona Simon, Executive Director and SHPO
Massachusetts Historical Commission
The Massachusetts State Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Dear Ms. Simon:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents on CD-Rom is enclosed. A separate copy of the Executive Summary with detailed information on the project is also enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Big Dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily for its petroleum terminals would deepen the existing -38-foot channel to -40 feet MLLW. Any improvement would be contingent on replacement of the Chelsea Street Bridge by the State, City and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

We are requesting your comments on the Boston Harbor deep-draft navigation study in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulations 36 CFR 800. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8552 or Mr. Marc Paiva at (978) 318-8796 . Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751.

Sincerely,

William A. Hubbard
Chief, Evaluation Branch

Enclosures (3)
Public Notice
Executive Summary
CD-Rom with Draft Feasibility Report and DSEIS/DEIR

Copy furnished (with enclosures):
Mr. Victor Mastone, Director
Board of Underwater Archaeological Resources
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2136

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 10, 2008

Engineering/Planning Division
Evaluation Branch

Ms. Cheryl Andrews-Maltais, Chairperson
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Dear Chairperson Andrews-Maltais:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents on CDRom is enclosed. A separate copy of the Executive Summary with detailed information on the project is also enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Big Dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
- Improving access to the Chelsea River primarily for its petroleum terminals would deepen the existing -38-foot channel to -40 feet MLLW. Any improvement would be contingent on replacement of the Chelsea Street Bridge by the State, City and USCG, as the existing bridge precludes the use of larger vessels.

These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

We are requesting your comments on the Boston Harbor deep-draft navigation study in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulations 36 CFR 800. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. You may also contact Mr. Marc Paiva, the District Tribal Liaison at (978) 318-8796 with any specific comments or concerns. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (3)
Public Notice
Executive Summary
CDRom with Draft Feasibility Report and DSEIS/DEIR

Copy furnished (with enclosures):
Ms. Bettina Washington, Acting THPO
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

April 10, 2008

REPLY TO:
ATTENTION OF:

Engineering/Planning Division
Evaluation Branch

Mr. Shawn W. Hendricks, Sr., Chairman
Mashpee Wampanoag Tribe
483 Great Neck Road, South
Mashpee, Massachusetts 02649

Dear Chairman Hendricks:

The U.S. Army Corps of Engineers, New England District, in partnership with the Massachusetts Port Authority (Massport), has prepared a Draft Feasibility Report and joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Massachusetts. A copy of the Draft Feasibility Report and accompanying documents on CDRom is enclosed. A separate copy of the Executive Summary with detailed information on the project is also enclosed.

The Feasibility Study is authorized by a Senate Subcommittee on Public Works Resolution dated September 11, 1969. The Corps and Massport began the study in 2002. After considering the needs of commercial navigation and public and private terminals in the several areas of the harbor, the following improvements are being recommended:

- Improving access to the Conley Terminal for containerships by deepening the harbor's existing 40-foot channels, turning basin and anchorage to a depth of -48 feet at mean lower low water (MLLW), with an additional two feet of depth in the Broad Sound North Entrance Channel. Massport would also deepen the berths at the Conley Terminal. These improvements would allow a greater percentage of New England cargo to be shipped through the Port of Boston, rather than through the Port of New York and New Jersey.
- Improving access to Massport's Marine Terminal in South Boston. This terminal was recently returned to Massport after many years of use for the Big Dig. Massport and its partners are developing the terminal for dry bulk cargo operations. The 40-foot lane of the Main Ship Channel above the Reserved Channel and below the Ted Williams Tunnel would be deepened to -45 feet MLLW, and Massport would deepen the berth to that depth.
- Improving access to Massport's Medford Street Terminal on the Mystic River for lesser draft dry bulk and break-bulk carriers. This small area of the existing 35-foot lane of the lower Mystic River Channel would be deepened to -40 feet MLLW. Massport has already cleared the site and deepened the berth to -40 feet MLLW.
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These improvements will involve dredging about 11.9 million cubic yards (MCY) of clays, sands, and tills, all parent materials largely of glacial origin, from the harbor bottom. In addition, about one MCY of rock would be blasted and dredged from the harbor. All materials have been tested and found suitable for ocean disposal at the Massachusetts Bay Disposal Site located about 18 miles seaward of the harbor. The project would take about three years to construct.

The project will appear in the April 18 Federal Register. A copy of the Public Notice for the project is also enclosed. A public meeting will be held at Massport's Black Falcon Cruise Ship Terminal in South Boston on May 20, 2008 at 1:00 PM. The public comment period on the project will close on June 2, 2008. The Massachusetts Environmental Policy Act review process will run concurrently with the Federal review process, with the State's review period closing on June 9, 2008.

We are requesting your comments on the Boston Harbor deep-draft navigation study in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and implementing regulations 36 CFR 800. Please feel free to call me with any questions or comments you may have on this project at (978) 318-8220. You may also contact Mr. Marc Paiva, the District Tribal Liaison at (978) 318-8796 with any specific comments or concerns. Written comments may be directed to me at the U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742-2751.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosures (3)
Public Notice
Executive Summary
CDRom with Draft Feasibility Report and DSEIS/DEIR

Copy furnished (with enclosures):
Mr. George Greene, Jr., Tribal Historic Preservation Officer
Mashpee Wampanoag Tribe
483 Great Neck Road, South
Mashpee, Massachusetts 02649

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

April 8, 2008

Engineering/Planning Division
Evaluation Branch

U.S. Environmental Protection Agency
Office of Federal Activities
EIS Filing Section, Room 7241
Ariel Rios Building (South Oval Lobby)
1200 Pennsylvania Avenue, NW
Washington, DC 20004

Dear Sir or Madam:

Please find enclosed five copies of the Boston Harbor Deep Draft Navigation Improvement Project Draft Feasibility Report and Draft Supplemental Environmental Impact Statement and State Environmental Impact Report (DFR/DSEIS/DEIR) for filing with your agency. A copy of the Notice of Availability is also enclosed for your reference. The three originals of the signed Notice of Availability have been or will be sent to your office from the U.S. Army Records Management and Declassification Agency for filing in the Federal Register on April 18, 2008. Please send a copy of the Notice of Availability in the Federal Register to Ms. Catherine Rogers at the above address or email a copy to catherine.j.rogers@usace.army.mil.

Copies of these documents have been distributed for review by April 11, 2008. Ms. Catherine Rogers can be reached at (978) 318-8231 regarding questions on the distribution or contents of the DSEIS/EIR.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosures

BILLING CODE: 3710-24

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Availability of the Draft Feasibility Report and Supplemental Environmental Impact Statement and Draft State Environmental Impact Report for the Boston Harbor Deep Draft Navigation Improvement Project

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

ACTION: Notice of availability.

SUMMARY: The U.S. Army Corps of Engineers, New England District in partnership with the Massachusetts Port Authority (Massport) has prepared a joint Draft Supplemental Environmental Impact Statement and State Draft Environmental Impact Report (DSEIS/DEIR) examining improvements to deep-draft navigation channels in Boston Harbor, Boston, MA. Four separate improvements were developed. The first examined deepening the outer and lower harbor's existing 40-foot channel system to provide deeper access to Massport's Conley Terminal in South Boston for containership traffic. All depths are referenced to minus mean lower low water (MLLW). Navigation channel depths of between 45 to 50 feet were examined, with a depth of 48 feet recommended, with an additional two feet in the entrance channel. Under this plan the following project features would be improved: the 40-foot lane of the Broad Sound North Entrance Channel would be deepened to 50 feet and widened through the bend at Finn's Ledge. The 40-foot lane of the Main Ship Channel from the Broad Sound North

Entrance Channel upstream through President Roads to the Reserved Channel would be deepened to 48 feet and its 600-foot wide reaches widened to between 800 and 900 feet, with additional width in the bends. The 40-foot lower reach of Reserved Channel and its turning area would be deepened to 48 feet, with the turning area also widened to 1600 feet. The 40-foot President Roads Anchorage would be deepened to 48 feet.

The second improvement would deepen the existing 40-foot lane of the Main Ship Channel from the Reserved Channel Turning Area upstream to just below the Third Harbor Tunnel to a depth of 45 feet, to improve access to the Massport Marine Terminal in South Boston. The third improvement would deepen a portion of the 35-foot Mystic River Channel lane to 40 feet to improve access to Massport's Medford Street Terminal. The fourth and final improvement would deepen the 38-foot Chelsea River Channel to 40 feet, with minor widening in the bridge approaches and the bend between the bridges.

In conjunction with work in the Federal channels, the Massachusetts Port Authority would deepen vessel berths at the Conley Terminal and Marine Terminal. Terminals on the Chelsea River would also deepen their berths to match the new channel depth. A total of about 12.1 million cubic yards (cy) of parent material, and 1.2 million cy of rock, would be removed by dredging and placed at the Massachusetts Bay Disposal Site (MBDS). Beneficial use opportunities for the dredged material have been identified and would be considered further during final design of the project. Those beneficial use opportunities include: creation of rock reefs in Massachusetts Bay and Broad Sound, and using the non-rock material as cover at the former Industrial Waste Site which overlaps the MBDS. This joint Federal and State document builds on the lessons learned from the

final EIR/S prepared in June of 1995 for the previous navigation improvement project in Boston Harbor.

DATES: Submit comments on or before June 2, 2008.

ADDRESSES: Comments should be submitted to Colonel Curtis L. Thalken, District Engineer, U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, MA 01742.

FOR FURTHER INFORMATION CONTACT: Ms. Catherine Rogers, (978) 318-8231.

SUPPLEMENTARY INFORMATION: The U.S. Army Corps of Engineers is authorized to conduct this Feasibility Study by a Senate Subcommittee on Public Works Resolution dated September 11, 1969.

The DSEIS/DEIR is available on-line on the New England District's web page at http://www.nae.usace.army.mil/projects/ma/BHNIP/BostonHarbor_draft_FeasibilitySEIS.zip and at the following local libraries: Boston Libraries - 25 Parameter Street, 20 City Hall Avenue, 18 Barnes Avenue, 666 Boylston Street, Boston City Hall, 179 Main Street, 646 West Broadway, 276 Meridan Street; Chelsea Library – 569 Broadway; Revere Library – 179 Beach Street; and the Winthrop Library – 2 Metcalf Square. If you wish to receive a copy of the Executive Summary or an electronic copy of the DSEIS/DEIR, please contact Ms. Catherine Rogers, Ecologist, U.S. Army Corps of Engineers, New England District, Evaluation Branch, 696 Virginia Road, Concord, MA 01742.

A public meeting to solicit comments has been scheduled for 1:00 p.m. on Tuesday May 20, 2008, on the second floor of the Black Falcon Cruise Terminal, One Black Falcon Avenue, Boston, MA.

8 April 08
Date

Curtis L. Thalken
Colonel, Corps of Engineers
New England District

PART 5

CORRESPONDENCE RECEIVED DURING PREPARATION OF THE DRAFT FEASIBILITY REPORT AND DSEIS/DEIR

U.S. Department of Homeland Security

United States Coast Guard

Commander
United States Coast Guard
Sector Boston

427 Commercial Street
Boston, MA 02109
Phone: (617) 223-5456
FAX: (617) 223-3032

16600
November 9, 2007

U.S. Army Corps of Engineers
New England District
Attn: Mr. Michael Keegan
696 Virginia Road
Concord, MA 01742

Dear Mr. Keegan:

I recently received your letter outlining the proposed improvements contained in the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. As Captain of the Port, one of my highest priorities is the safe transit of commercial vessels. Therefore, I am keenly interested in establishing and maintaining the maximum depth of navigable waterways within the harbor. I fully support the five areas slated for deepening as these improvements will significantly increase under keel clearance for commercial traffic in the Port.

You asked for specific feedback on proposed improvements regarding deepening of President Roads Anchorage. Maintaining adequate anchorage accessibility, particularly with the arrival of deeper-draft vessels anticipated within Boston Harbor, is essential and cannot be achieved without inclusion of President Roads Anchorage in the deepening project. This anchorage allows vessels a sheltered area to await pier availability and is a necessity in the event a vessel needs to anchor in an emergency during transit. It is also utilized by Coast Guard inspectors, in heavy weather, to conduct safety and security exams of vessels required to be boarded at sea, when a boarding out in Broad Sound may be too dangerous to accomplish safely. The Army Corps' deepening project is critical to the continued safe transit of commercial vessels within the port. I strongly support your proposal to include this viable anchorage in the larger plan.

Thank you for the opportunity to comment. If you have any questions please feel free to contact Lieutenant Junior Grade Heidi Miller, Assistant Chief of my Waterways Management Division, at (617) 223-5456.

Sincerely,

G. P. KULISCH
Captain, U. S. Coast Guard
Captain of the Port
Boston, Massachusetts

Copy: Ms. Deborah Hadden, Massachusetts Port Authority
Mr. Stewart Dalzell, Massachusetts Port Authority

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

13 August 2007

Programs/Project Management Division
Programs & Civil Project Management Branch

Commander Claudia C. Gelzer
U. S. Coast Guard Sector Boston
45 Commercial Street
Boston, MA 02109-1045

Dear Commander Gelzer:

The New England District, Corps of Engineers and Massport are completing their draft Boston Harbor Deep Draft Navigation Improvement Feasibility Study evaluating deep draft channel improvements to Boston Harbor. Before submitting that document to internal Corps review we request your views on the proposed improvements, specifically as they relate to port safety and security.

The proposed improvements, as shown in the attached figures, consist of the following:

- Deepening the Harbor's main channels providing access from the sea to the Conley Terminal, including the Broad Sound North Entrance Channel, Main Ship Channel, lower Reserved Channel and Reserved Channel Turning Area to a depth of at least 45 feet and potentially to as much as 50 feet. Depths in the entrance channel would be increased an additional two feet to allow for increased seas.
- Deepening the President Roads Anchorage Area to the same depth as the Main Ship Channel
- Deepening the Main Ship Channel above the Reserved Channel Turning Area to a depth of up to 45 feet to access the Massport Marine Terminal (North Jetty), which Massport plans to develop as a deep draft bulk cargo terminal
- Deepen a small 35-foot area of the lower Mystic River to 40 feet to improve access to Massport's Medford Street Terminal for bulk cargo operations
- Deepen the 38-foot Chelsea River Channel to 40 feet, contingent on replacement of the Chelsea Street Bridge to permit a wider channel cut.

The Project's Draft Feasibility Report and Supplemental Environmental Impact Statement would be released for public and agency review in November 2007 contingent on Corps Headquarters review and approval. Construction would not commence until at least 2011, contingent on Congressional authorization and funding and Massport and State cost-sharing. Construction is anticipated to take 4 to 7 years depending on the final depth recommended for the main channels.

For the President Roads Anchorage, the current improvement plan includes deepening the anchorage to the same depth as the improved channel. Corps design guidance issued in 2004

requires Corps projects to incorporate port security needs into project planning when designing modifications to a port's general navigation features (its channels and anchorages). In prior discussions with Coast Guard staff involved with Boston Harbor the need to include adequate anchorage accessible to the new deeper-draft cargo vessels that would use the deepened channels has been voiced. Reasons given have included the frequency of use of the anchorage for lightering, quarantine, inspection or emergency mooring of vessels. Please provide your views on the need for inclusion of anchorage deepening in the proposed improvement plans and the rationale for that need.

A ship simulation study conducted by the Corps Engineering Research and Design Center in Vicksburg, Mississippi, in cooperation with the Boston Harbor Pilots confirmed the basic channel layout developed from the PIANC and Corps deep-draft design guidance, with some minor modifications. At Finns Ledge and in the several channel bends between the Roads and the Reserved Channel Turning Area, bend wideners were recommended. The attached figures show those channel areas and turns. In general, the 900-foot width of the entrance channel was deemed adequate for the future vessel fleet, while widening the deep lane of the Main Ship Channel to 800 feet, with 900 feet in each bend, is included in the improvement design.

The Reserved Channel Turning Area would also be expanded under the current plan from its existing 1200-foot diameter to a general diameter of 1500 feet. In response to the results of the simulation study, the turning basin limits would also be flared in their junction with the northern side of the Reserved Channel and along the boundary of the Main Ship Channel as shown on the attached figures. The remaining question deals with the location of the centerline of the turning basin relative to the Logan International Airport runway and the Reserved Channel. The simulation study included runs on two alignments. The more northerly alignment was more centered on the Reserved Channel but located closer to the runway approach. The second alignment was centered further south along the Main Ship Channel and further from both the runway and Reserved Channel. While both alignments would impact runway use to some extent, the FAA is primarily interested in which alignment would enable large vessels to be turned the fastest, so as to limit runway down-time. Please examine the figures showing the two alignments and provide your views of each.

If you have any further questions or concerns, please feel free to contact the study manager for the deepening project, Mr. Mark Habel, at 978-318-8871 or me at 978-318-8087 or by email at michael.f.keegan@usace.army.mil.

Sincerely

Michael F. Keegan

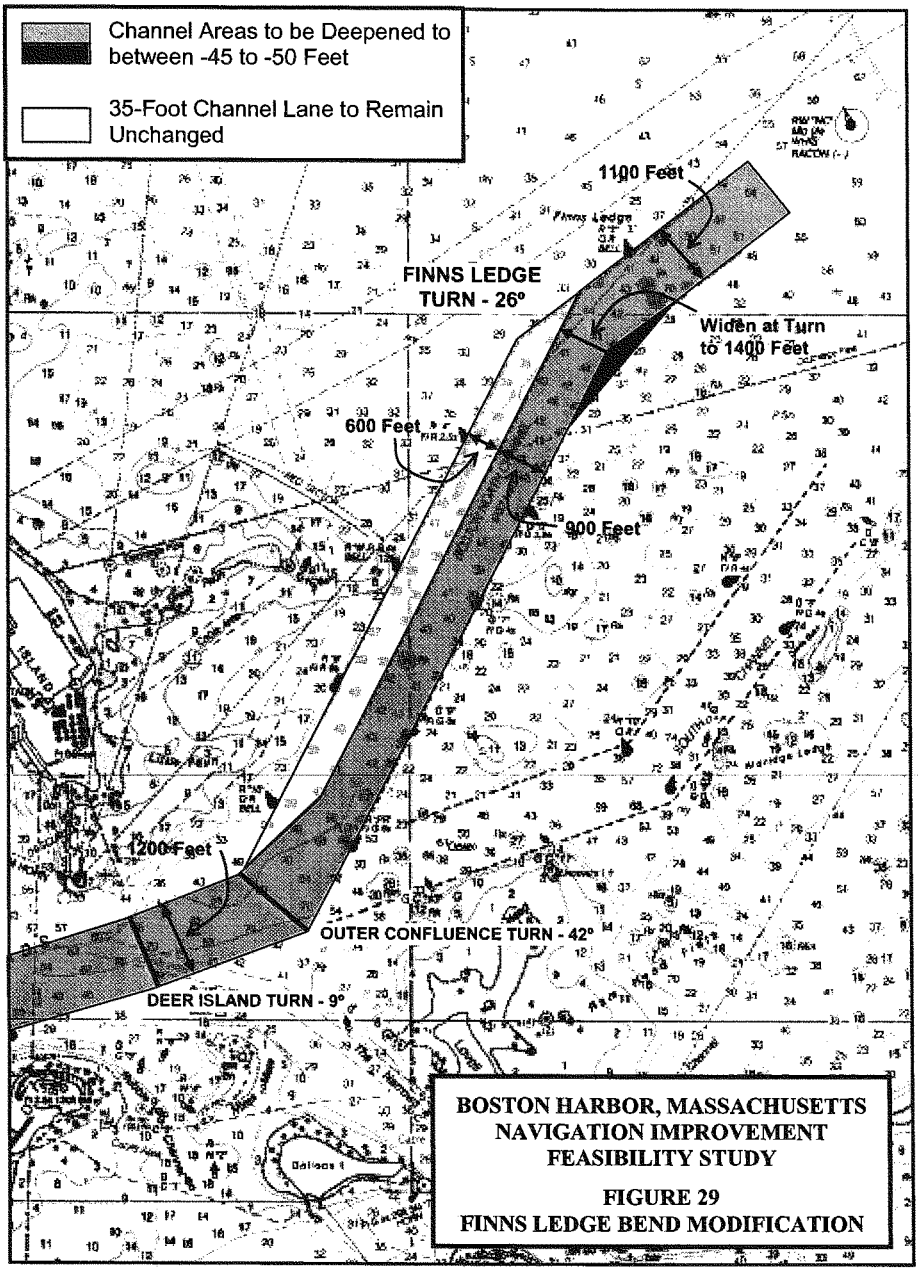
Michael F. Keegan, P.E; L.C.S.
Project Manager

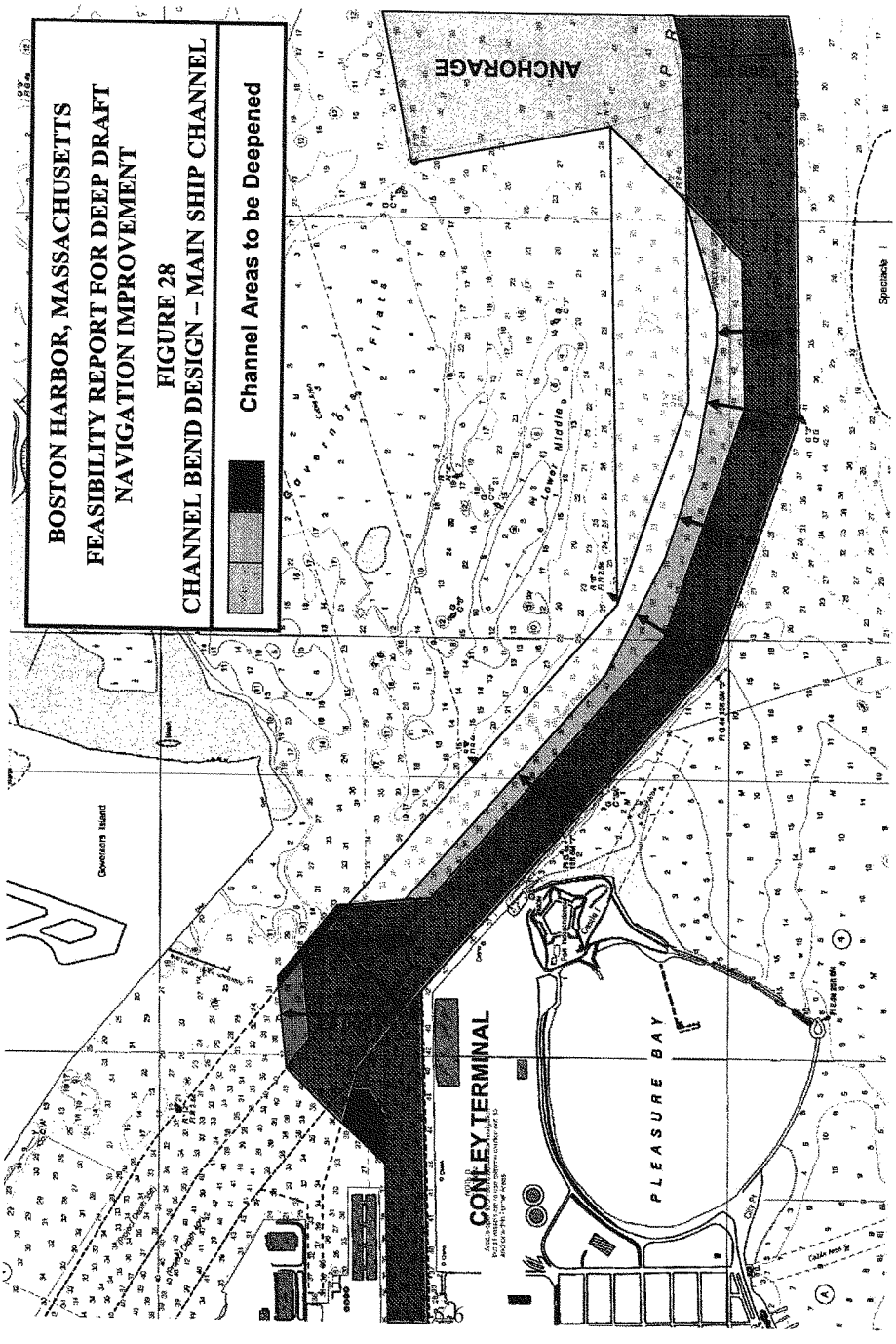
Copy Furnished: See Attached Sheet

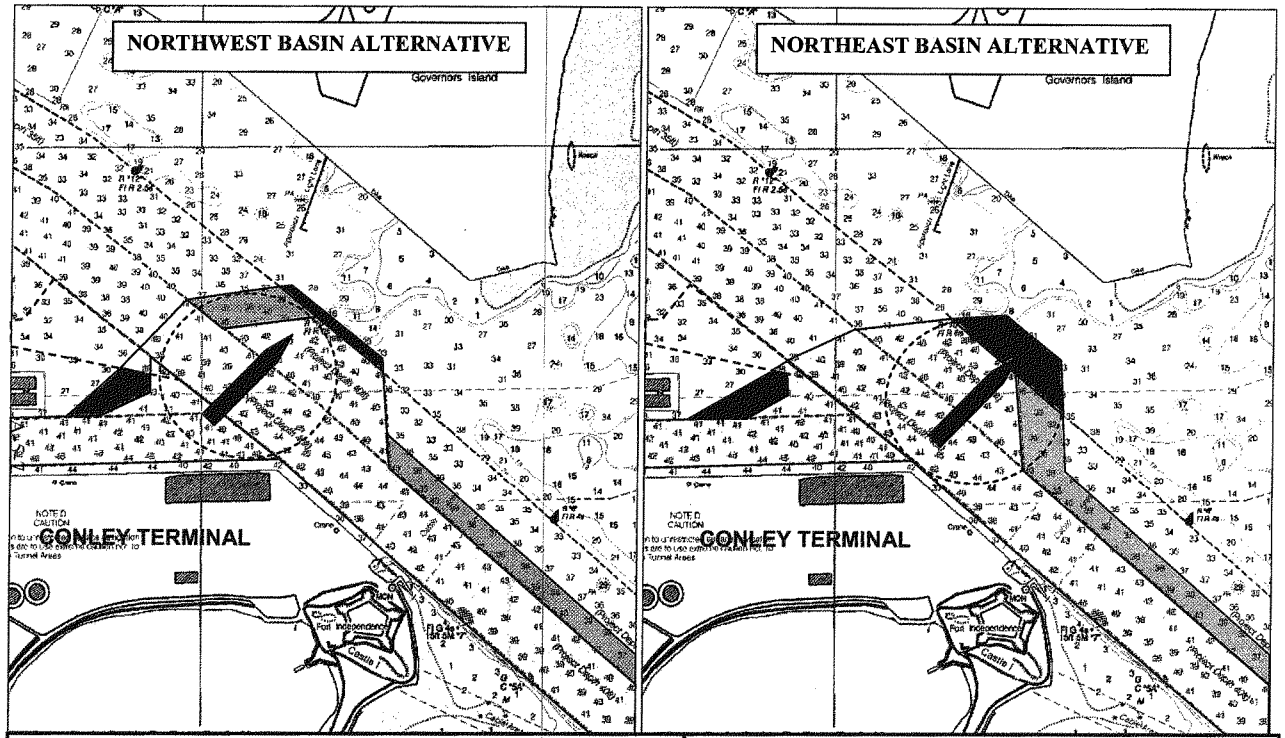
Copy Furnished:

Ms. Deborah Hadden, Deputy Port Director
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909

Mr. Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909


Channel Areas to be Deepened to between -45 to -50 Feet
35-Foot Channel Lane to Remain Unchanged
1100 Feet
FINNS LEDGE TURN - 26°
Widen at Turn to 1400 Feet
600 Feet
900 Feet
1200 Feet
OUTER CONFLUENCE TURN - 42°
DEER ISLAND TURN - 9°
BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
FIGURE 29
FINNS LEDGE BEND MODIFICATION


BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY REPORT FOR DEEP DRAFT
NAVIGATION IMPROVEMENT
FIGURE 28
CHANNEL BEND DESIGN – MAIN SHIP CHANNEL
Channel Areas to be Deepened
ANCHORAGE
Governors Island
CONLEY TERMINAL
PLEASURE BAY
Spectacle



BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY

FIGURE 30
RESERVED CHANNEL TURNING AREA EXPANSION
ALTERNATIVE BASIN ALIGNMENTS

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

August 3, 2007

Engineering-Planning Division
Planning Branch

Captain Gregg H. Farmer
Boston Harbor Pilots Association LLC
256 Marginal Street, Building #11
East Boston, Massachusetts 02128

Dear Captain Farmer:

I am writing concerning the feasibility study of deep draft channel improvements to Boston Harbor by the Corps and Massport. Specifically, we are seeking the views of the Boston Harbor Pilots on aspects of the proposed improvements related to navigational safety. Specifically we are requesting your views on widening the channel bends, the need to deepen the President Roads Anchorage Area, and the expansion of the Reserved Channel Turning Area.

The ship simulation study conducted by the Corps Engineering Research and Design Center in Vicksburg, Mississippi confirmed the basic channel layout developed from the PIANC and Corps deep-draft design guidance, with some minor modifications. At Finns Ledge and in the several channel bends between the Roads and the Reserved Channel Turning Area, bend wideners were recommended. The attached figures show those channel areas and turns. In general, the 900-foot width of the entrance channel was deemed adequate for the future vessel fleet, while widening the Main Ship Channel to 800 feet, with 900 feet in each bend, is included in the improvement design.

We are currently performing a depth optimization evaluation for the proposed channel improvement looking at depths of 45 to 50 feet to serve potential design containerships of 4300, 5600 and 7500 TEU capacities, with beams of 131 to 141 feet. The 7500 TEU vessel is new to the analysis and carries the 10 feet of additional beam. Information and views you could provide on the need for widened channel bends for these vessels would be helpful.

For the President Roads Anchorage, the current improvement plan includes deepening the anchorage to the same depth as the improved channel. Including the anchorage deepening in the plan was done mainly at the urging of your members and the US Coast Guard. Corps guidance also calls for the inclusion of such features in project recommendations where they are shown necessary for purposes of port security and safety. Information that you could provide on the frequency of use of the anchorage for lightering, quarantine, inspection, safe harborage, or emergency mooring of vessels would help in this analysis.

The Reserved Channel Turning Area would also be expanded under the current plan from its existing 1200-foot diameter to a general diameter of 1500 feet. In response to the results of the simulation study, the turning basin limits would also be flared in their junction with the northern side of the Reserved Channel and along the boundary of the Main Ship Channel as shown on the enclosed figures. The remaining question deals with the location of the centerline of the turning basin relative to the Logan International Airport runway and the Reserved Channel. The simulation study included runs on two alignments. The more northerly alignment was more centered on the Reserved Channel but located closer to the runway approach. The second alignment was centered further south along the Main Ship Channel and further from both the runway and Reserved Channel. While both alignments would impact runway use to some extent, the FAA is primarily interested in which alignment would enable large vessels to be turned and maneuvered into the Reserved Channel the fastest, so as to limit runway down-time. Please advise us what if any restrictions or notice requirements are currently practiced for vessel operations due to the airport. Please also examine the figures showing the two alignments and provide the opinion of the Boston Harbor Pilots as to the turning/maneuvering times associated with each for the larger vessels accessing the Reserved Channel.

If you have any further questions or concerns, please feel free to contact me at 978-318-8505, or the study or project managers for the deepening project, Mr. Mark Habel and Mr. Mike Keegan, at 978-318-8871 or 8087, respectively.

Sincerely

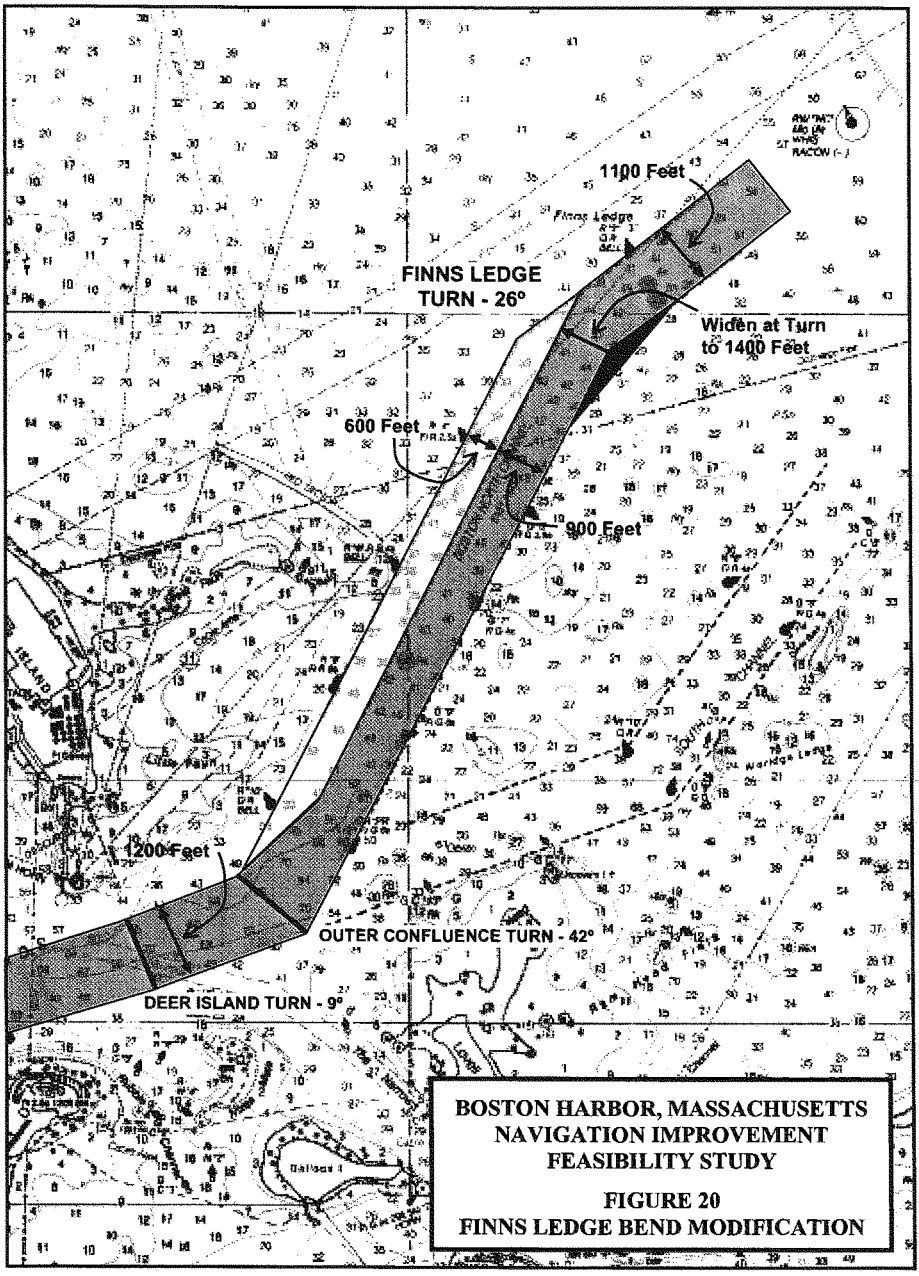
John R. Kennelly
Chief of Planning

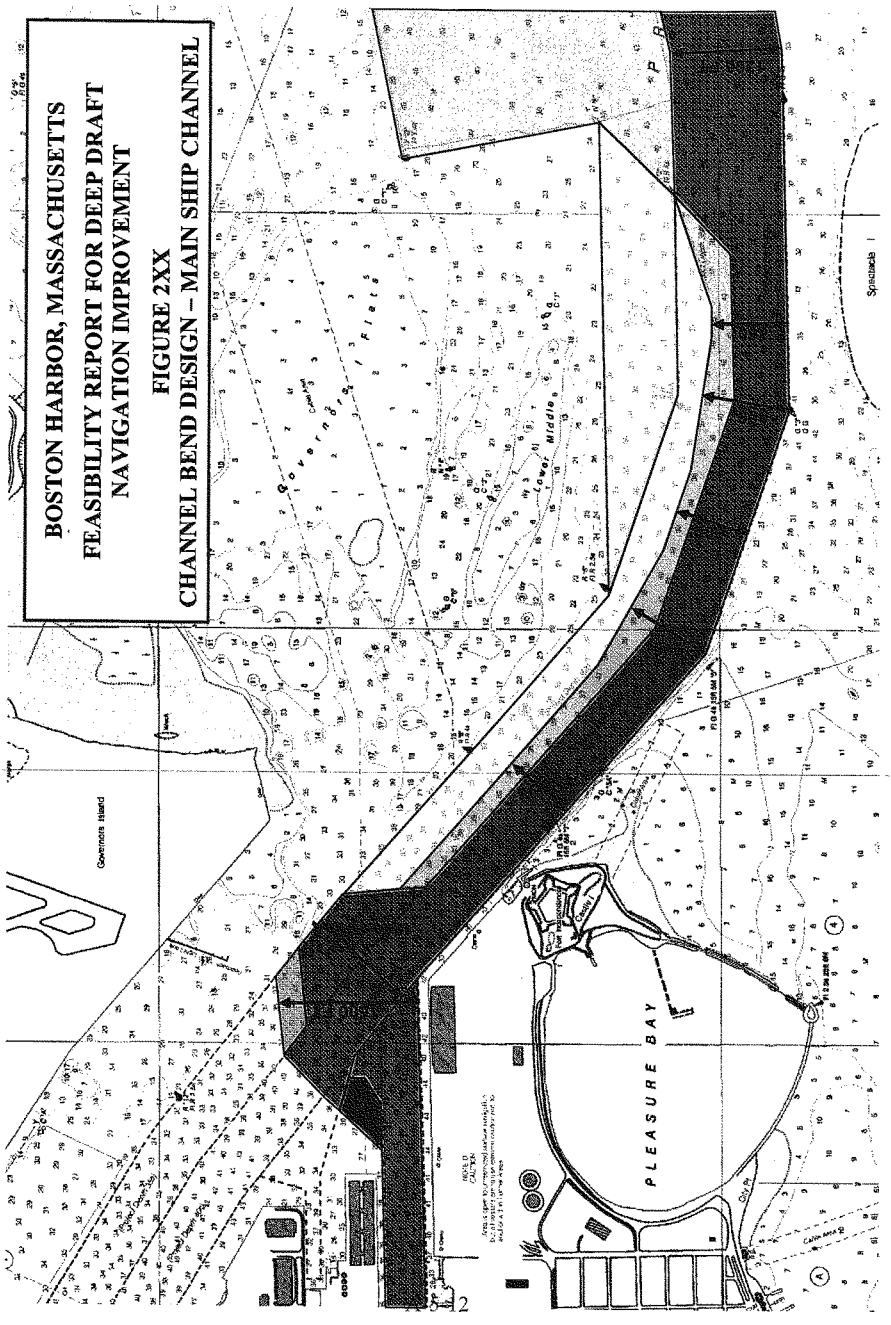
Enclosures

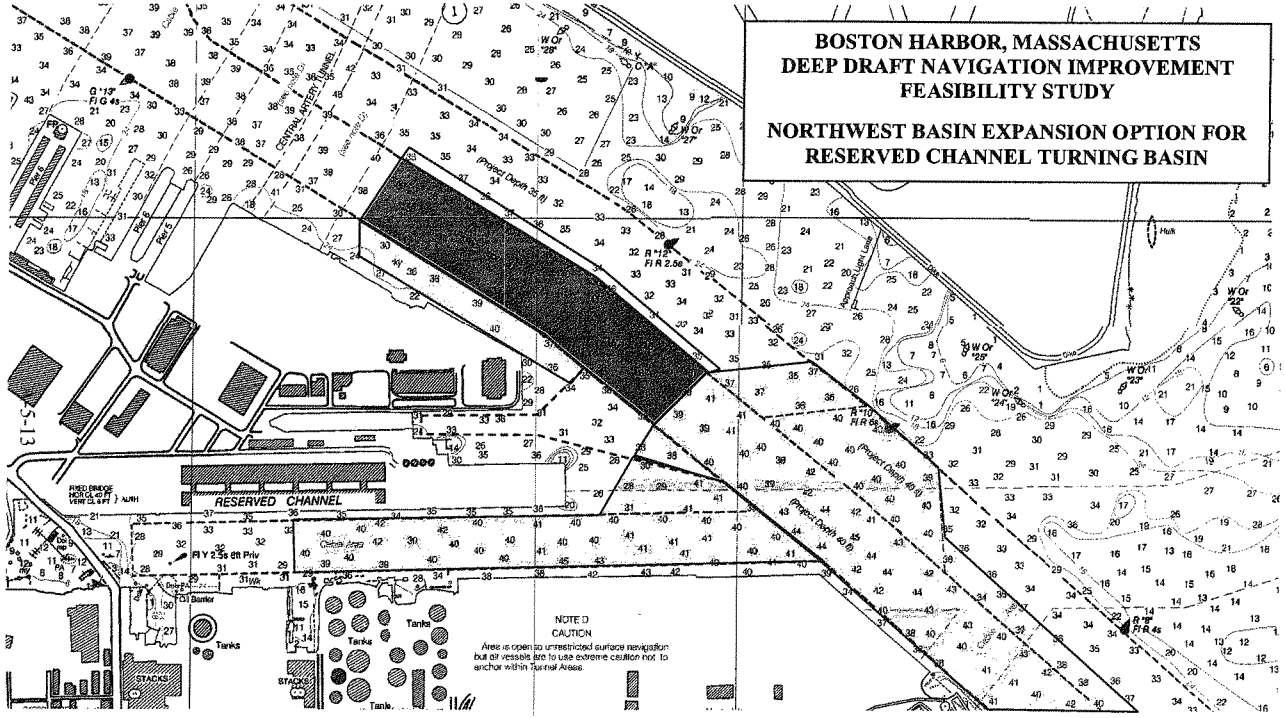
Copies Furnished:
Deborah Hadden, Deputy Port Director
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

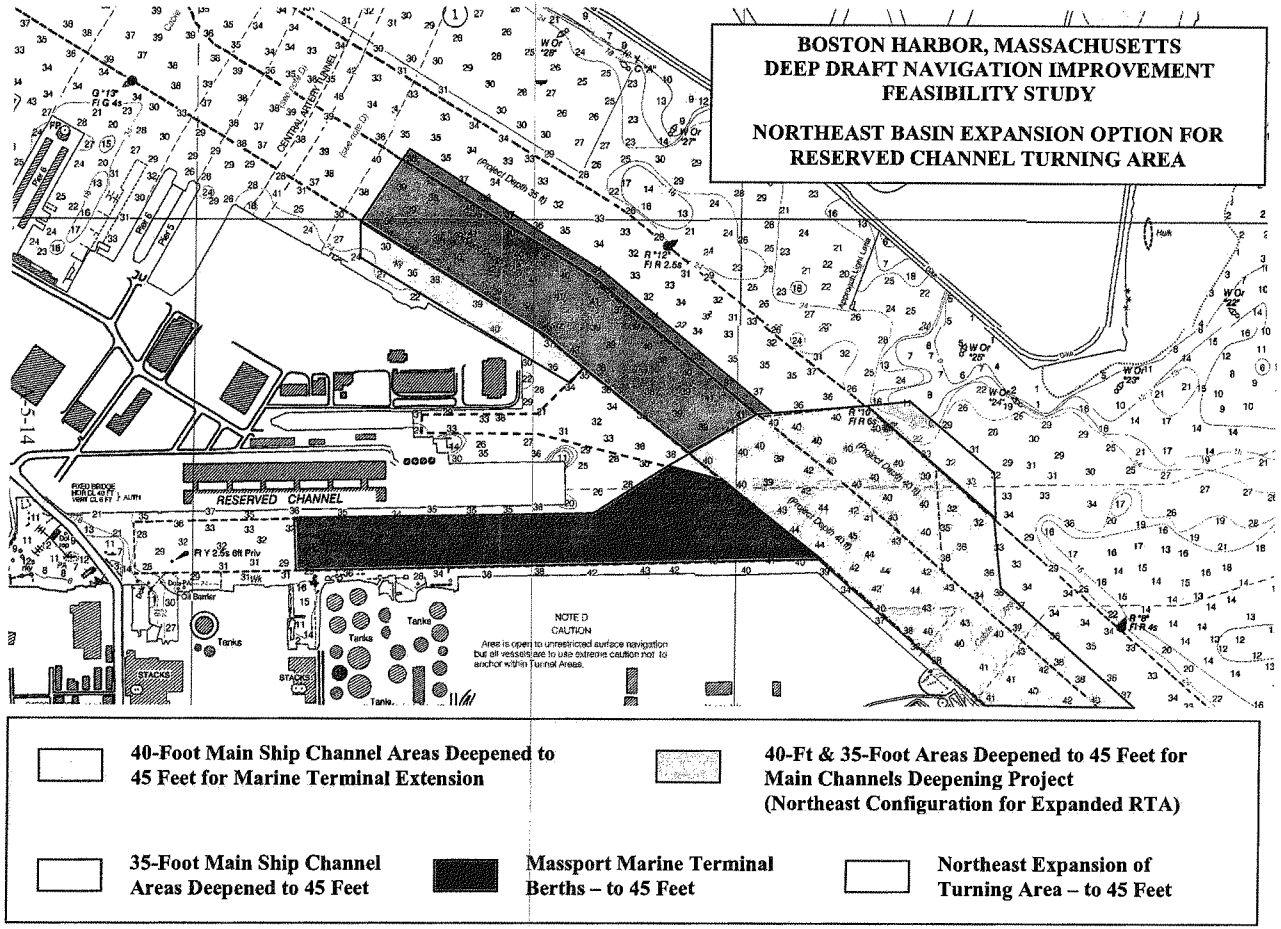
Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

40-Foot Channels, Anchorage and Turning Basin – Deepen to 45 to 50 Feet
35-Foot Channel Areas – Deepen to 45 to 50 Feet
Presently Undredged Areas – Deepen to 45 to 50 Feet
CONLEY TERMINAL
SOUTH BOSTON
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY – FIGURE 32A
45 to 50 FOOT MAIN CHANNELS IMPROVEMENT
FOR CONTAINERSHIP TRAFFIC
PLANS A, B & C


1100 Feet
FINNS LEDGE
TURN - 26°
Widen at Turn
to 1400 Feet
600 Feet
900 Feet
1200 Feet
OUTER CONFLUENCE TURN - 42°
DEER ISLAND TURN - 9°
BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
FIGURE 20
FINNS LEDGE BEND MODIFICATION


BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY REPORT FOR DEEP DRAFT
NAVIGATION IMPROVEMENT
FIGURE 2XX
CHANNEL BEND DESIGN – MAIN SHIP CHANNEL
Governors Island
PLEASURE BAY
Spectacle I


BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
NORTHWEST BASIN EXPANSION OPTION FOR
RESERVED CHANNEL TURNING BASIN
RESERVED CHANNEL
NOTED
CAUTION
Area is open to unrestricted surface navigation but all vessels are to use extreme caution not to anchor within Terminal Areas.
40-Foot Main Ship Channel Areas Deepened to 45 Feet for Marine Terminal Extension
35-Foot Main Ship Channel Areas Deepened to 45 Feet for MMT
40-Ft Areas Deepened to 45 or 48 Feet for Main Channels Deepening Project (Northwest Configuration for Expanded RTA)
Massport Marine Terminal Berths – to 45 Feet


BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
NORTHEAST BASIN EXPANSION OPTION FOR
RESERVED CHANNEL TURNING AREA
RESERVED CHANNEL
NOTED
CAUTION
Area is open to unrestricted surface navigation but all vessels are to use extreme caution not to anchor within Turnist Areas.
40-Foot Main Ship Channel Areas Deepened to 45 Feet for Marine Terminal Extension
40-Ft & 35-Foot Areas Deepened to 45 Feet for Main Channels Deepening Project (Northeast Configuration for Expanded RTA)
35-Foot Main Ship Channel Areas Deepened to 45 Feet
Massport Marine Terminal Berths – to 45 Feet
Northeast Expansion of Turning Area – to 45 Feet

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

July 30, 2007

Engineering-Planning Division
Planning Branch

Mr. Bruce K. Carlisle, Acting Director
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2136

Dear Mr. Carlisle:

I am writing in response to your letter of June 28, 2007 concerning the feasibility study of deep draft channel improvements to Boston Harbor by the Corps and Massport. Specifically, our correspondence has discussed the beneficial use potential for the 600,000 to 1.4 million cubic yards of blasted rock that would be generated by the proposed project, depending on the final channel depth recommended.

While the Corps would prefer to beneficially use the rock and other material generated by the project, the Corps and EPA have determined that all improvement material to be generated by the project, including the rock, is suitable for unconfined ocean disposal at the Massachusetts Bay Disposal Site (MBDS). The cost of disposal of the material at the MBDS is the least cost environmentally acceptable option, and is the Federal base plan for dredged material disposal for this project. Beneficial use options may be considered if there is no or minimal incremental cost involved over and above the base plan. Typically incremental disposal costs of ten percent or less are considered minimal. If incremental costs of beneficial use are more than minimal, those incremental costs must either be borne by others, or another Corps authority, such as our environmental restoration programs may potentially be applicable, subject to its own cost-sharing requirements.

The Corps and Massport have been considering beneficial uses for the projects dredged material, including hard bottom habitat creation using the rock from the project, since the beginning of the feasibility study in 2002. This use has been presented and discussed at each of the several meetings of the Boston Harbor interagency Technical Working Group (TWG) over the course of the study. The feasibility report and SEIS will begin their internal reviews later this month and will be provided to the Federal and State agencies, city and public in late fall for review and initiation of regulatory approvals prior to submittal of a report to Congress scheduled for the summer of 2008. Since you indicate that more in-depth analysis would be needed before you could support reef creation, at this time the Corps intends the feasibility report to not include a recommendation for beneficial use of the rock. The report will discuss our ongoing coordination and will state that reef creation and other potential beneficial use options will be further considered during the design phase of the project that would commence once Congress authorizes the improvement.

Your letter states that "there are questions as to the physical characteristics of the rock and hard material". The nature and character of the material and the output of the construction process have been discussed at TWG and the State Dredging Team meetings. While there are some areas of hard cobblely glacial tills, particularly in the entrance channel, the vast majority of the hard material in question will be blasted ledge. The blasting and dredging process will result in scowloads of fractured rock ranging in size from a few inches in diameter up to perhaps as much as 20 tons. Under the Federal base plan, there would be no need to sort or process this material before disposal at the MBDS. A review of the geology in the vicinity of the channel indicates that most of the rock will be argillite, except the small (5,000 cubic yard) area in the Chelsea River which would be granite. Any scow loads of rock or other hard material deemed unsuitable for reef creation or other uses would be deposited at the MBDS.

Your letter identified various beneficial use alternatives for the rock and I will offer the Corps views on each of the alternative uses you've discussed.

Hard-Bottom Habitat Creation: Battelle, under contract to the Corps, and after consultation with lobstermen and the TWG, identified five sites for creation of rock reefs in Massachusetts Bay. Of these two sites, one in Broad Sound south of Nahant, and one in the Bay east of the Harbor, were determined to be candidates for further consideration based on available area, existing bottom conditions and benthic community, and distance from the dredging site. The contractor's draft and final reports on these sites were made available to the TWG for review and comment. It is these two sites that the feasibility report will identify as potential beneficial use opportunities for hard bottom habitat creation that could be incorporated into the project plan during the final design phase of the project. Any allocation of incremental cost associated with the beneficial use would be subject to agreement between the Corps, the State and Massport, consistent with Federal authority to participate in such costs.

We understand that the Mass DMF, using mitigation funds provided by the Hubline project, has itself constructed a pilot project for hard bottom habitat creation in Boston Harbor. Mass DMF has consistently stressed the importance of such bottom habitat in the harbor and elsewhere for fisheries when dredging projects propose to impact such substrate. While the deepening of Boston's main channels would create an even greater expanse of hard bottom within the channels than presently exists, the availability of a large volume of dredged hard material offers a unique opportunity to create even more such habitat. We would welcome DMF's technical input on Battelle's report on the candidate sites identified for the navigation project, and would like the opportunity to continue review of the plans, analyses and data generated on their habitat creation work.

State-Sponsored Shore Protection Projects: Your letter cites State-sponsored shore protection projects for Point Allerton (Hull), George's Island, the Nahant Causeway and Winthrop Beach. We must stress that the rock as removed from the channels will not be engineered to any particular specification for such use. Should the State be willing to take the material by load at the dredge and supply rehandling, staging and transport for the rock, this material could be made

available on that basis. In order for the dredging project not to incur additional cost, sorting of the material would need to be a non-Federal responsibility, and would need to occur in a manner that would not compromise dredge production rates. The State would need to assume any costs to the dredging project above that which would be incurred for disposal at the MBDS.

Providing the Rock to Commercial Construction Contractors: The benefit to the government from this proposal would be avoiding the cost of hauling the rock material to the MBDS or some other disposal or beneficial use site outside the harbor. The material would need to be accepted by these parties as the dredge brings it up; unsorted and of mixed sizes and types, and potentially mixed with varying amounts of other unconsolidated material removed by the dredge bucket. As the Corps would simply haul all the material in a scow out to the dredge site for disposal, any costs for sorting or washing the material, or any other transport, storage, rehandling or disposal costs would need to be borne by the party receiving the material at the dredge. These parties would need to be identified in advance, and have agreements in place with the State allowing their receipt of the material. The Corps dredging contracts would need to be structured in a manner that allowed bidders access to these parties to make allowance in their bids for both material transferred to these users and material disposed by other means.

State Regulatory Approvals: Your letter also cites MEPA, Chapter 91, Water Quality Certification (WQC) and Federal Coastal Zone Consistency (CZMC) as State permitting authorizations required for any habitat creation work. As we understand, Massport, the non-Federal sponsor of the deepening project, is not required to secure a Chapter 91 license. The Corps would request CZMC for the Federal navigation project and would request WQC for any discharge of dredged materials into State waters. Massport would be responsible for MEPA and any other applicable State and local regulatory approvals.

We agree that the rock and any other dredged materials from the project should be considered for beneficial use opportunities to the extent consistent with applicable laws and regulations and the Corps authority to participate in such actions. In accordance with discussions with Mr. Bob Boeri of MACZM subsequent to receiving your letter we plan to bring these issues before the Boston Harbor Technical Working Group to attempt to reach a consensus on the steps needed to properly address these proposals and map out the actions needed to incorporate practicable beneficial use opportunities for these materials into the recommended project. We will also continue to keep the Massachusetts State Dredging Team apprised of these discussions and seek input from dredging team participants not represented on the TWG.

If you have any further questions or concerns, please feel free to contact me at 978-318-8505, or the study or project managers for the deepening project, Mr. Mark Habel and Mr. Mike Keegan, at 978-318-8871 or 8087, respectively.

Sincerely

for John R. Kennelly
Chief of Planning

Copy Furnished:

Robert Boeri, State Dredging Coordinator
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2136

Deborah Hadden, Deputy Port Director
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Stewart Dalzell
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

June 28, 2007

John Kennelly
Chief of Planning
Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear ~~Mr. Kennelly~~ JOHN:

Secretary Bowles has asked that I respond directly to you in response to your inquiry of May 24, 2007 regarding the Commonwealth's position on the beneficial use of rock and other hard material removed during the deepening of the Boston Harbor navigation channel.

On behalf of the Executive Office of Energy and Environmental Affairs (EOEEA), I applaud the Army Corps of Engineers, New England District ("Corps") for its firm commitment to seek the beneficial use of material that would otherwise be discarded at the Massachusetts Bay Disposal Site, particularly in light of the potential added expense involved in incorporating beneficial use into the dredging project. Depending on the final channel depths, the estimates of material range from 6 to 15 million cubic yards of sands and clays and 600,000 to 1.4 million cubic yards of rock and hard materials. The Massachusetts State Dredging Team, which is chaired by the Office of Coastal Zone Management (CZM) and includes EOEEA agencies, has been working closely with the Corps to collaborate on options and investigations for the beneficial use. The rock, in particular, is a manageable, valuable resource of enough importance that beneficial uses must be incorporated into the dredging project scope from the outset.

In your letter you describe the concept of a Corps' proposal to deposit some of the rock and hard material at sites in Broad Sound and Massachusetts Bay in order to create new hard bottom habitat with a primary goal of lobster habitat enhancement. At this time, based on the information available to date, habitat creation/enhancement is a viable alternative for a beneficial use project type, but more in-depth analysis is required to determine the likelihood for success in meeting the stated goals as well as minimizing adverse effects on natural resources and uses. As feasibility investigations into the hard bottom habitat creation project proceed, input from CZM, the Division of Marine Fisheries (DMF), and the Department of Environmental Protection should be sought. Among others, there are questions as to the physical characteristics of the rock and hard material and the material's suitability for lobster larvae settlement. DMF has the fishery staff expertise to provide the important technical input and guidance on this type of beneficial use project. The state permitting authorizations that would be required (including Massachusetts Environmental Protection Act, Chapter 91 Waterways, 401 Water Quality Certification, and Federal Consistency Review) should be initiated early to allow for adequate review and issuance.

In addition to the hard bottom habitat creation project proposed by the Corps, there are two types of potential alternative projects that should be considered. It should be noted that these alternatives are not mutually exclusive, and that the potential exists to use the material to support several beneficial use projects.

Another beneficial use project type alternative that the Massachusetts State Dredging Team is currently examining is the use of the material for medium to large-scale shore protection efforts being considered within the Boston Harbor region. Some of the projects that could benefit from the rock removed during the deepening of the Boston Harbor navigation channel include: the runway safety improvements proposed for Logan Airport; the rehabilitation of Department of Conservation and Recreation revetments at Point Allerton, on George's Island, and on the Nahant Causeway; the rehabilitation of Central Artery/Tunnel revetments at Spectacle Island; and the creation of the terminal groin at Winthrop Beach. Each of these projects requires armoring rock (in the 5 to 8 ton range) and/or toe stone (in the 8 to 12 ton range) and would offer the advantage of less processing of the rock material. These projects are also in close proximity to the navigation channel work. The volume of material required for each project is still being determined as is the identification of a shore-side staging and storage site to be used prior to the final placement of the material. The required permitting for these shore protection projects would be the responsibility of the respective state agency landowner.

A third potential type of use for the material involves the construction industry. At the present time two companies—with both an interest in, and the ability to handle and process, the large volumes of rock involved—have expressed interest in obtaining the material. The Massachusetts State Dredging Team is having further discussions with these and any other interested parties regarding the logistical issues involved in accepting the material, including transfer scow availability, shoreside handling facilities and associated permits, and distribution systems.

I would encourage you to continue to work the Massachusetts State Dredging Team and the EOEEA agencies as the Corps further explores the feasibility of the beneficial use of rock and other hard material removed during the deepening of the Boston Harbor navigation channel.

Sincerely,

Bruce K. Carlisle
Acting Director

Cc:
Ian Bowles, EOEEA
Phil Griffiths, EOEEA
David Cash, EOEEA
Paul Diodati, DMF
Lealdon Langley, DEP
Ben Lynch, DEP
Karst Hoogeboom, DCR
Martha King, DCR
Michael Leone, MassPort
Robert Boeri, CZM

Habel, Mark L NAE

Subject: FW: Harbor Deepening Project Questions

From: Gregg Farmer [mailto:gfarmer@bostonpilots.com]
Sent: Saturday, June 30, 2007 9:36 PM
To: Habel, Mark L NAE
Cc: ahammond@bostonpilots.com
Subject: RE: Harbor Deepening Project Questions

Mark,

I have been out of pocket sorry for not replying sooner.

1) A) 10-18kts
   B) 12-8 kts
   C) 7-5 kts
2) 20-30 minutes
3) 1-1.5 hrs
4) 1.5-2 hrs By entrance buoy I am assuming Mystic River. Generally it is 1.5 hrs to Pier One East Boston another 30 minutes to Island End River.
5) Conoco 1.5-2hrs
6) 2-2.5 hrs Revere

Thanks for passing this along Mark and yes please address the letter to me.

Gregg

I think the purpose of life is to be useful, to be responsible, to be honorable, to be compassionate. It is, after all, to matter: to count, to stand for something, to have made some difference that you lived at all.
--Leo C. Rosten

-----Original Message-----
From: Habel, Mark L NAE [mailto:Mark.L.Habel@nae02.usace.army.mil]
Sent: Tuesday, June 26, 2007 11:16 AM
To: gfarmer@bostonpilots.com
Subject: Harbor Deepening Project Questions

Gregg: I have a couple of questions to help us in making the case for channel improvements that I hope you can help me out with.

(1) For the larger containerships - what speed (in knots) do the ships travel through:
   A - The North Channel
   B - The Roads
   C - The Main Ship Channel up to the Reserved Channel

(2) How long does it take to turn the large containerships in the Reserved Channel Turning Area (Notch)

(3) Overall - how long does it take on an inbound transit from the NC buoy to the berth at Conley

(4) For the cement ships travelling to the Mystic River - how long is a transit from the NC entrance buoy

(5) Same question for tankers inbound to Conoco-Philips

(6) Same question for tankers inbound to the upper Chelsea terminals

Mark L. Habel, Chief, Navigation Section Engineering-Planning Division US Army Corps of Engineers New England District 696 Virginia Road, Concord, MA 01742

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

June 28, 2007

John Kennelly
Chief of Planning
Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

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I would encourage you to continue to work the Massachusetts State Dredging Team and the EOEEA agencies as the Corps further explores the feasibility of the beneficial use of rock and other hard material removed during the deepening of the Boston Harbor navigation channel.

Sincerely,

Bruce K. Carlisle
Acting Director

Cc:
Ian Bowles, EOEEA
Phil Griffiths, EOEEA
David Cash, EOEEA
Paul Diodati, DMF
Lealdon Langley, DEP
Ben Lynch, DEP
Karst Hoogeboom, DCR
Martha King, DCR
Michael Leone, MassPort
Robert Boeri, CZM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

June 25, 2007

John R. Kennelly, Chief
U.S. Army Corps of Engineers
New England District
Engineering/Planning Division
Evaluation Branch
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

Thank you for your letter dated April 27, 2007, regarding the Boston Harbor Deep Draft Navigation Improvement Project and the proposal by the U.S. Army Corps of Engineers, New England District to use some of the dredged material to attempt to cover and isolate debris and potentially contaminated sediments in the former Industrial Waste Site (IWS). The U.S. Environmental Protection Agency, Region 1 supports this proposal in concept and is willing to work with your office to design this aspect of the project and prepare any necessary environmental assessments. EPA shares the Corps' desire to use this dredged material beneficially, if possible, rather than merely disposing of it at the nearby Massachusetts Bay Disposal Site (MBDS).

To assist you with the development of the necessary planning and environmental impact documentation, we already had provided copies of reports by NOAA and the International Wildlife Coalition on surveys of the IWS during the early 1990s. Since we received your letter, we have provided preliminary data from our July 2006 side-scan survey on the location of barrels, and will continue to work with you to refine that data to optimize its usefulness.

We also have had several discussions with your staff on the technical merits of the proposal and believe it warrants further evaluation. Regarding further assessments, we recommend addressing the potential for the re-suspension of sediments during disposal events, and whether the capping will sufficiently isolate the vast majority of barrels from surface activities, such as fish trawling. We encourage you to utilize modeling or pilot projects to test re-suspension and to evaluate the extent of debris in and around the IWS. We understand that a field test of a proposed disposal methodology that may address these issues will be carried-out next year as part of the Boston Harbor maintenance dredging project.

We also have discussed legal aspects of the proposal internally and with your staff and do not think there are any prohibitions against pursuing the proposal under the applicable laws. One option we are currently considering would involve modifying the boundaries of the MBDS to encompass the IWS, which would require EPA to conduct a rulemaking

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consistent with the requirements of the Marine Protection, Research, and Sanctuaries Act and the National Environmental Policy Act. We would be happy to work with you to develop a communications strategy to both inform – and get feedback from – Boston Harbor and Massachusetts Bay stakeholders about your proposal. We also are willing to support you in these public outreach activities.

Thank you again for bringing to our attention this proposal for a possible beneficial use project. We hope to help determine whether the project is advisable and, if so, we hope to help make it a success. If you have any questions or need additional information, don't hesitate to call me at (617) 918-1553 or Matt Liebman of my staff at (617) 918-1626.

Sincerely,

Melville P. Coté, Jr., Manager
Ocean and Coastal Protection Unit

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

May 29, 2007

John R. Kennelly
Chief of Planning
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Dear Mr. Kennelly:

The U. S. Fish and Wildlife Service has reviewed the documents on the Boston Harbor Deep Draft Navigation Project in Boston, Massachusetts. The following comments constitute our Fish and Wildlife Coordination Act 2b report on the project (Fish and Wildlife Coordination Act 948 stat. 401, as amended; 16 U.S.C. 661 et seq.).

Our resources of concern have been adequately addressed in the documents and we support the project as proposed. We favor the creation of artificial reefs with the bedrock material. If you have any questions please contact me at 603-223-2541

Sincerely yours,

William J. Neidermyer

William J. Neidermyer
Assistant Supervisor, Federal Activities
New England Field Office

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 24, 2007

Engineering/Planning Division
Evaluation Branch

Mr. Ian A. Bowles, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, Massachusetts 02114-2136

Dear Mr. Bowles:

As you know, the U.S. Army Corps of Engineers, New England District (Corps) is conducting a Feasibility Study to evaluate deepening of the navigation channels in Boston Harbor in partnership with Massport. This study is focusing on providing deeper vessel access to the Conley container terminal in South Boston by deepening the Broad Sound Entrance Channel, the President Roads Anchorage, the Main Ship Channel upstream to the Reserved Channel and the lower Reserved Channel, all to a depth of between 45 and 50 feet at Mean Lower Low Water (MLLW), with the entrance channel deepened an additional two feet. The project is also examining three other improvements to the harbor; (1) extending the deepening of the Main Ship Channel to a point below the Third Harbor Tunnel to access Massport's Marine Terminal in South Boston, (2) deepening a small section of the Mystic River Channel at Massport's Medford Street Terminal to 40 feet MLLW, and (3) deepening the Chelsea River Channel to 40 feet MLLW.

Depending on the final depth chosen through economic analysis of the container shipping needs of the port, construction of these channel improvements would generate between six and 15 million cubic yards of unconsolidated materials, primarily glacial and marine clays and sands, and between 600,000 cubic yards and 1.4 million cubic yards of blasted rock and other hard materials. The Corps and U.S. Environmental Protection Agency have determined that these materials are suitable for unconfined ocean placement at the Massachusetts Bay Disposal Site. This method of disposal is the Federal base plan for the project.

However, it is the Corps policy to use dredged material in a beneficial manner when practicable. To promote this effort, five areas were selected as potential recipients of the blasted rock and hard material for hard bottom habitat enhancement in a meeting attended by Boston Harbor lobstermen, members of the Massachusetts Lobstermen Association, and staff of the Massachusetts Division of Marine Fisheries. The locations of the potential habitat enhancement sites included Broad Sound, Nantasket Roads, Massachusetts Bay, Nahant Bay, and an area off Magnolia. We have conducted sidescan surveys, Sediment Profile Imaging (SPI), benthic surveys, and other investigations to determine which site(s) meet the criteria selected for habitat enhancement. Two of these sites, Broad Sound and Massachusetts Bay, have sufficient areas not presently covered by hard bottom materials as candidate sites for creation of such habitat with

the dredged rock and hard materials. In addition to the creation of hard bottom habitat for beneficial use from rock material, staff from the MA Office of Coastal Zone Management has been investigating the use of blasted rock and other hard material for upland construction purposes too.

The purpose of this letter is to obtain the Commonwealth of Massachusetts position on the beneficial use of rock and other hard material removed during the deepening of Boston Harbor for habitat enhancement purposes at the candidate sites. The State's views on this subject are needed prior to submittal of our internal draft reports for review within this agency, and prior to the expenditure of additional funds for investigative and other review purposes. We request a response to our letter by June 29, 2007 to meet our schedule deadlines. If you have comments or questions, please contact Ms. Catherine Rogers at 978-318-8231 at your earliest convenience.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:

Mr. Robert Boeri, Dredging Coordinator
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114-2136

Mr. Paul Diodati, Director
Massachusetts Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114-2136

Mr. Michael Leone, Director of Maritime
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 27, 2007

Engineering/Planning Division
Evaluation Branch

Mr. Mel Cote
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Cote:

As you know, the U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

A suitability determination, with which your office concurred, found that all improvement dredging materials were suitable for unconfined ocean disposal at the Massachusetts Bay Disposal Site. While a full range of disposal alternatives will be addressed in the SEIS, it is expected that disposal at the Massachusetts Bay Disposal Site will be the Federal base plan for the project. However, it has been brought to our attention that the Industrial Waste Site (IWS), located in Massachusetts Bay, may also provide a suitable site for the beneficial use of dredged material from Boston Harbor. This site is known to contain debris such as the disposal of barrels containing chemical and low level radioactive waste. The placement of dredged material at this site may cap and isolate the debris from contact with biological resources.

The purpose of this letter is to request your agency's response to and views on the proposed use of the IWS as a potential site for beneficial use of the dredged material from the Boston Harbor Deep Draft project. In addition, we are requesting that information collected by U.S. EPA on the IWS be forwarded to our office for review and analysis for citation in the Boston Harbor SEIS/EIR. Information of interest includes maps of the IWS showing the location of the debris, background information, side scan sonar, surveys, video observations, and summaries of the information.

Your office has already provided copies of the 1996 NOAA survey report on their 1992 survey of the IWS (NOAA Technical Memorandum NOS ORCA 99), and the International Wildlife Coalition's 1991-1992 report that was submitted to your agency. Of particular interest is any information developed since those reports, including the results of EPA's July 2006 field

survey, including side scan sonar surveys and locations and images of potential cultural resources located by that effort.

If this beneficial use proposal is to be pursued further, we will need your agency's assistance in making such evaluations as would enable prioritizing areas to be capped, developing a plan for disposal of the material, and conducting any pre and post disposal surveys for monitoring impacts and effectiveness of the operation. The Corps intends to publish its draft Feasibility Report and SEIS this coming fall, and contingent on Congressional action on project authorization, plans to conduct design phase activities during the 2008-2010 timeframe, with construction likely to commence in FY 2011. For purposes of the draft Feasibility Report, we would need your agency's views on the need, feasibility, potential impact and anticipated benefits of such beneficial use of the project's dredged material.

Please direct any questions or comments, and the above information to Ms. Catherine Rogers, U.S. Army Corps of Engineers at (978) 318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:

Mr. Matt Liebman
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

January 24, 2007

Engineering/Planning Division
Evaluation Branch

Mr. William Neidermyer, Federal Activities Coordinator
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Neidermyer:

As you know, a letter was written to your office dated January 25, 2005, requesting your comments under the Fish and Wildlife Coordination Act, and a list of threatened and endangered species under the Endangered Species Act, for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. We received information on Federally threatened and endangered species in the project area, but no information under the Fish and Wildlife Coordination Act. It is our understanding that we need to provide your office with a Scope of Work (SOW) and funding to prepare a Planning Aid Letter and a Final Coordination Act Report. Please find enclosed the SOW and our estimate of the level of effort needed to provide this information. Our previous letter mentioned above, plus the enclosed SOW, has a project description for your convenience.

After you have had a chance to review the enclosed SOW and the estimated amount of effort, please contact Ms. Catherine Rogers at 978-318-8231 to finalize these two items.

Sincerely,

John R. Kennelly
Chief of Planning

Enclosure

Scope-of-Work
US Army Corps of Engineers and U.S Fish and Wildlife Service
Boston Harbor Deep Draft Navigation Improvement Study
Boston, Massachusetts

Purpose

The purpose of this Scope-of-Work (SOW) between the U.S. Army Corps of Engineers (Corps), New England District and the U.S. Fish and Wildlife Service (Service) is to provide a framework for preparing a Planning Aid Letter and a Final Coordination Act Report pursuant to the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. et seq.) for the Corps Boston Harbor Deep Draft Navigation Improvement Feasibility Study. Transfer funding between the Corps and the Service is authorized pursuant to the Economy Act (31 U.S.C. 1535). Recent coordination between the two agencies has covered the major maintenance dredging of the Port of Boston's outer harbor and inner harbor areas separately, and this coordination will cover the deepening of some of those same areas.

Point of Contacts

Corps District and Contacts: U.S. Army Corps of Engineers, New England District, 696 Virginia Road, Concord, Massachusetts, 01742-2751. The Environmental Team Member is Ms. Catherine Rogers (978) 318-8231 and the Study Manager is Mr. Mark Habel (978) 318-8871.

Service Regional Office and Contact: USFWS, NEFO-Ecological Services, 70 Commercial Street, Suite 300, Concord, NH, 03301. Project Leader: William Neidermyer (603-223-2541).

Description of the Study

The Corps is conducting a Feasibility Study to evaluate navigation improvement opportunities at Boston Harbor. This study is investigating deepening and widening the 40-foot MLLW lanes of the North Entrance Channel and Main Ship Channel up to the Reserved Channel, together with deepening the President Roads Anchorage and the lower Reserved Channel and expanding its turning area, to permit access by larger container ships.

Depending on which containership class design is optimized for, the recommended plan of improvement would be deepening the main navigation channels and anchorage to either 45 or 50 feet MLLW. Under all plans the Broad Sound North Entrance Channel would be deepened an additional two feet to compensate for higher seas. About 6.5 million cubic yards (cy) of dredged material plus 510,000 cy of rock would need to be removed to create a 45-foot MLLW channel. A 50-foot deep MLLW channel would require the removal of about 14.8 million cy of dredged material and 1.4 million cy of blasted ledge.

In response to a further request by Massport, the project sponsor, the study is also examining three other minor improvements to the Port's channels. These improvements include: 1) deepening the reach of the Main Ship Channel above the Reserved Channel up to the Ted Williams Tunnel to about 45 feet MLLW to access Massport's Marine Terminal, which they are developing for expanded bulk cargo shipment, 2) deepening a small area of the 35-foot MLLW portion of the Mystic River Channel to 40 feet MLLW to access Massport's Medford Street Terminal in Charlestown, which Massport has recently redeveloped to handle bulk cargo, and 3) deepening the 38-foot MLLW Chelsea River Channel to 40 feet MLLW, should the U.S. Coast Guard and the City of Boston proceed with replacement of the Chelsea Street Bridge and provided that Keyspan completes relocation of the natural gas siphon beneath the channel, as required for the previous 38-foot Boston Harbor navigation improvement project. These proposed improvements are shown in the attached Figures 2 and 3.

All improvement materials from all alternatives have been determined to be suitable for ocean disposal by the Corps and EPA at the EPA designated Massachusetts Bay Disposal Site. The rock and other hard material are suitable for beneficial use to create hard-bottom habitat for lobsters and other species. Figure 1 shows the location of five proposed hard-bottom habitat sites. These sites were selected based on State and local lobstermen input, and one or more of them could be used for the project.

Coordination and Scoping

Coordination between the Corps and the Service will occur periodically as necessary. Site visits and meetings are not expected to be necessary, as the Service has provided information on previous Boston Harbor navigation improvement and maintenance dredging projects. The Service has been invited to act as a cooperating agency in preparation of the SEIS, and has been invited to be a participant in the Technical Working Group of Federal, State and local agencies and port interests that meets several times each year to provide overview and input to the Corps and Massport on the maintenance and improvement activities.

Data and information needed from the Corps for the Service: 1) completed and signed transfer funding agreement, 2) description of proposed improvement alternatives, 3) draft Feasibility Study and Environmental Assessment (EA), for the Final Coordination Act Report, 4) other applicable maps, diagrams, reports, or documents available to the Corps, as requested by the Service.

Funds Expended to Date: none

Specific Work to be accomplished by the Service: 1) identify and review existing biological resource information in the Boston Harbor study area, 2) review previous EIS, SEIS and EA for the previous Boston Harbor navigation improvement and maintenance dredging projects, 3) review other reports prepared for the Boston Harbor area that may be relevant (i.e. MWRA reports) and the hard-bottom habitat sites, 4) prepare FWCA

Section 2(B) reports (Planning Aid Letter and Final Coordination Act Report) to address improvement alternatives and the hard-bottom habitat sites. The reports should include descriptions of biological resources in the study area. The Service will address potential adverse impacts on biological resources from the alternatives, and provide recommended types and amounts of mitigation for habitat losses, if required.

Corps and Service Submission Schedule

The Corps has provided the Service with the project description in our letter dated January 25, 2005 and in this SOW. The Service will submit a Planning Aid Letter to the Corps in February 2007. The agencies anticipate that this Planning Aid Letter will involve a minimal effort due to the extensive and recent coordination for the maintenance dredging activities for the same channel areas.

The Corps will provide the draft Feasibility Study and SEIS later in 2007. The Service will review Corps comments on the Planning Aid Letter, and the Corps draft Feasibility Study and SEIS, and prepare a Final Coordination Act Report within 45 days of receipt of the SEIS.

The Service will notify the Corps in writing of any anticipated changes in schedule. Notification will be submitted to the Corps point of contact as soon as possible, but not less than 15 days prior to the scheduled delivery date.

Estimated Level of Effort

Due to the amount of previous review and information available from the last three Boston Harbor projects (navigation improvement and maintenance dredging), a reduced level of effort is expected for this Deep Draft project. It is anticipated that three days would be needed to accomplish the above tasks (i.e. a Planning Aid Letter and a Final Coordination Act Report).

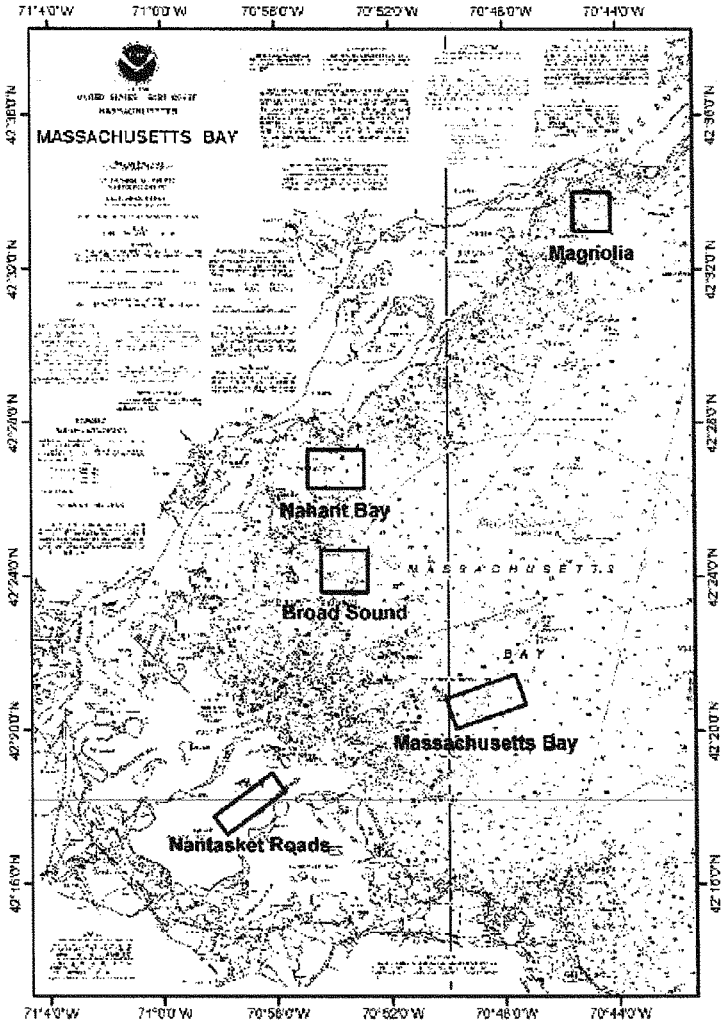
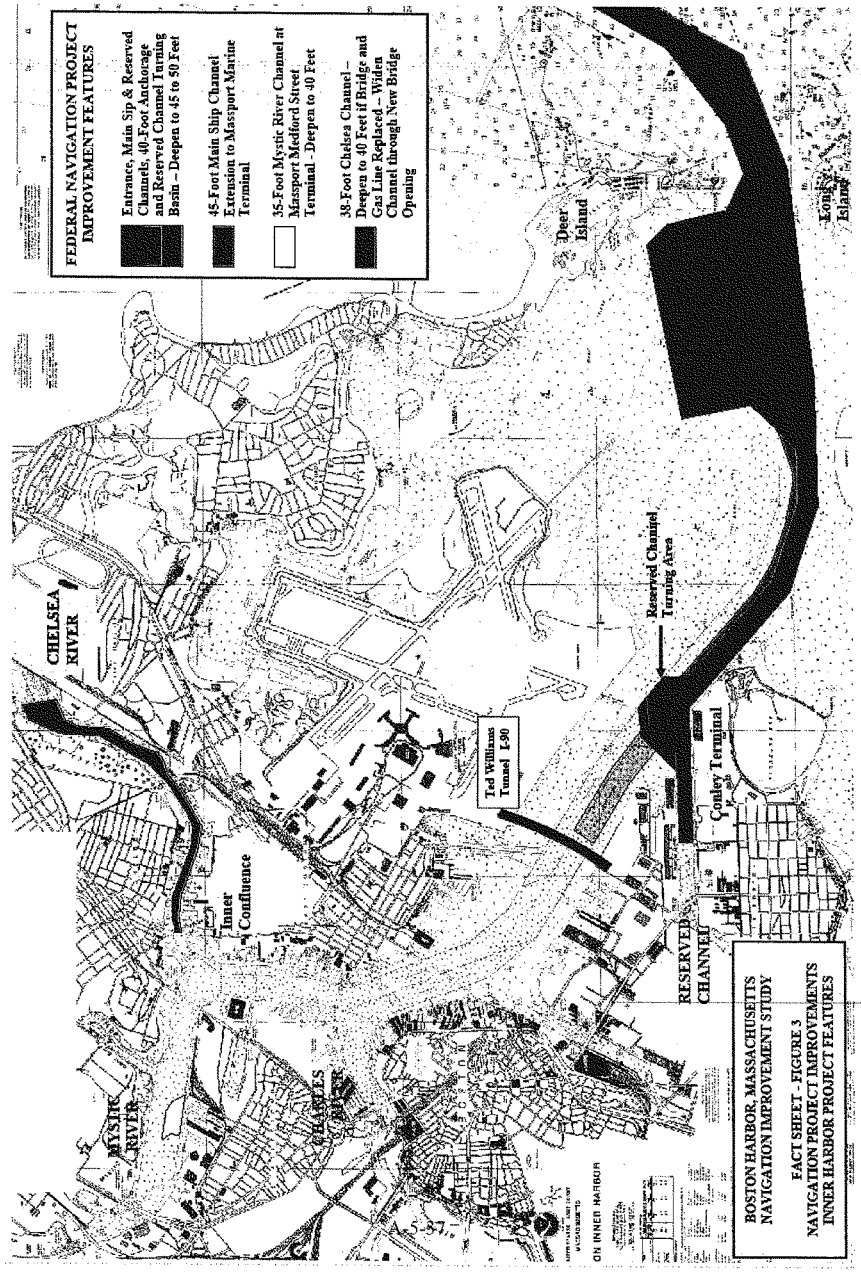


Figure 1. Area Site Map.

40-Foot Channels, Anchorage and Turning Basin – Deepen to 45 to 50 Feet
35-Foot Channel Areas – Deepen to 45 to 50 Feet
Presently Undredged Areas – Deepen to 45 to 50 Feet
Note: Reserved Channel area in this Drawing shows the Northern Turning Basin Alignment Alternative. Please see Detailed Maps of the Reserved Channel Area for Details on All Alternatives.
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY – FACT SHEET FIGURE 2
MAIN CHANNELS IMPROVEMENT
FOR CONTAINERSHIP TRAFFIC
PLANS A & B


FEDERAL NAVIGATION PROJECT
IMPROVEMENT FEATURES
Entrance, Main Sip & Reserved Channels, 40-Foot Anchorage and Reserved Channel Turning Basin – Deepen to 45 to 50 Feet
45-Foot Main Ship Channel Extension to Massport Marine Terminal
35-Foot Mystic River Channel at Massport Medford Street Terminal - Deepen to 40 Feet
38-Foot Chelsea Channel – Deepen to 40 Feet if Bridge and Gas Line Replaced – Widen Channel through New Bridge Opening
CHELSEA RIVER
MYSTIC RIVER
CHARLES RIVER
Inner Confluence
Ted Williams Tunnel I-90
Deer Island
Reserved Channel Turning Area
Conley Terminal
RESERVED CHANNEL
BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT STUDY
FACT SHEET - FIGURE 3
NAVIGATION PROJECT IMPROVEMENTS
INNER HARBOR PROJECT FEATURES

Habel, Mark L NAE

Subject: FW: FW: SD for Boston Harbor Deep Draft Improvement (UNCLASSIFIED)

Attachments: 200102368 SD2.doc

200102368
SD2.doc (318 KB)

-----Original Message-----
From: Guza.Olga@epamail.epa.gov [mailto:Guza.Olga@epamail.epa.gov]
Sent: Friday, December 08, 2006 11:53 AM
To: Nimeskern, Phillip W NAE
Cc: Habel, Mark L NAE
Subject: Re: FW: SD for Boston Harbor Deep Draft Improvement (UNCLASSIFIED)

I concur with the SD for Boston Harbor Deep Draft Improvement Project as written. The project has gone through multiple reviews and meets the conditions as written in the SD.

Olga Guza
Environmental Scientist
USEPA Region 1
Boston, MA
Telephone - 617-918-1542
Fax 617-918-0542

-----"Nimeskern, Phillip W NAE" <Phillip.W.Nimeskern@nae02.usace.army.mil> wrote: -----

To: Olga Guza/R1/USEPA/US@EPA
From: "Nimeskern, Phillip W NAE"
<Phillip.W.Nimeskern@nae02.usace.army.mil>
Date: 12/05/2006 05:43PM
cc: "Habel, Mark L NAE" <Mark.L.Habel@nae02.usace.army.mil>
Subject: FW: SD for Boston Harbor Deep Draft Improvement (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Hello Olga,

I am forwarding another copy of the draft suitability determination (SD) for the Boston Harbor Deep Draft Improvement project. As you see, it is the same as was sent to you in October. Mark Habel has asked that we have EPA's concurrence in writing before I finalize the SD for this project, even though we can assume concurrance based on our MOA. Would you please refresh your memory on this document and send me a note that you concur?

Thank you,

Phillip W. Nimeskern
US Army, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751
(978) 318-8660
FAX: (978) 318-8303

-----Original Message-----
From: Nimeskern, Phillip W NAE
Sent: Monday, October 02, 2006 3:53 PM
To: Olga Guza; William_Neidermyer@fws.gov; Peter.colosi@noaa.gov;
Ken Chin(Ken.Chin@State.MA.US)
Subject: SD for Boston Harbor Deep Draft Improvement

INTERAGENCY COORDINATION

DATE: 2 October 2006

PROPONENT: CENAE & Massport

APPLICATION NUMBER: 2001-02386

NOTIFICATION SENT TO:

EPA Olga Guza (617) 918-1505
Guza.Olga@epamail.epa.gov <mailto:Guza.Olga@epamail.epa.gov>

NMFS Peter Colosi (978) 281-9301
Peter.Colosi@noaa.gov <mailto:Peter.Colosi@noaa.gov>

F&WS William Neidermeyer (603) 223-0104
William_Neidermyer@fws.gov <mailto:William_Neidermyer@fws.gov>

cc: Ken Chin (617) 292-5696
Ken.Chin@state.ma.us <mailto:Ken.Chin@state.ma.us>

This draft is being transmitted in accordance with our agreement on interagency technical coordination procedures for projects involving open water disposal of dredged materials. The proponents are proposing to dredge between 5,460,000 and 15,323,000 CY of ordinary material and between 399,000 and 1,495,000 CY of rock from Boston Harbor in Boston, Massachusetts, and dispose of it at the MBDS.

Please respond to me within 10 working days of the above date at(978) 318-8871 if you have comments or concerns. If you have technicalquestions, you can contact Phillip Nimeskern at (978) 318-8660.

__Phill Nimeskern for_____ MARK HABEL
Project Manager

Classification: UNCLASSIFIED
Caveats: NONE

CENAE-R-PT 8 December 2006

MEMORANDUM THRU:

Ruth M. Ladd, Chief, Policy Analysis and Technical Support Branch

FOR: Mark Habel, Project Manager, CENAE-EP-PN

SUBJECT: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.

1. **Project Description:**

The **CENAE** is proposing to deepen portions of the Boston Harbor Federal Navigation Project. The proposed disposal site is Massachusetts Bay Disposal Site (**MBDS**). This work will be done according to a base plan, Plan B, and three additional incremental improvements, Plans C, D and E. The base plan, the incremental plans, and their estimated volumes of dredged materials are as follows:

Plan B - Outer and Lower Harbor Improvements: The CENAE is proposing to deepen the follow project components:

Broad Sound North Entrance Channel;
President Roads Anchorage;
Main Ship Channel, through President Roads and up to the Reserved Channel in South Boston;
the Reserved Channel Turning Area; and
the lower (currently 40-foot) reach of the Reserved Channel.

These would all be deepened to provide a channel depth of between -44 and -50 feet MLLW, with an additional two feet of depth in the entrance channel (-46 to -52 feet MLLW), and a further two feet (-48 to -54 feet MLLW) provided in areas of rock or hard bottom materials (cobble or glacial till).

In addition, the bend in the entrance channel opposite Finn's Ledge would be widened at its apex by approximately 300 feet, and the deep lane of the Main Ship Channel between President Roads and the Reserved Channel Turning Area would be widened to 800 feet, and up to 900 feet in sections, by incorporating a portion of the existing 35-foot channel lane into the deeper channel. The Reserved Channel Turning Area would also be widened within, and northwest of, the existing channel limits.

Deepening these project areas to between -44 and -46 feet or to between -50 and -52 feet would require removal of between 5,041,000 and 14,755,000

Subject: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.

CY of ordinary material and between 355,000 and 1,385,000 CY of rock. The distribution of this material by channel reach is shown below.

Plan B – At 44-46 Foot Depth		
FNP Area	Volume of sediment	Volume of rock
North Entrance Channel (46 Feet)	1,597,000 cy	258,000 cy
Main Ship Channel (44 Feet)		
President Roads Reach	233,000 cy	0 cy
President Roads to Reserved Channel	1,157,000 cy	41,000 cy
Lower Reserved Channel (44 Feet)	371,000 cy	14,000 cy
Reserved Channel Turning Area (44 Feet)	202,000 cy	10,000 cy
Presidential Roads Anchorage (44 Feet)	1,481,000 cy	32,000 cy
Total	5,041,000 cy	355,000 cy

Plan B – At 50-52 Foot Depth		
FNP Area	Volume of sediment	Volume of rock
North Entrance Channel (52 Feet)	3,924,000 cy	883,000 cy
Main Ship Channel (50 Feet)		
President Roads Reach	1,496,000 cy	1,000 cy
President Roads to Reserved Channel	2,947,000 cy	153,000 cy
Lower Reserved Channel (50 Feet)	572,000 cy	123,000 cy
Reserved Channel Turning Area (50 Feet)	906,000 cy	137,000 cy
Presidential Roads Anchorage (50 Feet)	4,910,000 cy	88,000 cy
Total	14,755,000 cy	1,385,000 cy

Plan C - Main Ship Channel Deepening Extension:
Extending the deepened portion of the Main Ship Channel above the Reserved Channel Turning Area to a point below the Ted Williams Tunnel (I-90) is also being examined, with channel depths of between -42 and -45 feet under consideration (with an additional two feet in rock or hard bottom areas). The deepened channel would include the entire width of the existing 40-foot channel lane in this area plus a 50- to 100-foot width of the existing 35-foot channel lane. Deepening the channel to between -42 and -45 feet MLLW would require the removal of between 119,000 and 268,000 CY of ordinary material and between 39,000 and 105,000 CY of rock.

Plan D - Mystic River Channel Improvements:
A small area of the 35-foot portion of the Mystic River Channel that was not deepened to -40 feet during the improvement project of 1998-2002 is now being considered for deepening to -40 feet MLLW. This improvement would allow deeper draft access to Massport's Medford Street Terminal for proposed bulk cargo operations. The area to be dredged will be an approximately 800' by 450' area in the 35' Channel along the Charlestown shore of the Mystic River. Deepening this small area of the 35-foot channel to -40 feet MLLW would require the removal of about 83,000 CY of ordinary material.

Subject: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.

Plan E - Chelsea River Channel Improvements:
The existing 38-foot Chelsea River Channel and Turning Basin would be deepened to -40 feet MLLW if other parties proceed with plans to replace the Chelsea Street Bridge. The channel would be widened to conform to the new bridge opening and would be widened slightly in its turns approaching the bridge. Deepening the channel to -40 feet MLLW would require the removal of about 217,000 CY of ordinary material and 5,000 CY of rock.

Summing up:
These improvements would involve removal of a total of **between 5,460,000 and 15,323,000 CY** of **ordinary material** and **between 399,000 and 1,495,000 CY** of **rock**, depending on the final channel depths supported by economic analysis in the feasibility and design phase investigations. The ordinary material removed under this project is proposed to be mechanically dredged and disposed of at the MBDS. Rock removed under this project is also proposed for disposal at MBDS, unless some suitable beneficial use, for habitat enhancement or other purposes, is identified and approved.

This improvement work will be performed after the proposed maintenance dredging of the existing Boston Harbor Project has been completed and has removed the overlying sediments. The Main Ship Channel above Spectacle Island and the small portion of the Mystic River at the Medford Street Terminal is intended to be accomplished in 2006-2008. In addition, the final improvement dredging of the Chelsea River Channel to -38 feet under the project of 1990, in the vicinity of the Chelsea Street Bridge, is intended to be accomplished at the same time.

A sampling plan was developed on 8 November 2001 for the analysis of physical, chemical and biological characteristics of the sediments proposed to be dredged for the improvement dredging. The federal agencies concurred with this plan. The project has since been modified by increasing the project depth and adding a new area, Chelsea River. Except for this new area, the project area remains the same. The sediment data report was dated September 30, 2006.

2. **Summary:**

This memorandum addresses compliance with the regulatory evaluation and testing requirements of 40 CFR 227.13 for unconfined open water disposal at an open ocean disposal site. This evaluation confirms that sufficient information was obtained to properly evaluate the suitability of this material for open water disposal under the guidelines and finds the sediments suitable for disposal at MBDS.

3. **Ocean Dumping Act Regulatory Requirements:**

The disposal of sediments below mean low water in Massachusetts Bay is

Subject: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.

regulated according to both Section 103 of the Ocean Disposal Act and Section 404 of the Clean Water Act.

§227.13 Dredged Materials.

(a) This paragraph defines dredged materials and does not give any criteria for the evaluation of sediments.

(b) This paragraph states that proposed dredged material which meets the criteria in one of the following three paragraphs is environmentally acceptable for ocean disposal without further testing.

(b)(1) Dredged material that is predominately sand, gravel, rock, or any other naturally occurring bottom material with particle size greater than silt and is found in areas of high current or wave energy can be disposed of in a 103 site without further testing. The material from the fourteen samples in the North Channel, Presidents Roads, and Reserved Channel Turning Basin (Samples A through M and Sample DD) had high proportions of gravel and sand. The fines in these samples ranged from 0.59% to 28.48%. The sediments from these areas meet this exclusion and are suitable for unconfined open water disposal at MBDS without further testing.

(b)(2) Dredged material that is proposed for beach nourishment and is predominantly sand, gravel or shell with grain sizes similar to the receiving beaches can be disposed of without further testing. As the material from this project is not proposed for beach disposal, it does not meet this exclusion.

(b)(3) When the dredged material is substantially the same as that at the disposal site and the dredged material is taken from a site far removed from known sources of pollution, it can be disposed of without further testing. This project's material does meet this exclusion. The sediment to be removed is parent material (mostly silts and clays) underlying the contaminated surficial material, which is being removed by the ongoing maintenance dredging. It is far removed from known sources of contamination, having been laid down by glaciers before the Industrial Revolution and insulated from industrial contaminants by soon-to-be-removed surficial material. It is the same type of material as at the disposal site, as the same glaciers laid sediments at both areas.

(c) This paragraph states that if the dredged material does not meet the criteria of paragraph b above, it must undergo further testing of the liquid, suspended particulate and solid phases before it can be considered acceptable for ocean disposal. This section does not apply to this project, as the dredge materials meet the criteria in paragraphs b(1) or b(3) above.

Subject: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.

(d) This subsection discusses the choice of the liquid phase analytes and does not give any criteria for the evaluation of sediments.

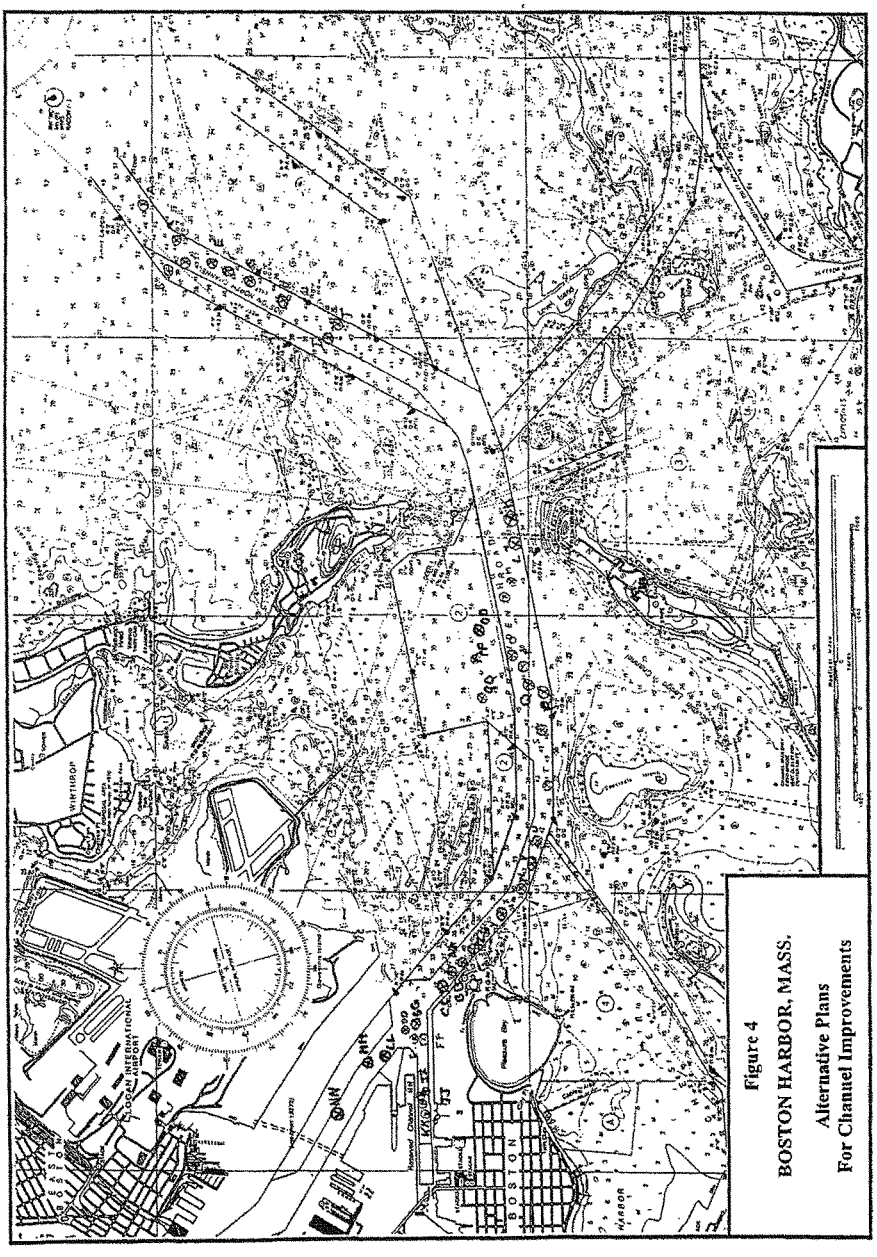
5. Copies of the above mentioned data and of the draft suitability determination were sent to the State DEP, US EPA, US F&WS and US NMFS for their review. The US EPA responded to say that they concur with the determination. No response was received from the other Federal agencies within the 10-day response period.

6. If you have any questions, please contact me at extension 660.

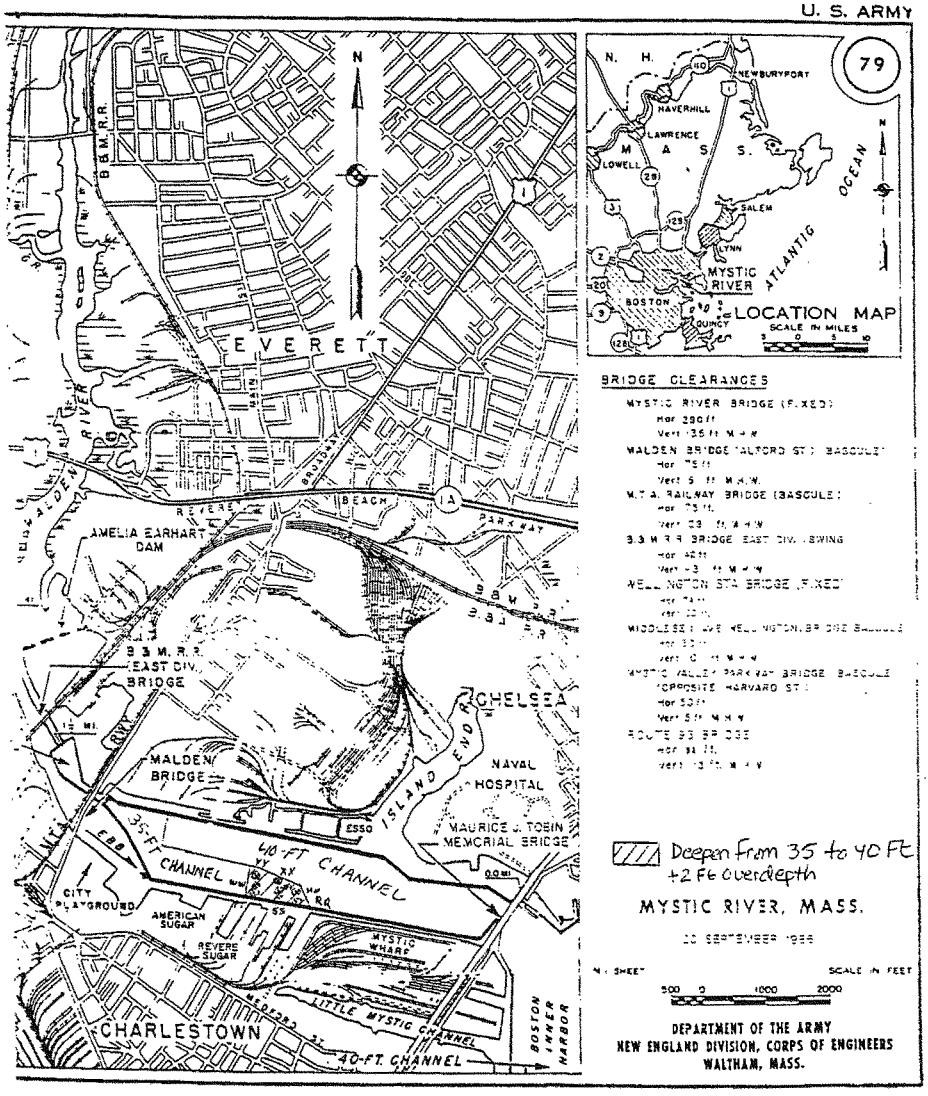
Phillip Nimeskern

PHILLIP NIMESKERN
Project Manager,
Marine Analysis Section

Subject: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.



Subject: Suitability Determination for Boston Harbor Deep Draft Improvement, Boston, Massachusetts, Application Number 200102386.



Mr Habel

Schmidt/jed/345

October 13, 2006

Engineering/Planning Division
HTRW/Geotechnical Engineering Branch

Mr. John S. Ramsey, P.E.
Applied Coastal Research and Engineering, Inc.
766 Falmouth Road, Suite A-1
Mashpee, Massachusetts 02649

Dear Mr. Ramsey:

The U.S. Army Corps of Engineers (USACE) is forwarding information concerning the nature of subsurface materials in the North Entrance Channel of Boston Harbor, for potential consideration as beachfill at Winthrop Beach. I am sending the information directly to you, at the request of our Regulatory Division and the permit applicant, Mr. Joe Orfant of the Department of Conservation and Recreation (DCR).

Please find the following documents enclosed:

a. 3 original reports prepared under contract to the Corps which must be returned to the USACE within 30 days:

(1) "Geophysical Explorations: Remote Sensing Archaeological Survey and Geologic Interpretation, Boston Harbor Navigation Improvement Study, Boston, Massachusetts," Ocean Surveys, Inc. (OSI), 21 May 2003.

(2) "Remote Sensing Archaeological Survey and Geologic Interpretation, Boston Harbor Navigation Improvement Study, Boston Harbor, Boston, Massachusetts," UMASS Archaeological Services, 30 May 2003.

(3) "Geotechnical Explorations, Boston Harbor, Mystic River, and Chelsea River, Navigation Improvement - Feasibility Study, Boston, Massachusetts," GEI Consultants, Inc., June 2004.

b. Probe logs for GEI's explorations in the North Channel. Also see Table 1 of the GEI report.

c. PDF showing GEI probe locations and contouring of the acoustic basement (CD).

The information provided comes from geophysical investigations of the North Channel performed by OSI during the fall and winter of 2002-2003 and geotechnical explorations by GEI Consultants, Inc. Results from these surveys indicate the likely presence of sandy and gravelly material in areas on the Harbor Bottom in the North Entrance Channel. Side scan sonar imagery revealed areas of coarse sediments at the surface in the section of the North Channel from Finns Ledge to Deer Island Light, just east of President Roads. Sub-bottom profiles developed from CHIRP seismic surveys showed that almost the entire southern half of the channel between Finn's Ledge and east-northeast of the Great and Little Faun Shoals had poor signal penetration, which may be an indication of coarse granular material on the seafloor bottom. Based on drilling observations during probe explorations by GEI, the sediments at the nearby Faun ledges were also interpreted to be predominantly clayey sand and sandy gravel. No samples were collected in this area, however, as part of GEI's work.

If you are interested in accessing the raw geophysical data, please contact me, so that I can give OSI permission to provide you the data directly. Data consist of: CHIRP Seismic data in SEG-Y file format (16 CDs), Side Scan Sonar data in XTF file format (27 CDs), Magnetic Intensity Data and HYPACK files (1 CD).

Once you've reviewed this information, please return the three hard copy reports. It is also requested that you provide USACE a copy of any additional reports or data analysis generated using the information provided, and the results of any investigations or explorations you may perform in the channel areas. If you have any questions or need further information, please contact Rosemary Schmidt at (978) 318-8345. Ms. Schmidt is also available to meet with you on October 23rd, when you will be here in our Concord office for a related meeting.

Sincerely,

H. FARRELL MACMILLAN, P.E.
Chief, Engineering/Planning Division

Enclosures

Copy Furnish (without Enclosure):

Joseph R. Orfant
Boston Harbor Beaches Program Planner
Department of Conservation & Recreation
Division of Planning and Engineering
251 Causeway Street, 7th Floor
Boston, Massachusetts 02114

CF:
Reading File
Mr. Habel, E/P
Ms. Schmidt, E/P
Mr. Keegan, E/P
Mr. Kotell, Reg Div

Commonwealth of Massachusetts
Division of Marine Fisheries
50A Portside Drive
Pocasset, MA 02559
(508) 563.1779
Fax (508) 563.5482

Paul J. Diodati
Director

To: Catherine Rogers, US Army Corps of Engineers

From: Jeremy King, Resource Assessment Project Leader, Marine Fisheries

Subject: Trawl survey data request for the 'Boston Harbor Federal Navigation Project Inner Harbor Maintenance and Deep Draft Channel Improvements Project'

Date: October 25, 2005

The attached spreadsheet, (ACOEdredgerequest.xls), has been provided to fulfill your request for Massachusetts Division of Marine Fisheries trawl survey data in reference to the Boston Harbor Federal Navigation Project Inner Harbor Maintenance and Deep Draft Channel Improvements Project. The information provided represents spring 1978 – 2005 and fall 1978 – 2004 trawl survey data from within a box defined by the following coordinates:
South Latitude : 42 13.507
North Latitude : 42 25.636
West Longitude : 7104.898
East Longitude : 70 47.134
as provided in your request letter.

To fulfill your request for 'A list of species collected form the MADMF research trawl surveys from the beginning of the sampling in 1978 to present on a seasonal basis' we have provided Spring_species_list and Fall_species_list. These tables include sums of the total weight and number of each recorded species for the survey timeseries within the defined area.

Spring_catch_per_station and Fall_catch_per_station provide the individual catch and station data, (including date and position) for each station completed within the defined area. All tows are standardized to a 20 minute tow length and require no further adjustment. Any tow with a shg code of 136 or less is considered a representative tow while any station with an shg greater than 136 represents a non-standard tow due to problems with the gear or tow duration.

Trends in abundance are neither provided nor recommended for the small defined area. The Massachusetts survey is stratified based on depth because we assume that variance of fish abundance and distribution is lower within a stratum than across depth strata. Four depth strata have been sampled within the defined box over the timeseries (see Spring_tows_per_strata and Fall_tows_per_strata). However, none of the four strata have been consistently sampled within the box each spring or fall, so no single stratum has sufficient coverage to generate an index. It is not recommended to combine data across strata in this case, since the many data gaps will result in the influence of any particular stratum varying according to the change in sampling effort by stratum. For example if yellowtail flounder are typically abundant in stratum 33, but scarce in stratum 31, a cruise which sampled no stations in stratum 33, but did sample in stratum 31 would likely have a much different result than a cruise which sampled stratum 33, but not stratum 31. For this reason, trends in abundance from our limited sampling within the defined box are not useful. The survey is designed to generate indices over broad geographic regions.

During the course of a phone conversation between Vincent Manfredi and Cathy Rogers on October 24, Cathy indicated that the request for annual reports was more particularly an interest in winter flounder data. In lieu of sending copies of dated annual reports, please refer to the report of the 2005 Groundfish Assessment Review Meeting, http://www.nefsc.noaa.gov/nefsc/publications/crd/crd0513/. Within this document you will find the

updated Massachusetts survey indices for Cape Cod - Gulf of Maine yellowtail flounder (E), Gulf of Maine Cod (F), Gulf of Maine – Georges Bank American Plaice (H) and Gulf of Maine Winter Flounder (I).

If you have any further questions regarding Massachusetts Division of Marine Fisheries trawl survey data I can be contacted at: Jeremy.King@state.ma.us
(508) 563-1779 ext. 112

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

September 16, 2005

Department of the Army
New England District, Corps of Engineers
Attn: John Kennelly
Engineering/Planning Division, Evaluation Branch
696 Virginia Road
Concord, MA 01742-2751

Re: SEIS Boston Harbor Inner Harbor Maintenance Dredging Project
Main ship channel
Boston, MA
NHESP Tracking Number: 05-18181

Dear Mr. Kennelly,

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-protected rare species in the vicinity of the site identified above.

In regard to the newly revised Massachusetts Endangered Species Act (MESA) regulations (321 CMR 10.00), the NHESP is currently in the process of evaluating whether or not your agency is subject to the fee normally associated with a rare species information request. In the interim we would like to offer the following comments regarding the above project:

At this time we are not aware of any state-listed rare plants or animals or exemplary natural communities in the immediate vicinity of this site and do not have any rare species concerns with the work as currently proposed.

This evaluation is based on the most recent information available in the NHESP database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered.

Please note that this determination addresses only the matter of rare wildlife habitat and does not pertain to other wildlife habitat issues that may be pertinent to the proposed project.

We appreciate the Army Corps efforts to address rare species concerns during your project planning process. If you have any questions regarding this review please call Jenna Garvey, Environmental Review Assistant, at (508) 792-7270, ext. 303.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

Habel

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

September 14, 2005

Engineering/Planning Division
Evaluation Branch

Mr. Stephen R. Pritchard, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street, 9th Floor
Boston, Massachusetts 02114

Dear Mr. Pritchard:

The U.S. Army Corps of Engineers (Corps) is writing this letter to request your assistance in obtaining resource information from one of your Departments, the Division of Marine Fisheries (DMF). The Corps is currently preparing a Supplemental Environmental Impact Statement (SEIS) for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study and another SEIS for the Boston Harbor Inner Harbor Maintenance Dredging Project. The State, including the DMF, have participated in the Technical Working Group (TWG) composed of various federal, state, and local agencies, as well as local universities and advocacy groups. The TWG discusses relevant issues and appropriate next steps for both Boston Harbor projects. One of the first items requested from the TWG was the accuracy of information gathered for the literature search of Boston Harbor and Massachusetts Bay. The TWG was invited to review the literature search database and provide additional information not captured.

Formal coordination included a letter dated December 16, 2004, requesting information under the Fish and Wildlife Coordination Act for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. In addition to the outstanding information we requested, we also requested information on finfish and shellfish resources in the harbor as well as the results of any biological studies or monitoring efforts undertaken by the MA Division of Marine Fisheries (MADMF) in another letter dated March 2, 2005. We received an email dated March 30, 2005, indicating that the requested information would be submitted to us shortly. The Corps also sent a coordination letter dated July 6, 2005, to your office with a copy to MADMF for the Boston Harbor Inner Harbor Maintenance Dredging Project. This letter requested comments under the Coastal Zone Management Act, the Clean Water Act Section 401, Fish and Wildlife Coordination Act and related jurisdiction. Since the two projects (the deep draft and inner harbor maintenance projects) are within Boston Harbor and involve many of the same channel areas, Ms. Catherine Rogers of my staff requested in June of this year that Mr. Vin Malkoski of MADMF send a letter addressing both projects when responding to the initial inner harbor maintenance dredging coordination letter. To date, we have not received a reply from MADMF to any of our letters. Copies of these letters are attached for your review.

In addition, as part of our investigation relative to the presence of biological resources within the harbor area(s), our contractor Battelle contacted Mr. Bob Glenn of your staff regarding lobster information. Battelle was informed that the State has been collecting lobster data from commercial lobstermen for about 20 years, as well as other lobster information from other sources. A meeting with Mr. Bob Glenn, Mr. Vin Malkoski, Ms. Lisa Lefkovitz from Battelle and Ms. Kari Lavalli, a subcontractor with Battelle, and Ms. Catherine Rogers was held on August 9, 2005, to discuss the lobster data collected by the State. We were informed by your staff that the subject data, in particular the Sea State program (commercial lobstermen data) was limited in its use and that the sample size would be too small to draw any meaningful conclusions for the purposes of our study. Also, the lobster data would need to be reformatted prior to release to the Corps and that MADMF staff would not be available to begin this effort until mid-October. Although we recognize the inherent limitations of this data, the Corps believes this data could be of use in determining the use of the harbor by lobsters and add to the weight of evidence in assessing potential impacts to the resource.

We are requesting data that the State has compiled from Region 4 (Boston Harbor area) under MADMF Sea State Lobster Program. This data, together with other information collected, may permit some level of characterization of the lobster resource within and in the vicinity of the harbor's shipping channels that will be dredged. We are also requesting information from the Inshore Bottom-Trawl Survey Program. This information may be useful in ranking the beneficial use sites for the proposed project and assessing resources for the project area. Details on the data we are requesting are included in the attached table.

Since there has been a significant delay in response to our initial letters referred to above, which is currently impacting project schedule, we are requesting a response from the MADMF relative to these inquiries (the previous three letters described above) as soon as possible, but no later than September 30, 2005, as well as the data requested above from the Sea State program and the Inshore Bottom Trawl Survey. If there is anything the Corps may be able to provide in order to assist the MADMF with this request or if there are any questions my staff could answer, please contact Ms. Catherine Rogers at 978-318-8231 or Mr. Mark Habel at 978-318-8871.

Sincerely,

Curtis L. Thalken
Colonel, Corps of Engineers
District Engineer

Enclosure

Copy Furnished:

Ms. Deborah Hadden
Deputy Port Director
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Ms. Susan Snow-Cotter, Director
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, Massachusetts 02114

Mr. Deerin Babb-Brott, Acting Director
Massachusetts Environmental Policy Act Office
100 Cambridge Street, Suite 900
Boston, Massachusetts 02114

Mr. David M. Peters, Commissioner
Massachusetts Department of Fish and Game
251 Causeway Street, Suite 400
Boston, Massachusetts 02114

Mr. Paul J. Diodati, Director
Massachusetts Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114

CF:
Ms. Rogers
Mr. Habel
Mr. Keegan
Reading File

Detail on Data Requested by the Corps from the Commonwealth for the Boston Harbor Federal Navigation Project Inner Harbor Maintenance and Deep Draft Channel Improvements Projects

We request the following data from Region 4 (Boston Harbor area) of the Sea State lobster program. To keep the database query concise, we have defined four regions of interest in and around Boston Harbor corresponding to north and south, inner and outer harbor areas. Each area is defined as a rectangle (see attached map) with the latitude and longitudes defining the outer boundaries as follows.

The latitude/longitudes of the defined regions are as follows:

South Latitude (Latitude = 42° 13.507')
Central Latitude (Latitude = 42° 19.642')
Northern Latitude (Latitude = 42° 25.636')
Western Longitude (Longitude = 71° 04.898')
Eastern Longitude (Longitude = 70° 47.134')
Central longitude (Longitude = 70° 57.209')

We request the following information and data for each of the regions defined above on a monthly basis for the year(s) in which data is available. If data were not available on a monthly basis, yearly would be acceptable.

- Total number, mean size, median size, mode of the size, standard deviation of size, minimum size, maximum size, of ovigerous lobsters for each month [or each year if monthly not available] for each region;
- Total number, mean size, median size, mode of the size, standard deviation of size, minimum size, maximum size, of sub-legal lobsters for each month [or each year if monthly not available] for each region;
- Total number, mean size, median size, mode of the size, standard deviation of size, minimum size, maximum size, of marketable lobsters for each month [or each year if monthly not available] for each region;
- Mean CPUE, median CPUE, mode of the CPUE, standard deviation of CPUE, minimum CPUE, maximum CPUE, of ovigerous lobsters for each month [or for each year if monthly not available] for each region;
- Mean CPUE, median CPUE, mode of the CPUE, standard deviation of CPUE, minimum CPUE, maximum CPUE, of sub-legal lobsters for each month [or for each year if monthly not available] for each region;
- Mean CPUE, median CPUE, mode of the CPUE, standard deviation of CPUE, minimum CPUE, maximum CPUE, of marketable lobsters for each month [or for each year if monthly not available] for each region.

We are also requesting information from the Inshore Bottom-Trawl Survey Program. This information may be useful in ranking the beneficial use sites for the proposed project and assessing resources for the project area. We are requesting data from Region 5 Massachusetts Bay from the Merrimack River to Scituate, using the same coordinate system as above for the lobsters, if possible, otherwise from Region 5. The following list of information is requested:

- A list of species collected from the MADMF research trawl surveys from the beginning of the sampling in 1978 to present on a seasonal basis (i.e., a fall species list and a spring species list).
- Provide the latitude/longitude coordinates for trawls located within the project area or Region 5).
- Provide the sampling dates along with the trawl coordinates.
- Summarize the trends in abundance for various age classes of several species (see list below) within the project area (or Region 5) on a seasonal basis. If this can't be done, please provide an explanation as to why (i.e., no information for this species in the project area, not particularly common in the region to allow for an analysis of trends, very low abundance in the region, no size class information available for the species, etc.)
- If unable to summarize the trends in abundance, then provide the necessary information to do so, with specific instructions on methods for summarizing the correct information. For example, if there is a field in the database that suggests the trawl was bad, let us know how to handle that information (whether to include it or not). Also include instructions on whether trawls should be standardized to time, area trawled etc.
- A copy of the annuals reports for the past 5 years.

Species to include:

1. All EFH Species:
   - Atlantic cod
   - Haddock
   - Pollock
   - Whiting (silver hake)
   - Red hake
   - White hake
   - Winter flounder
   - Yellowtail flounder
   - Windowpane flounder
   - American plaice
   - Ocean pout
   - Atlantic halibut
   - Atlantic sea herring
   - Bluefish
   - Long-finned squid
   - Short-finned squid
   - Atlantic butterfish
   - Atlantic mackerel
   - Summer flounder
   - Scup
   - Black sea bass
   - Bluefin tuna

2. Striped Bass (if caught in the trawls).

3. Non-EFH Species:
   - Tautog
   - Cunner
   - Skates
   - American eel
   - Alewife
   - Rainbow smelt
   - Blueback herring
   - Atlantic menhaden
   - American shad
   - Atlantic tomcod
   - White perch

4. Ecologically Important Species:
   - Northern searobin
   - Longhorn sculpin
   - Shortfin sculpin
   - American sand lance
   - Mummichog
   - Silversides
   - Fourspine stickleback
   - Threespine stickleback
   - Ninespine stickleback
   - Northern pipefish
   - Rock gunnel
   - Grubby

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

SEP - 6 2005

John R. Kennelly, Chief
Engineering/Planning Division, Evaluation Branch
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts

Attn: Catherine Rogers

Dear Mr. Kennelly,

This is in response to your letter dated March 29, 2005 and phone conversations between Catherine Rogers of your staff and Julie Crocker of my staff on August 9, 2005 regarding section 7 consultation for two proposed dredging projects in Boston Harbor. The Army Corps of Engineers (ACOE) has made the preliminary determination that these dredging projects are not likely to adversely affect any threatened and/or endangered species listed under the jurisdiction of NOAA's National Marine Fisheries Service (NMFS).

Boston Harbor Deep Draft Navigation Improvement Project
As part of the Deep Draft Project, the ACOE proposes to make navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of -40 feet mean lower low water (MLLW). The port's entrance and main ship channels (up to the Ted Williams Tunnel), President Roads anchorage and lower Reserved Channel would be deepened to between 40 and 50 feet MLLW. Dredging would be conducted with a mechanical dredge. The project is expected to take approximately two to three years to complete and two to six million cubic yards (cy) of material will be removed. The majority of the dredged material would be suitable for ocean disposal at the Massachusetts Bay Disposal Site (MBDS). The material unsuitable for disposal at MBDS would be placed in the confined aquatic disposal (CAD) cells north of the Ted Williams Tunnel, most likely in the Mystic River, Chelsea River or Inner Confluence. Rock and/or cobble removed from the channels may be disposed for beneficial uses in one or more of the following nearshore areas: Nantasket Roads, Massachusetts Bay, Nahant Bay and an area off of the town of Magnolia.

Boston Harbor, Inner Harbor, Maintenance Dredging Project
The maintenance project involves the dredging of the -35 and -40 MLLW Main Ship Channel from a point approximately halfway between Spectacle and Castle Island inbound to the Inner Confluence. In addition, the upper portion of the Reserved Channel (-35 foot MLLW), the -40 foot MLLW deep approach channel to the Navy Dry Dock and the -35 foot MMLW deep Federal

channel to the Charles River will also be dredged to their authorized depths. Ledge within the Main Ship channel and ledge outcrops in the President Roads Anchorage will also be removed. In addition, the removal of a gas siphon in the Chelsea River near the Chelsea Street Bridge is being pursued which will allow additional dredging to be performed in the Chelsea River from immediately below, through and immediately upstream of the Chelsea Street Bridge which will restore the Chelsea River to its -38 foot MLLW authorized depth. Dredging would be conducted with a mechanical dredge. The total quantity of material expected to be dredged is approximately 1.9 million cy, of which 1.5 million cy is unsuitable for ocean disposal. Suitable material will be disposed of at the MBDS while the unsuitable material will be disposed of at CAD cells within the Federal channels of the project.

Three species of federally threatened or endangered sea turtles and three species of endangered whales may be found in Massachusetts waters. The sea turtles in Massachusetts nearshore waters are typically small juveniles with the most abundant being the federally threatened loggerhead (*Caretta caretta*) followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*). Loggerheads and Kemp's ridleys have been documented in waters as cold as 11°C, but generally migrate northward when water temperatures exceed 16°C. These species are typically present in Massachusetts waters from June through November. Federally endangered leatherback sea turtles (*Dermochelys coriacea*) are located in New England waters during the warmer months as well. While leatherbacks are predominantly pelagic, they may occur close to shore, especially when pursuing their preferred jellyfish prey. Green sea turtles *(Chelonia mydas)* may also occur sporadically in New England waters, and any occurrence in Massachusetts waters is likely to be rare. Sea turtles are known to occur on Stellwagen Bank and in Massachusetts Bay. While no surveys for sea turtles have been conducted in Boston Harbor, suitable forage and habitat exists in this area and it is likely that sea turtles occasionally are present in Boston Harbor.

Federally endangered North Atlantic right whales (*Eubalaena glacialis*) and humpback whales (*Megaptera novaeangliae*) are also found seasonally in Massachusetts waters. North Atlantic right whales have been documented in the nearshore waters of Massachusetts from December through June. Humpback whales feed during the spring, summer, and fall over a range that encompasses the eastern coast of the United States, including Massachusetts Bay. While these whale species are not considered residents of the Boston Harbor area, transients occasionally enter the area as they complete seasonal migrations in nearby Massachusetts Bay. For example, in April 1996 a right whale was documented in Boston Harbor and in the fall of 2000, a humpback whale was documented in Boston Harbor. Fin (*Balaenoptera physalus*), Sei (*Balaenoptera borealis*) and Sperm (*Physter macrocephalus*) whales are also seasonally present in New England waters but are typically found in deeper offshore waters and are not likely to occur in Boston Harbor.

Dredge operations have been documented to injure and kill sea turtles. However, all of these instances have occurred with hydraulic hopper dredge operations. If sea turtles were present during dredging operations, it is expected that they will be able to avoid the mechanical dredge to be used. As such, no direct effects to sea turtles are likely to occur during dredging operations. Dredge operations will destroy the existing benthic community in dredged areas and most sedentary organisms associated with the bottom sediments would be killed. Most motile

organisms, such as crabs and finfish, are expected to avoid the dredge. As sea turtles are highly mobile and suitable foraging areas occur elsewhere in the vicinity of the proposed project, the loss of potential sea turtle forage items will not affect sea turtles. Recolonization of the dredged area is expected to be rapid; studies have indicated that pre-dredging conditions in a channel can be reestablished in as little as one month after dredging ceases. In addition, Boston Harbor is not known to be a high use area for sea turtles and any effects on the forage base for sea turtles will be insignificant. As listed whales are not likely to occur in Boston Harbor, they are not likely to be affected by the proposed dredging activities.

Dredging projects in industrial ports have the potential to affect water quality in the surrounding waters. However, no water quality violations have been recorded during monitoring of previous navigation improvement projects in Boston Harbor and the ACOE has indicated that no water quality impacts are expected from these projects. As such, no impacts to listed species from alterations in water quality in Boston Harbor are likely as a result of dredging and disposal operations.

Sea turtles and/or whales may be encountered at the MBDS and/or on the way to/from the disposal area. Separate Section 7 consultation between the ACOE and NMFS was concluded on the use of the MBDS in a letter dated August 29, 1997. It is the understanding of NMFS that all restrictions outlined in that letter will be adhered to during disposal operations for these projects.

Based on the analysis above, NMFS concurs with the ACOE's determination that this project is not likely to adversely affect any listed species under the jurisdiction of NMFS. Therefore, no further consultation pursuant to Section 7 of the ESA is required. Should project plans change or new information become available that changes the basis for this determination, consultation should be reinitiated. Should you have any questions about these comments, please contact Julie Crocker at (978) 281-9300 ext. 6530.

Sincerely,

Patricia A. Kurkul
Regional Administrator

Cc: Collins, GCNE
Williams, GCNE
Boelke, F/NER4

File Code: Sec 7 ACOE Mass. Boston Harbor Deep Draft and Maintenance Dredging
PCTS I/NER/2005/04609

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

July 6, 2005

Engineering/Planning Division
Evaluation Branch

Ms. Ellen Roy Herzfelder, Secretary
Massachusetts Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Dear Ms. Herzfelder:

The U.S. Army Corps of Engineers, New England District, is preparing a Supplemental Environmental Impact Statement (SEIS) for the Boston Harbor Inner Harbor Maintenance Dredging Project. We are requesting comments from your agency on the proposed project under the Commonwealth's Coastal Zone Management Act, the Clean Water Act Section 401, the Fish and Wildlife Coordination Act and related jurisdictions.

The proposed Boston Harbor Inner Harbor Maintenance Dredging Project involves the dredging of the -35 and –40 foot mean lower low water (MLLW) Main Ship Channel from a point approximately halfway between Spectacle and Castle Islands inbound to the Inner Confluence. In addition, the upper (-35 foot MLLW) portion of the Reserved Channel, the –40 foot MLLW approach channel to the Navy Dry Dock, and the –35 foot MLLW Federal channel to the Charles River will also be dredged to their authorized depths. Recent surveys have identified some areas of ledge within the Federal project that will also be removed as part of the next maintenance dredging effort. A section of ledge, located in the Main Ship Channel between the -35 and -40 foot MLLW channels, as well as six separate ledge outcrops in the President Roads Anchorage, will be also removed. In addition, Massport is pursuing the removal of a gas siphon in the Chelsea River near the Chelsea Street Bridge. If that line is removed as scheduled, additional dredging will be performed in the Chelsea River from immediately below, through, and immediately upstream of the Chelsea Street Bridge, which will restore the Chelsea River to its –38 foot MLLW authorized depth.

The total quantity of material estimated to be dredged is 1.9 million cubic yards, of which 1.5 million cubic yards are unsuitable for ocean disposal. A decision document is being prepared on how the unsuitable material will be managed, however, the likely plan will be the development and use of confined aquatic disposal (CAD) cells within the Federal channels of the project. While the full range of disposal alternatives will be

investigated, it is expected that the suitable material will be disposed at the Massachusetts Bay Disposal Site.

We would appreciate a response to our request within 30 days of the receipt of this letter. Any questions or comments can be directed to Ms. Catherine Rogers at (978) 318-8231 or Mr. Michael Keegan at (978) 318-8087.

Sincerely,

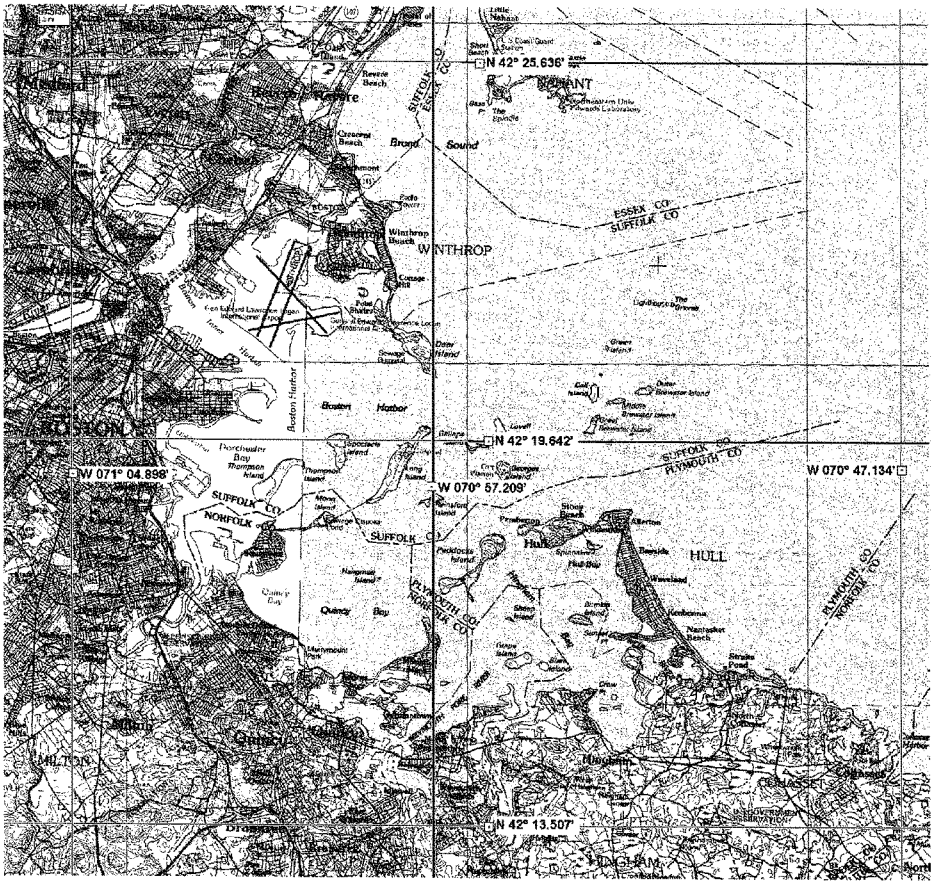
John R. Kennelly
Chief of Planning

Copy Furnished:

Ms. Susan Snow-Cotter, Director
Massachusetts Coastal Zone Management
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

Mr. Edward Kunce, Acting Commissioner
Massachusetts Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Mr. Paul J. Diodati, Director
Massachusetts Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114


N 42° 25.636'
NAHANT
Brand Sound
ESSEX CO
SUFFOLK CO
WINTHROP
Winthrop Beach
Boston Harbor
N 42° 19.642'
W 071° 04.898'
W 070° 57.209'
W 070° 47.134'
SUFFOLK CO
PLYMOUTH CO
NORFOLK CO
Quincy Bay
HULL
Hull
Nantasket Beach
N 42° 13.507'
HINGHAM
MILTON

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

OFFICE OF THE
REGIONAL ADMINISTRATOR

June 30, 2005

John Kennelly
Chief of Planning
United States Army Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

RE: Supplemental Environmental Impact Statement (SEIS) for the Boston Harbor Deep Draft Navigation Improvement Project

Dear Mr. Kennelly:

This letter responds to your request for the Environmental Protection Agency (EPA) to participate as a cooperating agency during the preparation of the Supplemental Environmental Impact Statement (SEIS) for the Boston Harbor Deep Draft Navigation Improvement Project. EPA New England agrees to participate as a cooperating agency during the preparation of a SEIS for the project.

EPA intends to work as a cooperating agency within the limit of our resources to help define the scope of analysis, identify sources of information and to offer input on how specific issues should be addressed in the SEIS. We encourage the Corps to continue to coordinate closely with local, state and federal agency representatives throughout the NEPA process.

If you have any questions about this letter or EPA's involvement in the SEIS process, please contact Timothy Timmermann at 617-918-1025.

Sincerely,

Robert W. Varney
Regional Administrator

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

May 31, 2005

U.S. Army Corps of Engineers
Attn: Catherine Rogers
696 Virginia Road
Concord, MA 01742

Re: Boston Harbor Deep Draft Navigation Improvement Feasibility Study
Boston, MA
NHESP File: 05-17941

Dear Ms. Rogers:

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-protected rare species in the vicinity of the site identified above.

At this time we do not have any rare species concerns with the work proposed in the vicinity of this site.

This evaluation is based on the most recent information available in the NHESP database, which is constantly being expanded and updated through ongoing research and inventory. Should your site plans change, or new rare species information become available, this evaluation may be reconsidered.

Please note that this determination addresses only the matter of **rare** wildlife habitat and does not pertain to other wildlife habitat issues that may be pertinent to the proposed project.

If you have any questions regarding this review please call Jenna Garvey, Environmental Review Assistant, at (508) 792-7270, ext. 303.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

cc: Boston Conservation Commission
DEP Northeastern Regional Office, Wetlands Program

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

John R. Kennelly
Chief of Planning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742

May 24, 2005

Dear Mr. Kennelly,

This letter is in response to recent communication between the Massachusetts Office of Coastal Zone Management (CZM) and your office regarding the development of the Supplemental Environmental Impact Statement (SEIS) for the Boston Harbor Deep Draft Navigation Improvement Project. This communication has been in reference to April 11, 2003 correspondence from your office to CZM requesting that CZM participate in the preparation of the SEIS as a cooperating agency, pursuant to §1501.6 of the National Environmental Policy Act.

CZM agrees to participate in the development of the SEIS as a cooperating agency, reflecting our continued participation in the project Technical Working Group (TWG) that was implemented recognizing the need for agency coordination to address project planning and environmental issues. John Weber of our office has been involved in the recent TWG activities and will continue to serve as the main point of contact for the project. He can be reached at 617.626.1064 or by email at john.weber@state.ma.us.

CZM looks forward to working with the Corps, Massport, and other resource agencies as the planning for the project moves ahead. Please feel free to contact John if you have any questions.

Sincerely,

Susan Snow-Cotter
Director

SSC/jw

Cc: Catherine Rogers, USACOE
Mark Habel, USACOE
Deb Hadden, Massport

MITT ROMNEY GOVERNOR, **KERRY HEALEY** LIEUTENANT GOVERNOR, **ELLEN ROY HERZFELDER** SECRETARY, **SUSAN SNOW-COTTER** DIRECTOR
www.mass.gov/czm

US Army Corps of Engineers®

New England District Number of Pages (Including Header): 3

Environmental Resources Section

Date: May 19, 2005

Please Deliver To: Jenna Garvey

Organization: MA Div of Fisheries and Wildlife

Jenna,

This responds to your letter dated Feb. 14, 2005 (I just received the letter, someone else in my office had it) requesting a locus map for the Boston Harbor deep draft navigation improvement feasibility study. Please complete your review of any state listed species. Please give me a call if you have any questions.

Thanks,
C.R.

From: Catherine J. Rogers
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742
Phone: (978) 318-8231
FAX: (978) 318-8560
E-Mail: Catherine.J.Rogers@usace.army.mil

Figure 2

42 to 50-Foot Channels
42 to 50-Foot Channel Extension
42 to 50-Foot Anchorage
40-Foot Mystic River Deepening
40-Foot Chelsea River Deepening
BOSTON HARBOR, MASS.
Proposed Deepening
the dark areas of the navigation channels are the proposed deepening areas

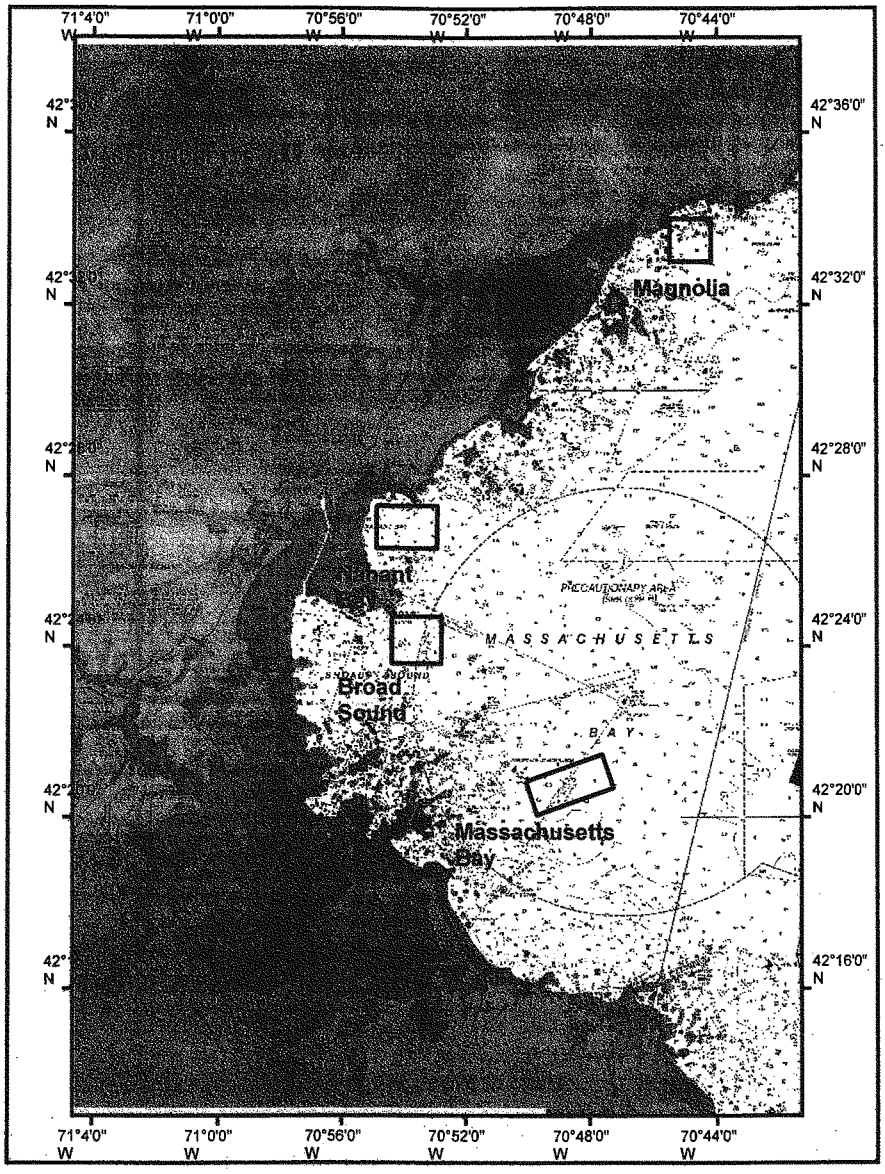


Figure 1. ~~**Benthic Sampling Areas**~~ Nearshore Beneficial Use Sites

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

APR 28 2005

Mr. John Kennelly
Chief of Planning
Engineering/Planning Division
Evaluation Branch
US Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742

Re: Boston Harbor Deep Draft Navigation Improvement Project

Dear Mr. Kennelly:

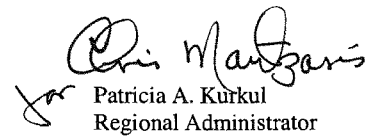
This responds to your letter requesting the National Marine Fisheries Service (NMFS) to participate as a cooperating agency in the preparation of a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor Massachusetts Federal Navigation Project. NOAA Fisheries agrees to participate as a cooperating agency to help advance effective interagency coordination on the SEIS/EIR for this project in accordance with the Council of Environmental Quality (CEQ) regulations (40 CFR 1501.6).

Our involvement generally will be in the areas of scoping, identification of issues and topics that need consideration and evaluation in the SEIS/EIR, review of documents, and routine attendance at meetings. We are not in a position to undertake data collection, conduct analyses, or prepare sections of the draft or final SEIS/EIR, as staff and resources are fully tasked in other obligatory NMFS programs.

We have been involved with the Boston Harbor Deep Draft Navigation Improvement Project through participation on the Technical Working Group (TWG). To date, we have provided comments on site selection criteria for the beneficial use of material from the channel within Boston Harbor and have offered site-specific information regarding NMFS trust resources expected to be within the project area. As we continue to move through the project review process, NMFS will be in a position to provide an exposition of issues from the standpoint of our federal mandates and will work collegially with the federal partners.

I understand that the next steps will be the review of the Draft Supplemental Environmental Impact Statement/Environmental Impact Report to evaluate the potential impacts of the proposed project. We expect there to be increasing public attention directed to this project and we will make every reasonable effort to work with your staff to review and provide comments on this project. If you have any questions pertaining to this letter, please contact Chris Boelke of my staff at (978) 281-9131. We look forward to exploring the issues associated with the Boston Harbor Deep Draft Navigation Improvement Project as it moves through the public review process.

Sincerely,



Patricia A. Kurkul
Regional Administrator

cc: Mike Bartlett, US FWS
Robert Varney, US EPA
Christine Godfrey, US ACOE
Peter Colosi, NMFS
Secretary Ellen Roy Herzfelder, EOEA
Paul Diodati, MA DMF
Mary Colligan, PRD
George Darcy, SFD

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

March 29, 2005

Engineering/Planning Division
Evaluation Branch

Ms. Patricia A. Kurkul, Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Dear Ms. Kurkul:

As requested in your letter dated February 14, 2005, the U.S. Army Corps of Engineers, New England District is writing this letter to continue the Endangered Species Act Section 7 consultation for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. In our earlier letter dated January 10, 2005, we stated that we are investigating the feasibility of navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of 40-feet mean lower low water. The port's entrance and main ship channels (up to the Ted William Tunnel), President Roads anchorage and lower Reserved Channel would be deepened to between 40 and 50 ft mean lower low water. A small portion of the Mystic River would be deepened to 40 ft and the Chelsea River to 40 ft mean lower low water. Dredging would be conducted with a mechanical or clamshell dredge. The project is expected to take approximately two to three years to complete and dredge approximately two to six million cubic yards of material, depending on the proposed navigation channel depth. The majority of the dredged material would be suitable for ocean disposal at the Massachusetts Bay Disposal Site (MBDS). A small amount of overlying shoal material that is unsuitable for ocean water disposal would be placed in confined aquatic disposal (CAD) cells north of the Ted Williams Tunnel, most likely in the Mystic River, Chelsea River and/or Inner Confluence. Rock and/or cobble removed from the navigation channels may be disposed for beneficial use in one or more of the following nearshore areas: Nantasket Roads, Broad Sound, Massachusetts Bay, Nahant Bay and an area off of the town of Magnolia. See the enclosed figure.

A Supplemental Environmental Impact Statement (SEIS) is being prepared for this proposed project. Information from the EIS and Biological Assessment prepared for the previous Boston Harbor Navigation Improvement Project (BHNIP) will be used in the preparation of this SEIS.

Conditions to protect threatened and endangered species are in place for dredged material disposal at the MBDS. The intent of the following conditions is to reduce the potential for vessel collisions with endangered species, including right whales. From February 1 through May 30 of any year, disposal vessels including tugs, barges, and scows transiting between the dredge site and the MBDS shall operate at speeds not to

exceed five knots after sunset, before sunrise, or in daylight conditions where visibility is less than one nautical mile. Disposal shall not be permitted if these requirements cannot be met due to weather or sea conditions. From February 1 through May 30 of any year, an approved marine mammal observer (meeting National Marine Fisheries Service criteria on observer qualifications, including the specified skill sets for sea turtles and whales) must be present aboard disposal vessels transiting between the dredge site and the Massachusetts Bay Disposal Site during daylight hours. To date, the marine mammal observation reports have not indicated any physical contact with whales while transiting to the MBDS.

Listed species under your jurisdiction in Massachusetts waters include three species of Federally threatened or endangered sea turtles (loggerhead sea turtles, Kemp's ridley sea turtles, and leatherback sea turtles) and three species of endangered whales (North Atlantic right whales, humpback whales, and fin whales). Conditions are in place to protect the rare right whale and other threatened and endangered species during transit and disposal at the MBDS. In addition, a mechanical dredge will be used for the proposed project, thereby minimizing any impacts to sea turtles. Based on these facts, we have determined that the proposed deep draft project for Boston Harbor is not likely to adversely impact threatened or endangered species listed under the jurisdiction of the National Marine Fisheries Service.

We request your concurrence with this determination. If the proposed project description changes significantly, we will reinitiate Section 7 consultation. Any questions or comments can be directed to Ms. Catherine Rogers at (978) 318-8231.

Sincerely,

for John R. Kennelly
Chief of Planning

Enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE

New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

March 2, 2005

Reference: Project — Deep Draft Navigation Improvement Feasibility Study
Location — Boston Harbor, MA

John R. Kennelly
Chief of Planning
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

This responds to your recent correspondence requesting information on the presence of federally-listed and/or proposed endangered or threatened species in relation to the proposed activity(ies) referenced above.

Based on information currently available to us, no federally-listed or proposed, threatened or endangered species or critical habitat under the jurisdiction of the U.S. Fish and Wildlife Service are known to occur in the project area(s). Preparation of a Biological Assessment or further consultation with us under Section 7 of the Endangered Species Act is not required.

This concludes our review of listed species and critical habitat in the project location(s) and environs referenced above. No further Endangered Species Act coordination of this type is necessary for a period of one year from the date of this letter, unless additional information on listed or proposed species becomes available.

Thank you for your coordination. Please contact us at 603-223-2541 if we can be of further assistance.

Sincerely yours,

Michael J. Amaral

Michael J. Amaral
Endangered Species Specialist
New England Field Office

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

March 2, 2005

Project Management Division
Programs and Civil Project Management Branch

Mr. Paul J. Diodati, Director
Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114

Dear Mr. Diodati:

On December 16, 2004 I wrote to you to request your comments under the Fish and Wildlife Coordination Act for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. The letter explained that we are evaluating the feasibility of navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of 40-feet Mean Lower Low Water (MLLW) and outlined the alternatives under consideration.

In addition the letter indicated that in response to a prior request for information, your office provided data on the results of a sampling program for early benthic phase lobster in areas of Boston Harbor. Our letter of December 16, 2004 requested that you provide the sampling and evaluation methodology for this investigation and the bottom habitat/substrate types for the sampling locations. Our letter also requested that you provide any information you may have on finfish and other shellfish resources in the harbor so that we may assess the potential impacts of the proposed channel improvements on biological resources that have ecological, commercial or recreational significance. The location and description of known spawning, nursery, or feeding habitats for these species, and the results of any studies by the Division, including sampling locations, methodology and data was also requested as was any other information on biological resources considered relevant to this proposed project.

Our letter requested a response within 30 days so that we could include the information into our analysis efforts for the project. At this time we have received no response from your office. If you have any of the requested data I would appreciate if you would contact Ms. Catherine Rogers at 978-318-8231, Mr. Mark Habel at 978-318-8871, or me at 978-318-8087 and inform us as to the information you have and when we might be furnished that information. I have enclosed a copy of my December 16, 2004 letter for your information.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E.
Project Manager

Enclosure

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

FEB 14 2005

Ms. Catherine Rodgers
US Army Corps of Engineers
New England District
Engineering/Planning Division
Evaluation Branch
696 Virginia Road
Concord, MA 01742-2751

Re: Request for Information regarding fishery resources and endangered species within Boston Harbor; Boston Harbor Deep Draft Navigation Improvement Feasibility Study

Dear Ms. Rodgers:

This letter is in response to your letter dated January 10, 2005, requesting information regarding the presence and distribution of Essential Fish Habitat (EFH), fishery resources, and protected resources within Boston Harbor. Specifically, this request is in reference to the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. The National Marine Fisheries Service (NOAA Fisheries Service) provides the following comments in an attempt to identify and address potential adverse impacts on NOAA trust resources within the project area.

Essential Fish Habitat

EFH has been designated for a number of federally managed species within the proposed work area. A complete list of species and life stages that have been designated for the proposed project location can be found on the NOAA Fisheries Habitat Conservation Division website at http://www.nero.noaa.gov/ro/doc/webintro.html

Among those species listed, particular attention should be focused on winter flounder (*Pseudopleuronectes americanus*) habitat that may be adversely affected by this project. Adult winter flounder utilize this area for spawning and feeding, while eggs, larvae, and juveniles use the area for early life stage development. Suspended sediment deposition resulting from the proposed project can adversely affect winter flounder eggs and juvenile development. Winter flounder have been identified throughout the harbor as well as within the Mystic and Chelsea Rivers. Other EFH species that have been identified within the project footprint should be evaluated for adverse effects resulting from the proposed project.

EFH Assessment

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) and the Fish and Wildlife Coordination Act require federal agencies to consult with one another on projects such as this. Insofar as a project involves essential fish habitat (EFH), as this project does, this process

guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments and generally outlines each agency's obligations in this consultation procedure.

The required contents of an EFH assessment include: 1) a description of the action; 2) an analysis of the potential adverse effects of the action on EFH and the managed species; 3) the ACOE's conclusions regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable. Other information that should be contained in the EFH assessment, if appropriate, includes: 1) the results of on-site inspections to evaluate the habitat and site-specific effects; 2) the views of recognized experts on the habitat or the species that may be affected; 3) a review of pertinent literature and related information; and 4) an analysis of alternatives to the action that could avoid or minimize the adverse effects on EFH. Upon submittal of an EFH assessment, NOAA Fisheries Service will provide official conservation recommendations for the proposed project.

Finfish and shellfish resources under the Fish and Wildlife Coordination Act

The substrate found within the project area also serves as habitat for benthic organisms, such as shellfish and other invertebrates living within and on the surface of the sediment. These organisms contribute to the productivity of the federally managed species by acting as a food source for both juvenile and adult life stages of finfish. Shellfish resources of concern within the project area include soft-shelled clams, blue mussels, and surf clams. Surf clams are present within the vicinity of Broad Sound. Shellfish resources may be adversely affected by the proposed project through direct impact (i.e., dredge) or by elevated levels of suspended sediment that can interfere with spawning success and feeding.

In addition, the anadromous rainbow smelt, alewife, and blueback herring utilize Boston Harbor, the Mystic River, and the Chelsea River for passage to upstream spawning locations. Elevated levels of suspended sediment can serve as an impediment to passage if work is performed during upstream and/or downstream migrations. In order to avoid adverse impacts on the resource, dredge work should be timed accordingly. Finally, a variety of state-managed fishery resources are present within the project area, and further coordination with the Massachusetts Division of Marine Fisheries should occur. Pursuant to the Fish and Wildlife Coordination Act, conservation recommendations will be provided in order to avoid and minimize adverse effects to the above referenced NOAA trust resources.

Protected Resources

Three species of federally threatened or endangered sea turtles and three species of endangered whales may be found in Massachusetts waters. The sea turtles in northeastern nearshore waters are typically small juveniles with the most abundant being the federally threatened loggerhead (*Caretta caretta*) followed by the federally endangered Kemp's ridley (*Lepidochelys kempi*). Loggerhead turtles have been found to be relatively abundant off the Northeast coast (from near Nova Scotia, Canada to Cape Hatteras, North Carolina). Loggerheads and Kemp's ridleys have been documented in waters as cold as 11°C, but generally migrate northward when water temperatures exceed 16°C. These species are typically present in Massachusetts waters from June through October. Federally endangered leatherback sea turtles (*Dermochelys coriacea*) are located in New England waters

during the warmer months as well. While leatherbacks are predominantly pelagic, they may occur close to shore, especially when pursuing their preferred jellyfish prey. Green sea turtles *(Chelonia mydas)* may also occur sporadically in Massachusetts waters, but those instances would be rare. Sea turtles are not likely to occur in the area to be dredged and any occurrence in the Weymouth area would be an unlikely event. In addition, as the dredging is to take place in the fall and winter, the likelihood of sea turtle presence is further reduced.

Federally endangered North Atlantic right whales (*Eubalaena glacialis*), humpback whales (*Megaptera novaeangliae*), and fin whales (*Balaenoptera physalus*) may also be found seasonally in Massachusetts waters. North Atlantic right whales have been documented in the nearshore waters of Massachusetts from December through June. Humpback whales feed during the spring, summer, and fall over a range that encompasses the eastern coast of the United States. Fin whales are common in waters of the United States Exclusive Economic Zone, principally offshore from Cape Hatteras northward. While these whale species are not considered residents of the Boston Harbor area, it is possible that transients may enter the area during seasonal migrations. While possible, it is unlikely that any of these whale species would be present in the area to be dredged.

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, states that each federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat. Because federally listed species may be present in the vicinity of the project area, any discretionary federal action that may affect these species must undergo Section 7 consultation. The federal action agency, in this case the ACOE, would be responsible for initiating Section 7 consultation, at which time the project details would be submitted to NOAA Fisheries Service, Northeast Regional Office, One Blackburn Drive, Gloucester, MA 01930. An assessment of the project's impacts on federally endangered species should be included with the project details. After reviewing this information, NOAA Fisheries Service would then be able to conduct a consultation under section 7 of the ESA.

Thank you for your coordination with NOAA Fisheries Service regarding this project. If you have questions regarding these comments, please contact Christopher Boelke at 978-281-9131 for EFH issues, or Sara McNulty at 978-281-9328, ext. 6520, for protected resources issues or the section 7 consultation process in general.

Sincerely,

Peter D. Colosi
Assistant Regional Administrator
for Habitat Conservation

cc: PRD – M. Colligan, S. McNulty

Commonwealth of Massachusetts

Division of Fisheries & Wildlife

MassWildlife

Wayne F. MacCallum, *Director*

February 14, 2005

Department of the Army
New England District, Corps of Engineers
Attn: Catherine Rogers
Engineering/Planning Division Evaluation Branch
696 Virginia Road
Concord, MA 01742-2751

RE: Boston Harbor Deep Draft Navigation Improvement Feasibility Study

Dear Ms. Rogers,

Thank you for contacting the Natural Heritage and Endangered Species Program ("NHESP") of the MA Division of Fisheries & Wildlife for information regarding state-protected rare species at the above referenced site.

In order to complete our review, the NHESP will need additional information, in particular, a clearly demarcated locus map showing the entire project area. Once this information is received, we can inform you of any rare species issues/concerns that could potentially be associated with this project.

If you have any questions, please contact Jenna Garvey, Environmental Review Assistant at: (508) 792-7270, ext. 303.

Sincerely,

Thomas W. French

Thomas W. French, Ph.D.
Assistant Director

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

January 25, 2005

Engineering/Planning Division
Evaluation Branch

Mr. William Neidermyer, Federal Activities Coordinator
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Neidermyer:

This letter is written to request your comments under the Fish and Wildlife Coordination Act, and a list of threatened and endangered species under the Endangered Species Act, for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. This investigation is evaluating the feasibility of navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of 40-feet Mean Lower Low Water (MLLW). Various alternatives are being evaluated for the Broad Sound North Entrance Channel, the Main Ship Channel through the President Roads Channel and up to the Marine Terminal just seaward of the Ted Williams Tunnel, the President Roads Anchorage, and portions of the Reserved Channel, for channel depths up to –50 feet MLLW. Deepening a small area of the Mystic River Channel upstream of the Moran Terminal, from the current 35-foot depth to 40 feet, and deepening the Chelsea River from the current 38-foot depth to 40 feet, will also be evaluated.

Most of the disposal is expected to occur at the Massachusetts Bay Disposal Site, and at the previously permitted confined aquatic disposal (CAD) cells in the Inner Confluence, Mystic River or Chelsea River. Rock and/or cobble material removed from the navigation channels may be disposed for beneficial use in one or more of the following nearshore areas: Nantasket Roads, Broad Sound, Massachusetts Bay, Nahant Bay and off of Magnolia.

Other information on biological resources considered relevant to this proposed project would also be appreciated. Your response to this letter within the next 30 days would be appreciated. Any questions or comments can be addressed to Ms. Catherine Rogers at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

January 25, 2005

Engineering/Planning Division
Evaluation Branch

Mr. Henry Woolsey, Program Manager
Natural Heritage and Endangered Species Program
Massachusetts Division of Fisheries and Wildlife
North Drive
Westborough, Massachusetts 01581

Dear Mr. Woolsey:

This letter is written to request a list of Threatened, Endangered, and Special Concern species for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. This investigation is evaluating the feasibility of navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of 40-feet Mean Lower Low Water (MLLW). Various alternatives are being evaluated for the Broad Sound North Entrance Channel, the Main Ship Channel through the President Roads Channel and up to the Marine Terminal just seaward of the Ted Williams Tunnel, the President Roads Anchorage, and portions of the Reserved Channel, for channel depths up to –50 feet MLLW. Deepening a small area of the Mystic River Channel upstream of the Moran Terminal, from the current 35-foot depth to 40 feet, and deepening the Chelsea River from the current 38-foot depth to 40 feet, will also be evaluated.

Disposal is expected to occur at the Massachusetts Bay Disposal Site, and at the previously permitted confined aquatic disposal (CAD) cells in the Inner Confluence, Mystic River or Chelsea River. Rock and/or cobble material removed from the navigation channels may be disposed for beneficial use in one or more of the following nearshore areas: Nantasket Roads, Broad Sound, Massachusetts Bay, Nahant Bay and off of Magnolia.

Your response to this letter within the next 30 days would be appreciated. Any questions or comments can be addressed to Ms. Catherine Rogers at 978-318-8231.

Sincerely,

John R. Kennelly
Chief of Planning

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

January 10, 2005

Engineering/Planning Division
Evaluation Branch

Mr. Peter Colosi, Assistant Regional Administrator
National Marine Fisheries Service
One Blackburn Drive
Gloucester, Massachusetts 01930-3097

Dear Mr. Colosi:

This letter is written to request your comments under the Fish and Wildlife Coordination Act, and a list of threatened and endangered species under the Endangered Species Act, for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. This investigation is evaluating the feasibility of navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of 40-feet Mean Lower Low Water (MLLW). Various alternatives are being evaluated for the Broad Sound North Entrance Channel, the Main Ship Channel through the President Roads Channel and up to the Marine Terminal just seaward of the Ted Williams Tunnel, the President Roads Anchorage, and portions of the Reserved Channel, for channel depths up to –50 feet MLLW. Deepening a small area of the Mystic River Channel upstream of the Moran Terminal, from the current 35-foot depth to 40 feet, and deepening the Chelsea River from the current 38-foot depth to 40 feet, will also be evaluated.

In particular, we request that you provide any information you may have on finfish and other shellfish resources in the harbor so that we may assess the potential impacts of the proposed channel improvements on biological resources that have ecological, commercial or recreational significance. The location and description of known spawning, nursery, or feeding habitats for these species, and the results of any studies by the National Marine Fisheries Service including sampling locations, methodology and dates are requested. We are also requesting your agency's input in determining which important finfish and shellfish species should be considered, and why they should be considered, for evaluation in the Feasibility Study.

Other information on biological resources considered relevant to this proposed project would also be appreciated. Your response to this letter within the next 30 days

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

December 16, 2004

Project Management Division
Programs and Civil Project Management Branch

Mr. Paul J. Diodati, Director
Division of Marine Fisheries
251 Causeway Street, Suite 400
Boston, Massachusetts 02114

Dear Mr. Diodati:

This letter is written to request your comments under the Fish and Wildlife Coordination Act for the Boston Harbor Deep Draft Navigation Improvement Feasibility Study. This investigation is evaluating the feasibility of navigation improvements to portions of the Federal Navigation Project in the Port of Boston, which currently has a maximum authorized depth of 40-feet Mean Lower Low Water (MLLW). Various ~~alternatives are being evaluated for the Broad Sound North Entrance Channel, the Main~~ Ship Channel through the President Roads Channel and up to the Marine Terminal just seaward of the Ted Williams Tunnel, the President Roads Anchorage, and portions of the Reserved Channel, for channel depths up to –50 feet MLLW. Deepening a small area of the Mystic River Channel upstream of the Moran Terminal, from the current 35-foot depth to 40 feet, and deepening the Chelsea River from the current 38-foot depth to 40 feet, will also be evaluated.

In response to a prior request for information, your office provided data on the results of a sampling program for early benthic phase lobster in areas of Boston Harbor. We request that you provide the sampling and evaluation methodology for this investigation and the bottom habitat/substrate types for the sampling locations.

In addition, we request that you provide any information you may have on finfish and other shellfish resources in the harbor so that we may assess the potential impacts of the proposed channel improvements on biological resources that have ecological, commercial or recreational significance. The location and description of known spawning, nursery, or feeding habitats for these species, and the results of any studies by the Division, including sampling locations, methodology and data are requested.

Other information on biological resources considered relevant to this proposed project is also requested. Your response to this letter within the next 30 days would be appreciated. Any questions or comments can be addressed to Ms. Catherine Rogers at 978-318-8231, Mr. Mark Habel at 978-318-8871, or Mr. Michael Keegan at 978-318-8087.

Sincerely,

Michael F. Keegan, P.E.
Project Manager

Cc:
Ms. Rogers
Mr. Habel

Mr. Habel

June 22, 2004

Engineering/Planning Division
Evaluation Branch

Paiva/arw/796

Mr. Victor Mastone, Director
Board of Underwater Archaeological Resources
241 Causeway Street, Suite 900
Boston, Massachusetts 02114-2136

Dear Mr. Mastone:

The U.S. Army Corps of Engineers, New England District, has recently completed an inspection of magnetic anomalies and archaeological subsurface testing as part of the Boston Harbor Deep Draft Navigation Improvement Project in Boston Harbor. Included for your review and approval, are copies of the subject archaeological survey reports entitled, Inspection of Magnetic Anomalies, Remote Sensing Archaeological Survey, Boston Harbor Deep Draft Navigation Improvement Study (Robinson and Ford 2003); and, Archaeological Subsurface Testing for the Boston Harbor Navigation Improvement Study, Boston Harbor, Boston, Massachusetts (Lynch et al. 2004).

We have previously provided to your office (by correspondence dated June 18, 2003) the final report of the original remote sensing archaeological survey entitled, Remote Sensing Archaeological Survey and Geologic Interpretation, Boston Harbor Navigation Improvement Study, Boston Harbor, Boston, Massachusetts (Mulholland et al. 2003). Additionally, we have consulted with you and the Naval Historical Center (NHC) concerning the evaluation of a modern-era steel barge within the footprint of the Boston Harbor channel (July-September 2003). Copies of formal responses regarding this project from your office, the NHC, and the Massachusetts Historical Commission are enclosed for your information. With all archaeological studies now complete, we would like your formal and final comments on the project as a whole.

As you may recall, three magnetic anomalies and portions of a sunken barge in two sections were identified during the initial remote sensing survey conducted by University of Massachusetts Archaeological Services (UMAS). A recommendation was made for a dive inspection of these anomalies to determine if they constituted significant cultural resources. Coordination on the sunken barge was conducted separately with your office and the NHC, and it was determined that this wreck was ineligible for the National Register of Historic Places. No further coordination is required concerning the barge. The remainder of this letter pertains to the original three anomalies and later subsurface testing in Boston Harbor.

The Public Archaeology Laboratory, Inc. (PAL) conducted the inspection of the three anomalies at the western edge of the channel off Castle Island in August 2003, utilizing a remote-operated vehicle. No pre-Contact Period archaeological or historic resources were identified as part of the survey. The magnetic anomalies were likely caused by lobster pots and/or magnetic rock outcrops or boulders. Most recently, UMAS conducted subsurface testing of the study area through the use of nine vibratory cores collected in September 2003. An analysis of these cores for stratigraphic integrity and evidence of inundated archaeological resources or buried soil horizons entailed both visual means and magnetic susceptibility studies. It was determined that any potentially preserved cultural resources in the Boston Harbor channel are well below the maximum depth of the proposed dredging and no further investigations were recommended.

Based upon these results detailed further in the enclosed reports, we conclude that the Boston Harbor Deep Draft Navigation Improvement Study will have no effect upon any structure or site of historic, architectural, or archaeological significance as defined by the National Historic Preservation Act of 1966, as amended, and implementing regulations 36 CFR 800. We would appreciate your concurrence with this determination.

If you have any questions, please contact Mr. Marc Paiva of the Evaluation Branch at 978-318-8796.

Sincerely,

John Kennelly

~~David L. Duhaime, P.E.~~

Chief, ~~Engineering~~/Planning ~~Division~~

Enclosures

Copies furnished (with enclosures):

Ms. Cara Metz, Executive Director and SHPO
Massachusetts Historical Commission
The Massachusetts State Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

Ms. Beverly Wright, Chairperson
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

CF:
Mr. Paiva
Mr. Ring
✓Mr. Habel
Mr. Keegan
Reading File

Maritime Division
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston MA 02128-2909
TEL (617) 946-4413 FAX (617) 946-4422
www.massport.com

17 June 2003

Colonel Thomas L. Koning
District Engineer
US Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Koning:

I am writing in regard to our ongoing cooperative feasibility study of potential deep-draft channel improvements to Boston Harbor. Massport has determined that it is in the overall interest of the Port of Boston to include examination of the deepening of the Chelsea River channel in the current feasibility study.

Chelsea River was deepened to 38 feet as part of the recently completed Boston Harbor improvement project. Deepening to 40 feet at that time was precluded by the limitation on vessel size due to the Chelsea Street Bridge and by the elevation of a natural gas siphon located immediately downstream of the bridge. Recent proposals by others to eliminate these obstructions may make further deepening of the Chelsea channel economic and Massport would like to investigate this possibility with the Corps. I understand from discussions with your staff at the monthly project team meetings that the cost of adding Chelsea to the study would be about $400,000, increasing the total study cost to about $4,434,000, and Massport's share to about $2,217,000, including in-kind services as outlined in the Feasibility Cost Sharing Agreement executed last June.

Massport requests that the Corps prepare an amended Project Study Plan to include the Chelsea River in the feasibility study.

Sincerely,

MASSACHUSETTS PORT AUTHORITY

Michael A. Leone
Port Director

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

June 11, 2003

Janeen Hansen
Planning & Development
Massachusetts Port Authority
1 Harborside Drive, Suite 200S
East Boston, MA 02128-2909

Re: Scope of Work for Boston Harbor Deep Draft Navigation Improvement Project
Biological Resource Surveys

Dear Janeen,

Thank you for the opportunity to comment on this scope of studies. I look forward to continue to work with you in crafting a study design that will produce information useful in making decisions within the Environmental Impact Study (EIS) process.

General Comments

1. Sample design should be hypothesis driven. Once you know what questions to answer, your study design should evolve from there. Here are some questions you may consider:

1. What are the significant biological resources most at risk from the project?
2. Within the project impact area, are significant biological resources evenly distributed spatially and temporally?
3. Are there life stages/processes (i.e. eggs/spawning) of these significant biological resources occurring within the project impact area?

2. The first step in designing any study is having a complete knowledge of what comparable data exists and how it was collected. This will allow you to determine the level of sampling effort required and will assure that comparable methods are used to ensure data compatibility.

3. Sampling appears to be targeted to only summer and fall, but does not address resources in the winter or spring. There is no explanation as to the rational for sampling only this time of the year. This is of concern, especially since the project proponent intends to dredge continual for 2.5 years straight.

4. There are several other major construction projects that are occurring within the same general vicinity of this proposed project. In considering sampling location and timing, you should be aware of the location and timelines of these projects.

Specific Comments

Benthic Sampling

1. There is no discussion or map provided on where the stations are in comparison to the project footprint. Twenty stations are selected, but no rational is provided as to why 20 and not 25 or 30. It appears that one grab sample is to be taken per station, this limits your statistical analysis as you have no replication. Multiple sediment profile photographs are taken at each station to provide some replication.

2. There are no direct measurements of total organic carbon or grain size in the sediments, these are critical parameters that control benthic community composition. The REMOTS photographs give you a qualitative sense of grain size, but it is not quantitative. Additionally, the REMOTS photographs only give you a snapshot of the surface sediments and limited information on deep dwelling organisms.

3. It would be nice to take the samples for sediment suitability from the same locations as the biological samples. Thus, grain size and TOC can be obtained form those samples. It would also provide some context for the sediment chemistry and the toxicity testing results.

4. Ideally, the REMOTS survey would be done at a wide variety of stations to establish the relative heterogeneity of the sediments. Then, based on that information, the number and location of benthic community samples could be developed.

Lobster Survey

1. Limited sampling effort yields limited/meaningless information.

2. How are pot deployment locations selected? Is any consideration given to bottom type or other features? How are these going to be deployed in relation to commercial gear? Is the amount of commercial effort in the immediate vicinity going to be considered/quantified?

Finfish

1. For this level of effort, very limited benefits. Finfish numbers are highly variable and seasonal. This survey does not even cover the full array of seasons and cannot speak to interannual variability. The trawl survey and gill netting, as designed, will result in an incomplete species list, but no real information on the importance of these areas as habitat.

2. I assume that this is exclusively daytime sampling. Some sampling effort should be directed at the nocturnal fish community.

3. What are the dimensions of the gill nets? mesh size? Are they deployed in pairs?

4. Is the trawl survey done in a fashion that it is comparable in anyway to other trawl surveys

done in the area by other agencies?

5. Are gill nets and trawls done in a fashion to sample all substrate types and depths encountered within the project area?

Water Quality

1. The level of effort associated with the water quality sampling is not specified. The number of sampling days needs to be specified.

2. If the goal is to determine worst case stratification conditions, then sampling in the summer for thermal stratification is appropriate as well as the spring for salinity driven stratification. In the summer, HOBOs can be used to record continuous thermal data for up to 30 day periods. This will allow for much better quality information to be used in the model.

3. General weather and rainfall information should be collected in conjunction with the water quality data.

Physical Oceanography

1. How this work will be integrated with the water quality data collection is unclear, but it would be desirable to collect this data in conjunction with water quality.

2. How long are the arrays deployed for?

Feel free to contact me with any specific questions on these comments.

Sincerely,

Phil Colarusso

Phil Colarusso, Marine Biologist
Office of Ecosystem Protection

cc: Vernon Lang, USFWS
Vinnie Malkoski, MA DMF
Stephanie Cunningham, MA DMF
Kathy Rogers, USACE
Judy Pederson, MIT
Mike Johnson, NMFS

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 19, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Gene Gallagher
University of Massachusetts, Boston
100 Morrissey Blvd.
Boston, MA 02125

Dear Mr. Gallagher:

On May 14, 2003 I sent you a letter inviting you to the first meeting of the technical working group (TWG) for the Boston Harbor Deep Draft Navigation Improvement Project. Some of the topics to be discussed at the first meeting include field sampling, sediment sampling, disposal alternatives and other areas of concern. I had indicated that a copy of the draft scope of work for biological fieldwork to be conducted this summer and later in the fall of this year would be emailed to you shortly for review prior to the meeting. Since I did not have your email address, I am enclosing a copy of the scope of work for your review and comments. Please be ready to discuss you comments at the meeting on June 10, 2003 at the Black Falcon Terminal.

If you have any questions or additional information is needed, please contact me at 978-318-8087 or you can email me at michael.f.Keegan@usace.army.mil ..

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Enclosure

Copy furnished:

Ms. Jacquelyn Wilkins
Aviation Planning & Development Dept
Massachusetts Port Authority
Logan Office Center
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
NORTHEAST REGION
One Blackburn Drive
Gloucester, MA 01930-2298

MAY 19 2003

John R. Kennelly
Chief of Planning
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

This responds to your letter of April 11, 2003 requesting the National Marine Fisheries Service (NOAA Fisheries) to participate as a cooperating agency in the preparation of a Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project, in accordance with the Council of Environmental Quality (CEQ) regulations (40 CFR 1501.6). NOAA Fisheries agrees to participate as a cooperating agency to help advance effective interagency coordination on a SEIS/EIR for this project.

Our role and degree of involvement as a cooperator will be constrained by existing staff and fiscal resources capabilities. Our contributions generally will be limited to scoping, identification of issues and topics that need consideration and evaluation in the EIS, review of documents, and routine attendance at meetings. We are not in a position to undertake data collection, conduct EIS analyses, or prepare sections of the draft or final EIS as staff and resources are fully tasked in other obligatory NOAA Fisheries programs.

We appreciate the opportunity to participate in early coordination on this project with the Army Corps of Engineers and other agencies. Habitat Conservation Division staff have already attended public meetings and expect to be participating on the Technical Working Group for this project.

If you have any questions pertaining to this letter, please contact Jack Terrill at 978-281-9136. We look forward to exploring the issues associated with the Boston Harbor Deep Draft Navigation Improvement Project as it moves through the public review process.

Sincerely,

Patricia A. Kurkul
Regional Administrator

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1
1 CONGRESS STREET, SUITE 1100
BOSTON, MASSACHUSETTS 02114-2023

May 16, 2003

John R. Kennelly
Chief of Planning
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

RE: Boston Harbor Deep Draft Navigation Improvement Project Cooperating Agency Request

Dear Mr. Kennelly,

This letter responds to your request for the Environmental Protection Agency (EPA) to participate as a cooperating agency during the preparation of the Supplemental Environmental Impact Statement (SEIS) for the Boston Harbor Deep Draft Navigation Improvement Project. EPA New England is willing to participate as a cooperating agency during the preparation of the SEIS for this project.

Close interagency coordination throughout the preparation of the SEIS is critical. To that end, EPA intends to work as a cooperating agency within the limit of our resources to help define the scope of analysis, identify sources of information and to offer input on how specific issues should be addressed in the SEIS. We encourage the U.S. Army Corps to continue to foster an open dialogue with local, state and federal agency representatives throughout the NEPA process.

At this point we suggest that you consider Phil Colarusso of EPA New England's Office of Ecosystem Protection (617-918-1506) as the primary point of contact for marine resource and impact assessment issues and Timothy Timmermann of EPA's Office of Environmental Review (617-918-1025) as the point of contact for questions concerning the National Environmental Policy Act. Please feel free to contact either Phil or Tim with any questions you may have about EPA's involvement in the upcoming process.

Sincerely,

Elizabeth A. Higgins, Director
Office of Environmental Review

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MAY 19 2003
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U.S. Department of Transportation
United States Coast Guard

Commander
First Coast Guard District

408 Atlantic Avenue
Boston, MA 02110-3350
Staff Symbol: m
Phone: (617)223-8480
Fax: (617)223-8115

5740

MAY 1 5 2003

Mr. John R. Kennelly
Chief of Planning
Department of The Army
New England District, Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

I would like to thank the New England District, Corps of Engineers for inviting the First Coast Guard District to participate as a cooperating agency in the preparation of a joint Supplemental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project.

I have selected Captain Brian Salerno, Commanding Officer of Coast Guard Marine Safety Office Boston, to act as our single point of contact for matters involving this project. As Captain of the Port, Captain Salerno routinely deals with issues concerning Waterways Management for the Port of Boston. Captain Salerno may be contacted at 617-223-3025.

Sincerely,

Mark G. VanHaverbeke
Captain, U.S. Coast Guard
Chief, Marine Safety Division
First Coast Guard District

Copy: Commanding Officer, Coast Guard Marine Safety Office

United States Department of the Interior

FISH AND WILDLIFE SERVICE
New England Field Office
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

May 14, 2003

John R. Kennelly
Chief of Planning
Engineering/Planning Division
U.S. Army Corps of Engineers
696 Virginia Road
Concord, MA 01742-2751

Dear Mr. Kennelly:

This is in response to your April 11, 2003 letter wherein you request that we become a cooperating agency, subject to certain conditions, on the joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project.

The project would involve deepening the main ship channel from -40 feet up to -50 feet mean lower low water (MLLW), and the Mystic and Chelsea River Channels from -35 and -38 feet respectively to -40 feet MLLW. A typical deepening plan could generate approximately six million cubic yards of dredge material.

We acknowledge that the proposed project is extremely important. In fact we believe it would be precedent-setting in that every other coastal deep-draft port in New England will likely seek the same project depths and the perceived advantages that such project dimensions provide.

Your letter requests that we decline to participate as a cooperating agency if we cannot fully participate due to funding or personnel constraints. As you know, we are currently experiencing constraints in both areas, particularly with regard to personnel. On the other hand, the fish and wildlife resources at stake are too significant to allow me to simply decline the opportunity to become involved at this critical point in the process. I would prefer instead that we be involved to the extent that our personnel and funding constraints allow.

If you would like to discuss this further, please call me or Mr. Vern Lang of this office at 603-223-2541.

Sincerely yours,

Michael J. Bartlett
Supervisor
New England Field Office

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Timothy Famulare
Boston Conservation Commission
Executive Secretary
Boston City Hall, Room 805
Boston, MA 02201

Dear Mr. Famulare:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

The first technical working group meeting will be held on Tuesday June 10, 2003 between 10:00am and 2:00pm at the Black Falcon Cruise Terminal in South Boston. Agenda items include a description of the proposed project, lessons learned from the previous Boston Harbor navigation improvement project, a review of the scope of work for biological and physical sampling in Boston Harbor, and a review of the physical, chemical and biological sediment sampling. A copy of the draft scope of work for biological fieldwork to be conducted this summer and later in the fall of this year will be emailed to you shortly for review prior to the meeting.

Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

Copy furnished:

Ms. Jacquelyn Wilkins
Aviation Planning & Development Dept
Massachusetts Port Authority
Logan Office Center
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Vern Lang
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, NH 03301-5087

Dear Mr. Lang:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Gene Gallagher
University of Massachusetts, Boston
100 Morrissey Blvd.
Boston, MA 02125

Dear Mr. Gallagher:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Bruce Berman
Save the Harbor/Save the Bay
59 Temple Place, Suite 304
Boston, MA 02111

Dear Mr. Berman:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. David MacDuffee
National Marine Fisheries Service
1 Blackburn Drive
Gloucester, MA 01930

Dear Mr. MacDuffee:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

The first technical working group meeting will be held on Tuesday June 10, 2003 between 10:00am and 2:00pm at the Black Falcon Cruise Terminal in South Boston. Agenda items include a description of the proposed project, lessons learned from the previous Boston Harbor navigation improvement project, a review of the scope of work for biological and physical sampling in Boston Harbor, and a review of the physical, chemical and biological sediment sampling. A copy of the draft scope of work for biological fieldwork to be conducted this summer and later in the fall of this year will be emailed to you shortly for review prior to the meeting.

Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Eric Adams
MIT Sea Grant Program
MIT 48-325, 77 Massachusetts Avenue
Cambridge, MA 02139

Dear Mr. Adams:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Ms. Judith Pederson
MIT Sea Grant Program
292 Main Street, E38-300
Cambridge, MA 02139

Dear Ms. Pederson:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Any questions or comments can be addressed to Ms. Jackie Wilkins (617) 358-3558 at Massport or Mr. Mark Habel at (978) 318-8871 or Ms. Catherine Rogers at (978) 318-8231 at the New England District.

Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Deerin Babb-Brott
Massachusetts Coastal Zone Management
251 Causeway Street, Suite 900
Boston, MA 02114

Dear Mr. Babb-Brott:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Ms. Yvonne Unger
Massachusetts Department of Environmental Protection
One Winter Street
Boston, MA 02108

Dear Ms. Unger:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Ms. Olga Guza
Environmental Protection Agency
One Congress Street, Suite 1100
Mail Cd CWQ
Boston, MA 02114-2023

Dear Ms. Guza:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Matthew Liebman
Environmental Protection Agency
One Congress Street, Suite 1100
Mail Cd CWQ
Boston, MA 02114-2023

Dear Mr. Liebman:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Ms. Vivien Li
The Boston Harbor Association
Executive Director
374 Congress Street, Suite 609
Boston, MA 02210

Dear Ms. Li:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

May 14, 2003

Programs/Project Management Division
Programs & Civil Project Management Branch

Mr. Vincent Malkowski
Massachusetts Division of Marine Fisheries
50A Portside Drive
Pocasset, Massachusetts 02559

Dear Mr. Malkowski:

The U.S. Army Corps of Engineers (Corps) and the Massachusetts Port Authority (Massport) are preparing a joint Supplemental Environmental Impact Statement and Environmental Impact Report (SEIS/EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. To facilitate the preparation of this document, we have formed a technical working group (TWG) to discuss a variety of subjects during the course of our studies. Your agency/organization has indicated an interest in participating in the TWG and has nominated you to serve on the TWG. Some of the topics to be discussed include field sampling, sediment sampling, disposal alternatives and other topics of concern.

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Sincerely,

Michael F. Keegan

Michael F. Keegan, P.E; L.C.S
Project Manager

Copy furnished: See Attached Page

Copy furnished:

Ms. Jacquelyn Wilkins
Aviation Planning & Development Dept
Massachusetts Port Authority
Logan Office Center
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

April 18, 2003

REPLY TO
ATTENTION OF

Engineering/Planning Division
Evaluation Branch

Ms. Laurie Perry
Interim Tribal Historic Preservation Officer
Wampanoag Tribe of Gay Head (Aquinnah)
20 Black Brook Road
Aquinnah, Massachusetts 02535

Dear Ms. Perry:

The U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

The project will explore alternatives for accommodating increased deep draft vessel traffic in Boston Harbor including a no action alternative. Alternatives will include incremental deepening schemes of the Broad Sound North entrance channel, President Roads anchorage area, and the main ship channel from –40 feet up to –50 feet mean lower low water (MLLW), a portion of the Mystic River channel from –35 feet to –40 feet MLLW, and the Chelsea River channel from –38 feet to –40 feet MLLW. Although the quantity of dredged material that could be generated varies depending on the alternative, we estimate that the typical plan would generate approximately six million cubic yards of dredged material.

While the full range of disposal alternatives will be investigated, it is expected that the majority of the material will be suitable for disposal at the Massachusetts Bay Disposal Site. The remaining unsuitable material may be disposed in one of the previously permitted confined aquatic disposal cells identified as part of the previous Boston Harbor navigation improvement project.

We are requesting that your agency consider participating in the preparation of the SEIS/EIR as a cooperating agency per section 1501.6 of the National Environmental Policy Act. We are making this request due to the Tribe's jurisdiction by law and special expertise under the National Historic Preservation Act. Actions anticipated by your agency to facilitate the preparation of an SEIS/EIR include: attending working group meetings, active participation in alternative analysis, active participation in discussion of field sampling results, disposal site selection and response to requests on the above regulations.

We request that if your agency cannot fully participate in the above activities due to funding or personnel constraints, that your agency decline participation as a cooperating agency. We would appreciate a response to our request, and identification of a single point of contact, within 30 days of the receipt of this letter. We are anticipating having our first working group meeting in June 2003. Any questions or comments can be directed to Ms. Catherine Rogers, Mr. Mark Habel, or Mr. Marc Paiva at the U.S. Army Corps of Engineers at (978) 318-8231, (978) 318-8871, and (978) 318-8796, respectively, or Ms. Deborah Hadden of the Massachusetts Port Authority at (617) 946-4435.

Sincerely,

John R. Kennelly
Chief of Planning

Copy Furnished:

Ms. Deborah Hadden, Manager
Maritime Environmental Affairs
Massport – Port Department, Suite 200 South
One Harborside Drive
Boston, Massachusetts 02128

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 11, 2003

Engineering/Planning
Evaluation Branch

Ms. Ellen Roy Herzfelder, Secretary
Massachusetts Executive Office of Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02202

Dear Ms. Herzfelder:

The U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

The project will explore alternatives for accommodating increased deep draft vessel traffic in Boston Harbor including a no action alternative. Alternatives will include incremental deepening schemes of the Broad Sound North entrance channel, President Roads anchorage area, and the main ship channel from –40 feet up to –50 feet mean lower low water (MLLW), a portion of the Mystic River channel from –35 feet to –40 feet MLLW and the Chelsea River channel from –38 feet to –40 feet MLLW. Although the quantity of dredged material that could be generated varies depending on the alternative, we estimate that the typical plan would generate approximately six million cubic yards of dredged material.

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We are requesting that your agency consider participating in the preparation of the EIS as a cooperating agency per section 1501.6 of the National Environmental Policy Act. We are making this request due to the Commonwealth of Massachusetts' jurisdiction by law and special expertise under the Clean Water Act, the Coastal Zone Management Act, and other Acts such as the Endangered Species Act and the National Historic Preservation Act. Actions anticipated by your agency to facilitate the preparation of an EIS include: attending working group meetings, active participation in alternative analysis, active participation in discussion of field sampling results, disposal site selection and response to requests on the above regulations.

We request that if your agency cannot fully participate in the above activities due to funding or personnel constraints, that your agency decline participation as a cooperating agency. We would appreciate a response to our request, and identification of a single point of contact, within 30 days of the receipt of this letter. We are anticipating having our first working group meeting in June 2003. Any questions or comments can be directed to Ms. Catherine Rogers or Mr. Mark Habel at the U.S. Army Corps of Engineers at (978) 318-8231 and (978) 318-8871, respectively or Ms. Deborah Hadden of the Massachusetts Port Authority at (617) 946-4435.

John R. Kennelly
Chief of Planning

CF:
Mr. Thomas Skinner, Director
Massachusetts Coastal Zone Management
251 Causeway Street, Suite 900
Boston, Massachusetts 02114

Mr. Edward Kunce, Acting Commissioner
Massachusetts Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Mr. Vincent Malkoski
Massachusetts Division of Marine Fisheries
50A Portside Drive
Pocasset, Massachusetts 02559

Ms. Deborah Hadden, Manager
Maritime Environmental Affairs
Massport – Port Department, Suite 200 South
One Harborside Drive
Boston, Massachusetts 02128

M. HABEL

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 11, 2003

Engineering/Planning
Evaluation Branch

Rear Admiral Vivien S. Crea
Commander
First Coast Guard District
408 Atlantic Avenue
Boston, Massachusetts 02110-3350

Dear Admiral Crea:

The U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

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We are requesting that your agency consider participating in the preparation of the SEIS/EIR as a cooperating agency per section 1501.6 of the National Environmental Policy Act (NEPA). We are making this request due to the U.S. Coast Guard's jurisdiction and responsibility for aids to navigation, port security, and operations. Actions anticipated by your agency to facilitate the preparation of an SEIS/EIR include: attending working group meetings, active participation in alternative analysis, active participation in discussion of field sampling results, disposal site selection and response to requests on the above regulations.

We request that if your agency cannot fully participate in the above activities due to funding or personnel constraints, that your agency decline participation as a cooperating agency. We would appreciate a response to our request, and identification of a single point of contact, within 30 days of the receipt of this letter. We are anticipating having our first working group meeting in June 2003. Any questions or comments can be directed to Ms. Catherine Rogers or Mr. Mark Habel at the U.S. Army Corps of Engineers at (978) 318-8231 and (978) 318-8871, respectively or Ms. Deborah Hadden of the Massachusetts Port Authority at (617) 946-4435.

John R. Kennelly
Chief of Planning

CF:
Ms. Deborah Hadden, Manager
Maritime Environmental Affairs
Massport – Port Department, Suite 200 South
One Harborside Drive
Boston, Massachusetts 02128

C. M. HABEL

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 11, 2003

Engineering/Planning Division
Evaluation Branch

Mr. Robert Varney, Regional Administrator
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Dear Mr. Varney:

The U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

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We are requesting that your agency consider participating in the preparation of the SEIS/EIR as a cooperating agency per section 1501.6 of the National Environmental Policy Act (NEPA). We are making this request due to the U.S. Environmental Protection Agency's jurisdiction by law and special expertise under the Clean Water Act, the Marine Protection, Research and Sanctuaries Act, the Clean Air Act, and the NEPA. Actions anticipated by your agency to facilitate the preparation of an SEIS/EIR include: attending working group meetings, active participation in alternative analysis, active participation in discussion of field sampling results, disposal site selection and response to requests on the above regulations.

We request that if your agency cannot fully participate in the above activities due to funding or personnel constraints, that your agency decline participation as a cooperating agency. We would appreciate a response to our request, and identification of a single point of contact, within 30 days of the receipt of this letter. We are anticipating having our first working group meeting in June 2003. Any questions or comments can be directed to Ms. Catherine Rogers or Mr. Mark Habel at the U.S. Army Corps of Engineers at (978) 318-8231 and (978) 318-8871, respectively or Ms. Deborah Hadden of the Massachusetts Port Authority at (617) 946-4435.

John R. Kennelly
Chief of Planning

CF:
Mr. Mel Cote
U.S. Environmental Protection Agency
One Congress Street, Suite 1100
Boston, Massachusetts 02114-2023

Ms. Deborah Hadden, Manager
Maritime Environmental Affairs
Massport – Port Department, Suite 200 South
One Harborside Drive
Boston, Massachusetts 02128

M. Habel

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

April 11, 2003

Engineering/Planning Division
Evaluation Branch

Mr. Michael Bartlett, Regional Administrator
U.S. Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301-5087

Dear Mr. Bartlett:

The U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

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While the full range of disposal alternatives will be investigated, it is expected that the majority of the material will be suitable for disposal at the Massachusetts Bay Disposal Site. The remaining unsuitable material may be disposed in one of the previously permitted confined aquatic disposal cells identified as part of the previous Boston Harbor navigation improvement project.

We are requesting that your agency consider participating in the preparation of the SEIS/EIR as a cooperating agency per section 1501.6 of the National Environmental Policy Act. We are making this request due to the U.S. Fish and Wildlife Service's jurisdiction by law and special expertise under the Fish and Wildlife Coordination Act, and the Endangered Species Act. Actions anticipated by your agency to facilitate the preparation of an EIS include: attending working group meetings, active participation in alternative analysis, active participation in discussion of field sampling results, disposal site selection and response to requests on the above regulations.

We request that if your agency cannot fully participate in the above activities due to funding or personnel constraints, that your agency decline participation as a cooperating agency. We would appreciate a response to our request, and identification of a single point of contact, within 30 days of the receipt of this letter. We are anticipating having our first working group meeting in June 2003. Any questions or comments can be directed to Ms. Catherine Rogers or Mr. Mark Habel at the U.S. Army Corps of Engineers at (978) 318-8231 and (978) 318-8871, respectively or Ms. Deborah Hadden of the Massachusetts Port Authority at (617) 946-4435.

John R. Kennelly
Chief of Planning

CF:
Ms. Deborah Hadden, Manager
Maritime Environmental Affairs
Massport – Port Department, Suite 200 South
One Harborside Drive
Boston, Massachusetts 02128

√ M. HABEL

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF
Engineering/Planning Division
Evaluation Branch

April 11, 2003

Ms. Patricia Kurkul, Regional Administrator
National Marine Fisheries Service, Northeast Regional Office
One Blackburn Drive
Gloucester, Massachusetts 01930-2298

Dear Ms. Kurkul:

The U.S. Army Corps of Engineers, New England District, and the Massachusetts Port Authority are preparing a joint Supplemental Environmental Impact Statement (SEIS) and Environmental Impact Report (EIR) for the Boston Harbor Deep Draft Navigation Improvement Project. The purpose of the joint SEIS/EIR is to evaluate the feasibility of potential deep draft navigation channel improvements to the Boston Harbor, Massachusetts Federal Navigation Project.

The project will explore alternatives for accommodating increased deep draft vessel traffic in Boston Harbor including a no action alternative. Alternatives will include incremental deepening schemes of the Broad Sound North entrance channel, President Roads anchorage area, and the main ship channel from -40 feet up to -50 feet mean lower low water (MLLW), a portion of the Mystic River channel from -35 feet to -40 feet MLLW and the Chelsea River channel from -38 feet to -40 feet MLLW. Although the quantity of dredged material that could be generated varies depending on the alternative, we estimate that the typical plan would generate approximately six million cubic yards of dredged material.

While the full range of disposal alternatives will be investigated, it is expected that the majority of the material will be suitable for disposal at the Massachusetts Bay Disposal Site. The remaining unsuitable material may be disposed in one of the previously permitted confined aquatic disposal cells identified as part of the previous Boston Harbor navigation improvement project.

We are requesting that your agency consider participating in the preparation of the SEIS/EIR as a cooperating agency per section 1501.6 of the National Environmental Policy Act. We are making this request due to the National Marine Fisheries Service's jurisdiction by law and special expertise under the Fish and Wildlife Coordination Act, the Endangered Species Act, and the Essential Fish Habitat provisions under the Magnuson-Stevens Fishery Conservation and Management Act. Actions anticipated by your agency to facilitate the preparation of an SEIS/EIR include: attending working group meetings, active participation in alternative analysis, active participation in discussion of field sampling results, disposal site selection and response to requests on the above regulations.

We request that if your agency cannot fully participate in the above activities due to funding or personnel constraints, that your agency decline participation as a cooperating agency. We would appreciate a response to our request, and identification of a single point of contact, within 30 days of the receipt of this letter. We are anticipating having our first working group meeting in June 2003. Any questions or comments can be directed to Ms. Catherine Rogers or Mr. Mark Habel at the U.S. Army Corps of Engineers at (978) 318-8231 and (978) 318-8871, respectively or Ms. Deborah Hadden of the Massachusetts Port Authority at (617) 946-4435.

John R. Kennelly
Chief of Planning

CF:
Ms. Deborah Hadden, Manager
Maritime Environmental Affairs
Massport – Port Department, Suite 200 South
One Harborside Drive
Boston, Massachusetts 02128

J M. HABEL

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO:
ATTENTION OF:

March 20, 2003

Regulatory Division
CENAE-R-198900530

Mr. Philip B. Andreas
Vice President, Electric Operations
NSTAR
One NSTAR Way
Westwood, Massachusetts 02090-9230

Ms. Marianne Connolly
Program Manager, Regulatory Compliance
Massachusetts Water Resources Authority
100 First Avenue, Charlestown Navy Yard
Boston, Massachusetts 02129

Dear Mr. Andreas and Ms. Connolly:

This concerns Department of the Army Permit No. 198900530, which authorized the installation of a power cable under Boston Harbor between South Boston and the Deer Island Wastewater Treatment Plant. Based on information in your February 28, 2003 letters to the Massachusetts Executive Office of Environmental Affairs, it appears that the cable may not have been installed in compliance with the terms and conditions of that permit.

Sheets 3 and 9 of the permit drawings indicate that under the Reserved Channel and the Main Ship Channel the three four-inch-diameter cables were to be installed such that their tops would be at least 25 feet below the mudline. This required that the top of the cables be 60 feet or more below the elevation of mean low water in the Reserved Channel and the 35-foot Main Ship Channel and 65 feet or more below the elevation of mean low water in the 40-foot Main Ship Channel. Your letters indicate that the cables are more shallow than these minimum depths.

Special Condition No. 4 required submittal of a drawing certifying the location and configuration of the cable after completion of construction. This had to be submitted both to the Corps Regulatory Branch (now Regulatory Division) and the National Ocean Service (NOS). We do not have a copy of this submittal in our file or a confirmation that it was sent to us.

Within 30 days of the date of this letter please outline to us in writing why the cables were apparently not installed in compliance with the Corps permit and what you plan to do to bring them into compliance. Please also send us a copy of the submittal Condition 4 required, which should include location information in both the horizontal and vertical planes.

We are furnishing a copy of this letter to those who were furnished copies of your letters.

We appreciate your cooperation in resolving this matter. If you have questions concerning this please contact Mr. Paul Howard of our Inspection Section at (978) 318-8674.

Sincerely,

Brian A. Green
Lieutenant Colonel, Corps of Engineers
Deputy District Engineer

Copies Furnished:

Massachusetts Department of Environmental Protection, Division of Wetlands and Waterways
Massachusetts Environmental Policy Act Unit, Massachusetts Executive Office of Environmental Affairs
Boston Conservation Commission
Massachusetts Port Authority
Senator Robert Travaglini
Representative Robert A. DeLeo
Maggie Debbie, MWRA
David Finlay, MWRA
Jeff McLaughlin, MWRA

March 10, 2003

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Boston Harbor Deep Draft Navigation Improvement Project
PROJECT MUNICIPALITY	: Boston, Chelsea and Revere
PROJECT WATERSHED	: Boston Harbor
EOEA NUMBER	: 12958
PROJECT PROPONENT	: Massport
DATE NOTICED IN MONITOR	: February 8, 2003

Pursuant to the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and Section 11.03 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project **requires** the preparation of an Environmental Impact Report (EIR).

Project Description

As described in the Environmental Notification Form (ENF), the project consists of a feasibility study of potential deep-draft navigation channel improvements within Boston Harbor. The US Army Corps of Engineers (ACOE), in partnership with the Massachusetts Port Authority (Massport), is conducting the feasibility study. It will examine the Port of Boston's current and future role in maritime commerce and identify potential levels of future vessel traffic and commerce. The study will explore options for accommodating increased deep draft vessel traffic in Boston Harbor, including no action and channel

deepening at a range of depths. The study will explore deepening the Entrance Channel, Main Anchorage and Main Ship Channel from -40 feet up to -50 feet mean lower low water (MLLW), the Mystic River Channel from -35 feet up to -40 feet MLLW and the Chelsea River Channel from -38 up to -40 feet MLLW. Channel deepening will be conducted with a mechanical bucket dredge and could generate approximately 6 million cubic yards (cy) of dredged spoils. Resource areas affected by the project include approximately 1,140 acres of Land Under Ocean and Fish Runs located within a Designated Port Area (DPA).

While the full range of disposal options will be addressed in the EIR, Massport has indicated that the majority of the dredged material will be natural clay and till (and to a lesser extent ledge) that is suitable for disposal at the Massachusetts Bay Disposal Site (MBDS). The remaining material is likely to be disposed of in one of the previously permitted Confined Aquatic Disposal (CAD) Cells developed as part of the Boston Harbor Navigation Improvement Project (BHNIP).

Permits and Jurisdiction

The project is undergoing MEPA review and requires the preparation of an EIR pursuant to Section 11.03 (a)(1)(a) because it requires a state permit and will alter more than ten acres of wetlands. The project requires a 401 Water Quality Certification from the Department of Environmental Protection (DEP), an Order of Conditions from the Boston, Chelsea and Revere Conservation Commissions, and Coastal Zone Management (CZM) Federal Consistency review.

Also, the project requires an Environmental Impact Statement (EIS) pursuant to the requirements of the National Environmental Policy Act (NEPA). Both MEPA and NEPA regulations allow (and encourage) joint review documents. Massport has indicated that the federal EIS and state EIR will be submitted as a single document that addresses the requirements of both review processes. The EIS/EIR should fully address both the federal and state scopes although I will ultimately issue a determination of adequacy only for those portions of the document required in the state scope.

Because the proponent is a state agency and is funding half of the project costs, MEPA jurisdiction extends to all aspects of the project that may cause significant Damage to the

Environment including air quality, water quality, threatened and endangered species, marine habitat, and fisheries.

Boston Harbor Navigation Improvement and Berth Dredging Project (#8695)

The planning and permitting process for the BHNIP addressed a number of issues that are directly relevant to the design and implementation of this project. The BHNIP was the first major dredging project in Boston Harbor in thirty years and was unique in terms of size, design, process and construction techniques. It included the maintenance and improvement dredging of the main shipping channels and berths within Boston's Inner Harbor. Over 784,850 cubic yards of dredged material deemed unsuitable for open-water disposal was placed within nine CAD cells constructed within the dredging footprint of navigation channels.

The overall size of the project and the amount of contaminated material (containing elevated levels of metals and organic compounds) raised a number of environmental issues and concerns related to dredging and the disposal of dredged materials. These issues and concerns were outlined in related environmental filings and addressed through project design and permitting. A Technical Advisory Committee (TAC), consisting of resource agencies, environmental advocates, scientists and others, was formed to help advise the proponent and was instrumental to the success of this project through the design, permitting and construction phases. The TAC helped evaluate a wide range of disposal alternatives, develop conditions for the Water Quality Certification, and modify construction and monitoring techniques as necessary.

The BHNIP, which was completed in late 2001, has provided a framework for creating an environmentally acceptable dredging and disposal plan. It furthered our understanding of dredging operations and techniques, provided valuable information about baseline conditions within Boston Harbor, and resulted in the development of guidelines for permitting and constructing CADs to minimize impacts. I expect that the recommendations included in the feasibility study for this proposed project will be informed by the experience developed during the BHNIP and I encourage the proponent to include a summary of lessons learned in the EIR to facilitate understanding of the proposed design and mitigation. In particular, an evaluation of the utility of water quality monitoring methodology, the geographical behavior

of the CAD cells and data related to marine habitat will be useful.

SCOPE

The EIR should follow Section 11.07 of the MEPA regulations for outline and content, as modified by this scope. It should include a copy of this Certificate and of each comment received. The proponent should address the comments to the extent that they are within this scope. The proponent should circulate the EIR to those who commented on the ENF, and to any state agencies from which the proponent will potentially seek permits or approvals.

The draft scope provided by the proponent within the ENF addresses most of the issues that should be included in the EIR including a No Action scenario to establish a baseline and a number of additional alternatives including alternatives for disposal of the dredged material.

Project Description

The EIR should clearly identify where this project and its alternatives overlap with previous improvement and/or maintenance dredging. While Massport is the proponent of this project in terms of MEPA review, it is my understanding that the ACOE will conduct most of the actual dredging and related mitigation while Massport may implement discrete elements of it. The EIR should identify who is responsible for what elements of the project and its related mitigation and whether or not that responsibility shifts depending on the alternative selected.

Environmental Impacts

The EIR will include a section on environmental impacts of dredging and dredged material disposal including water quality, biological resources, threatened and endangered species, historic and archaeological resources, noise and odor. This section should indicate which impacts are temporary and which are permanent. The EIR should identify wetland resource areas present within the project boundaries on a reasonably scaled plan and it should indicate the significance of the resources.

The environmental impacts section should include the secondary impacts of the deepening project such as increased ship traffic and an increase in the size of ships entering the harbor. The EIR should examine the impact of these changes to fishing, marine mammals, water quality, air quality and harbor uses.

Cumulative Impacts

A number of comments have suggested that the EIR should address the cumulative impacts of a number of ongoing and planned projects within Boston Harbor and Massachusetts Bay. As noted, a number of small and large scale projects with potential short and long term impacts to marine resources are planned within these areas. These projects are set against a background of impacts to coastal resources from a range of human activities, including use of existing disposal sites, shipping, commercial and recreational fishing, and long term climate changes. I believe these comments emerge from a concern that planning for appropriate activities and uses within our ocean resources are being permitted in the absence of a proactive management and planning framework and highlight the relevance of such an approach. EOEA agencies responsible for coastal planning permitting and decision-making can successfully address this issue over time in a comprehensive manner that could not be demanded of a single project proponent. *

However, to assist the permitting agencies in their evaluation of the potential impacts of this project, the EIR should describe ongoing and planned projects within Boston Harbor and Massachusetts Bay to include, at a minimum, the Hub Line gas pipeline project and the proposed Everett Extension, the ACOE maintenance dredging, and the use of an offshore borrow site (NOMES I) by the MDC as a sand source for the Winthrop Shores Reservation and Restoration Project. The description should include a summary of the projects' impacts, individually and cumulatively, including the size of the impacted area, the resources impacted by the projects, and the duration of the impacts. The description should also include a timeline that shows when the projects are planned to occur in relation to the dredging project. Coordination with agencies/organizations regarding existing infrastructure.

Alternatives

A number of project design alternatives will be included in the EIR that vary, incrementally, in the depth and areas of dredging. Dredged material disposal options and sites will be summarized. A preferred design and disposal alternative will be identified. This section should include a discussion of project phasing. Will dredging be conducted only in one area at one time or will multiple areas be dredged at once? What are the volumes of material that will be dredged and disposed of over what time period? It should explore the comparative impacts to the substrate and water column of several smaller deepening efforts as opposed to one larger one and this information should be incorporated into the ACOE cost/benefit analysis. Finally, it should include a discussion of the types of dredges that can be used for this project and compare the benefits and/or drawbacks of each.

The EIR should include a discussion of maintenance needs, indicate how often maintenance dredging will be required and how associated dredged materials will be disposed.

Coordination with Proposed Projects

As noted previously, a number of projects have been proposed within the general vicinity of this one. The DEIR should lay out a process for coordination with the agencies and organizations responsible for these projects to minimize conflicts and environmental damage.

The Massachusetts Water Resources Authority, NSTAR and the Central Artery/Tunnel Project have requested that the proponent address construction period impacts on existing harbor infrastructure such as utility crossings and the Ted Williams Tunnel, respectively. Impacts to one or more of the buried utilities, particularly the cross harbor electric power cable that is the primary source of power to the Deer Island Treatment plant, could result in very significant adverse effects. The cable construction, operation and maintenance and associated substations is borne entirely by the MWRA and its ratepayers.

The DEIR should lay out a clear process for coordination between parties, indicate who is responsible for identifying actual locations and depths of existing infrastructure that could be directly affected by the project's construction, who is responsible for related costs, and, should include a contingency

plan in the event that a problem occurs. Because the range of dredging depths being considered could result in little or no buffer between the utility cable and the ocean floor, the DEIR should explore the feasibility and cost of relocating the cable.

Technical Working Group (TWG)

As noted earlier, the ongoing participation of technical advisors for the BHNIP was critical to its success. I applaud the proponent's inclusion of a TWG for this project and expect the TWG will help refine the monitoring and mitigation requirements as the project is designed and developed.

Mitigation

The mitigation section should correspond with the areas of impact outlined in previous sections of the proponent's draft scope. Mitigation should address temporary, short-term and long-term impacts.

The proponent should indicate how it will minimize turbidity and migration of dredged sediments during dredging and disposal. The proponent should identify dredging windows and related monitoring activities to minimize and mitigate impacts to fishery resources in, and adjacent to, the dredging and disposal activities. In addition, the proponent should consider beneficial reuse of ledge material to provide benthic habitat and/or shore protection. The state Water Quality Certification, issued by DEP, will be the vehicle for solidifying most mitigation requirements.

The EIR should include a summary of all mitigation measures to which the proponent has committed, including mitigation for construction period impacts. The EIR should also include Proposed Section 61 Findings for use by the state permitting agencies.

March 10, 2003
Date

Ellen Roy Herzfelder

EOEA# 12958 ENF Certificate 03/10/03

Comments received:
02/27/03 Department of Environmental Protection (DEP)
02/27/03 Division of Marine Fisheries (DMF)
02/27/03 Coastal Zone Management (CZM)
02/28/03 Massachusetts Water Resources Authority (MWRA)
02/27/03 Massachusetts Turnpike Authority(MTA)/CA/T Project
02/28/03 City of Boston/The Environment Department
02/28/03 The Boston Harbor Association (TBHA)
02/28/03 NSTAR

ERH/CDB/cdb

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

MITT ROMNEY
Governor

KERRY HEALEY
Lieutenant Governor

ELLEN ROY HERZFELDER
Secretary

EDWARD P. KUNCE
Acting Commissioner

DB

RECEIVED
FEB 28 2003
MEPA

February 27, 2003

Ellen Roy Herzfelder, Secretary
Executive Office of Environmental Affairs
251 Causeway Street, 9th floor
Boston, Massachusetts 02114

Re: EOEA # 12958
Environmental Notification Form
Boston Harbor Deep Draft
Navigation Improvement Project

Attention: Deirdre Buckley

Dear Ms. Herzfelder:

The Department of Environmental Protection (DEP) has reviewed the Environmental Notification Form (ENF) published in the February 8, 2003, *Environmental Monitor* for a Feasibility Study (Boston Harbor Deep Draft Navigation Improvement Project [BHDDNIP]) of potential navigation channel improvements to the Port of Boston and this correspondence includes DEP's consolidated comments.

Project Description

The U.S. Army Corps of Engineers (ACOE), in partnership with Massport as the non-federal sponsor, plans to conduct a Feasibility Study of potential deep draft navigation channel improvements to Boston Harbor. The study will examine the Port of Boston's current and likely future levels of future navigation traffic and commerce through the port. The study will specifically investigate alternatives for accommodating increased deep draft vessel traffic in Boston Harbor, including channel deepening, cargo diversion, and no action to identify whether improvements are warranted. Environmental documentation as required under the Massachusetts Environmental Policy Act (MEPA) and under the National Environmental Policy Act (NEPA) will be conducted as part of the Feasibility Study. DEP notes that this project is categorically required to prepare an EIR.

Background Information

As MEPA is aware, in addition to the BHDDNIP, two additional navigational dredging projects for the Port of Boston have either recently been completed or planned to be performed in the near future; (1) the now-completed Boston Harbor Navigation Improvement and Berth Dredging Project (BHNIP), and (2) a federal maintenance dredging project of the main shipping channel to be undertaken solely by ACOE, proposed to begin the summer of 2003. In late 2001, ACOE/Massport

This information is available in alternate format. Call Aprel McCabe, ADA Coordinator at 1-617-556-1171. TDD Service - 1-800-298-2207.
DEP on the World Wide Web: http://www.mass.gov/dep
Printed on Recycled Paper

completed the dredging and sediment management for the BHNIP (EOEA # 8695), which resulted in deepening of key tributaries and portions of the main shipping channel to 40 feet and related berths to depth ranging from 35 to 45 feet. The ACOE project will consist of maintenance dredging of the federal channels up to the CA/T Ted Williams Tunnel.

Comments

1. In addition to the above referenced navigation dredging projects, there are a number of ongoing and/or planned projects within the Boston Harbor environs which should be considered in the scooping of the BHDDNIP EIR. Those projects include, but are not limited to; (1) ongoing Maritimes and Northeast Pipeline/Algonquin Gas Transmission Company Hubline Project (EOEA # 12355); (2) proposed Everett Extension Pipeline Project (extension/modification to Hubline Project); (3) Massachusetts Water Resources Authority (MWRA) ongoing implementation of the Boston Harbor Cleanup; (4) MDC's Back-to-the-Beaches Program; (5) ongoing Central Artery/Tunnel Project, including opening of the Spectacle Island Park (EOEA # 4325); and the numerous shore-side development projects (including Portside @ Pier One/Boston Harbor Shipyard and Marina (EOEA # 12623), Pier 4 (EOEA # 12433), and Fan Pier (EOEA # 12083).

   At the February 25th MEPA Scoping Session the issue of cumulative impacts and/or "overlapping" projects, was specifically raised as a significant concern. DEP agrees that this issue should be considered in the development of the EIR Scope.

2. DEP has agreed to actively participate in the BHDDNIP Technical Working Group (TWG). Yvonne Unger (Bureau of Resource Protection/Dredging Program) will be the DEP-designee on the TWG. DEP staff actively participated in the TWG for the previous BHNIP, an activity which was critical to getting consensus on that project. DEP expects that the discussions which will occur as part of the BHDDNIP TWG will be as successful.

3. According to the ENF, and as discussed at the Scoping Session, the overwhelming majority of the approximate 6 million of cubic yards of material to be dredged and/or removed will be natural clay and till (and to a lesser extent ledge) which are planned to be barged to the MBDS, but ACOE anticipates that there will be some volume of silt materials that will probably not be allowed to be placed at the MBDS. The Feasibility Study will consider options for the management of this material, including; placement into one or more In-Channel CAD Cells that were permitted as part of the BHNIP, and upland disposition. At the Scoping Session the ACOE spokesperson stated that there currently is extensive capacity in various permitted, but unused, CAD Cells and that ACOE and Massport are likely to propose to place the silts into one or more of these cells.

   During the environmental review, permitting, implementation and post-dredging monitoring of the BHNIDP, DEP staff have been directly involved in the consideration and assessment of the CAD Cell disposal activities. In this regard, DEP staff recently performed a review of the "One-Year Monitoring Plan for the Boston Harbor CAD Cells - Summary 2001" document prepared and submitted as a condition of the Water Quality Certification. Based on a review of this report and prior information, DEP is of the opinion that the CAD Cells are functioning properly and that DEP would therefore look favorably at a proposal by ACOE/Massport to

utilize one or more of the unused (or partially filled) cells for disposal of the silty sediment from the BHDDNIP.

DEP would like to also indicate that based on its experiences working on the BHNIDP, CA/T and Hubline Projects, that an upland management option for significant volumes of silty sediment from Boston Harbor will be problematic.

4. At the Scoping Session concerns were raised by representatives from NSTAR and MWRA regarding impacts to utilities (particularly buried power cables) located in areas of the Harbor which would overlap with the proposed dredging footprint. According to the NSTAR representative, there were significant problems during the BHNIDP. Impacts to one or more of the buried utilities, particularly the power cable running down Reserved Channel to Deer Island, could result in very significant adverse effects, therefore DEP strongly recommends that the EIR scope fully address this issue.

5. It will be important for the proponent to closely coordinate with relevant local, state and federal resource agencies relative to minimizing and mitigation impacts to fishery resources in, and adjacent to, the dredging and sediment disposal activities. A key element will be defining allowable "dredging windows" and monitoring activities. DEP staff will need to be involved in all such discussions in that the WQC will be the state-permitting vehicle for defining the monitoring requirements, contingency measures, allowable dredging periods, etc. ACOE and Massport should carefully review the WQCs that have been issued by DEP for the BHNIDP, CA/T Ted William Tunnel and Hubline Projects as guides to the activities and conditions that are likely to be included in the BHDDNIP.

Feel free to contact Yvonne Unger at 617-292-5893 or me at 617-292-5698 if you have any questions regarding this correspondence.

Very truly yours,

Steven G. Lipman, P.E.
Special Projects Coordinator
Commissioner's Office

Cc: Mike Keagan (ACOE)
Deb Hadden and Jacki Wilkins (Massport)
Deerin Babb-Brott (CZM)
Vin Malkoski (DMF)
Dave Shakespeare, Yvonne Unger, Jim Sprague, Eric Worrall, Lealdon Langley (DEP)

Commonwealth of Massachusetts
Division of Marine Fisheries
251 Causeway Street • Suite 400
Boston, Massachusetts 02114
(617) 626-1520
fax (617) 626-1509

Paul J. Diodati
Director

03

February 27, 2003

Ellen Roy Herzfelder, Secretary
EOEA, Attention: MEPA Office
Deirdre Buckley, EOEA No. 12958
251 Causeway Street, Suite 900
Boston, MA 02114-2150

RECEIVED
FEB 27 2003
MEPA

Dear Secretary Roy Herzfelder:

The Division of Marine Fisheries has reviewed the Environmental Notification Form (EOEA #12958) for the Boston Harbor Deep Draft Navigation Improvement Project with respect to its effect on the marine fisheries resources of the Commonwealth. We offer the following comments for your consideration.

The proposed Scope of Work for the DEIR/DEIS prepared by the Army Corps of Engineers appears to have identified the major resource questions that must be addressed. It is our understanding that the specific data sets and techniques to be used in this evaluation will be identified and defined by the Technical Working Group. In addition, there are several issues not included in the DEIR Scope of Work that need to be addressed:

1. The Corps should identify opportunities for beneficial reuse of dredged materials such as rock and cobble. In some areas, there may be an environmental benefit to leaving the unconsolidated material in place to provide benthic habitat. Other uses would include shore protection or redeployment in another area to enhance benthic habitat.

2. The DEIR should include discussion of how this dredging project will contribute to the overall cumulative impact to marine resources and habitat caused by on-going projects in this portion of Massachusetts Bay. At this time, installation of the Hubline gas pipeline is altering nearly 30 square miles of bottom, the Corps is proposing to perform maintenance dredging that will remove approximately 250 acres of sand, cobble, and gravel from Broad Sound, and the MDC is proposing to remove 1 million cubic yards of cobble and gravel (approximately 100 acres) from nearby Massachusetts Bay. Alteration of these habitat areas will result in direct and indirect impacts to fisheries and the loss of habitat functions and value during recovery. For example, cobble and ledge habitat (critical habitat for juvenile cod and lobster) may take upwards of 10 years to recover from radical alterations and may never fully recover.

3. Relative to the direct loss of habitat and temporal loss of function, creation of a comprehensive recovery monitoring and mitigation plan will be needed to compensate for these losses. This effort should be guided by the Technical Working Group and the plan included as a condition of project permits.

Thank you for the opportunity to comment on this proposal and we look forward to working with the Army Corps and Massport on this project as part of the Technical Working Group. If you have any questions about this review, please contact Vin Malkoski in our Pocasset office at (508) 563-1779, ext. 119.

Sincerely,

Paul J. Diodati
Director

Cc: Timothy Famulare, Boston Conservation Commission
Michael Keegan, ACOE
Mike Johnson & David MacDuffee, NMFS Gloucester
Timothy Timmerman, US EPA
Deerin Babb-Brott & Jane Mead, MCZM
Steve Lipman, MA DEP
Yvonne Unger, MA DEP
Cunningham, Estrella, Kennedy, & Pierce, MDMF

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 900, Boston, MA 02114-2136
(617) 626-12100 fax: (617) 626-1240

MEMORANDUM

TO:	Ellen Roy Herzfelder, Secretary, EOEA
ATTN:	Deirdre Buckley, MEPA Unit
FROM:	Tom Skinner, Director, CZM
DATE:	February 27, 2003
RE:	EOEA #12958 – Boston Harbor Deep Draft Navigation Improvement Project

The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the above-referenced Environmental Notification Form (ENF) noticed in the Environmental Monitor dated February 8, 2003. CZM understands that this project categorically requires the preparation of an Environmental Impact Report (EIR).

Project Description

The US Army Corps of Engineers (Corps), in partnership with the Massachusetts Port Authority (Massport), has initiated a feasibility study of potential deep-draft navigation channel improvements to the Boston Harbor. The study will examine the Port of Boston's current and future role in the maritime commerce of the nation, and identify likely levels of future vessel traffic and commerce through the Port. In addition, the study will investigate options for accommodating increased deep draft vessel traffic at Boston Harbor, including channel deepening, cargo diversion, and no action. The costs of implementing alternative options will be measured against estimated benefits to improving commercial transportation costs in order to identify whether improvements are warranted consistent with Corps policies. Plans for channel improvements will result in the deepening of the entrance channel and main anchorage (from –40 feet to up to –50 feet mean lower-low water (MLLW)), the main ship channel (from -40 feet to up to –50 feet MLLW), the Mystic River Channel (from –35 feet to –40 feet MLLW), and the Chelsea River Channel (from –38 to –40 feet MLLW).

Comments

CZM participated in the technical working group for the recently completed Boston Harbor Navigation Improvement Project (BHNIP), which deepened the Harbor to –40 feet MLLW, and looks forward to participating in a similar process for the Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP).

Confined Aquatic Disposal, Water Quality, Fisheries Impacts

As part of the recently completed BHNIP project, the Corps used in-channel confined aquatic disposal (CAD) cells as a method of disposing of dredged sediment deemed unsuitable for disposal at the state approved ocean disposal site. At the MEPA scoping meeting, the Corps indicated its intention to consider use of the unused BHNIP CAD cells (approved under the

BHNIP) for the placement of contaminated dredged material from the currently proposed deepening effort. CZM supports the assessment of the previously approved CAD cells for this purpose. In the EIR, CZM requests that the Corps summarize the "lessons learned" from the recently completed BHNIP with regard to this method of sediment disposal, in addition to recommended changes for the upcoming dredging project based on that information. In particular, an evaluation of the utility of the water quality monitoring methodology, the geographical behavior of the CAD cells, and any other available data related to impacts to marine habitat will be useful for the evaluation of the proposed dredging project.

Cost/Benefit Analysis

CZM understands that the Corps must perform a cost/benefit analysis of any project it proposes to construct using federal funds. It is our understanding that this analysis will be performed incrementally for the BHDDNIP project, i.e., the cost/benefit model will be applied to a project that deepens to -42 feet MLLW, -44 feet MLLW, -46 MLLW, etc., up to -50 feet MLLW, and the depth selected will be that which provides the most benefit for the least cost, in accordance with Corps regulations.

The Corps' cost/benefit analysis often leads to the selection of a depth that most parties recognize will not be sufficient to meet even the mid-term needs of the shipping industry. As is often the case, the need for channel depths in excess of the BHNIP selected depth of -40 feet was recognized prior to the completion of that project. With this in mind, CZM requests that the Corps consider, as part of the cost/benefit analysis, the environmental impacts of disturbing the substrate and impacting the water column with several smaller deepening efforts as opposed to one larger one.

Coordination With Utility Providers, Other Projects

During the scoping session, concerns were raised by N-Star and the MWRA regarding the respective agencies cables and pipelines which run under Boston Harbor. CZM suggests that the EIR lay out a clear process for coordination between any parties with utilities in the area of the proposed dredging project. The EIR should discuss a similar process for coordination between the other multiple projects taking place in and around Boston Harbor during a similar timeframe.

Proposed Outline

The ENF contains a proposed outline for the BHDDNIP draft EIR/SEIS. Except as requested above, the outline appears to cover most of the relevant issues associated with the proposed deepening project. CZM looks forward to seeing the information referenced in the draft outline, and will comment in detail on its findings when the EIR/SEIS becomes available.

Additional Review

As stated in the ENF, this project will be subject to CZM federal consistency. The project must be found to be consistent with CZM's enforceable program policies. For further information on this process, please contact Jane W. Mead, Project Review Coordinator, at 617-626-1219 or visit the CZM web site at www.state.ma.us/czm/fcr.htm.

TWS/MG

Cc: Deerin Babb-Brott, Assistant Director
Massachusetts Office of Coastal Zone Management
James Sprague, Section Chief
Northeast Regional Office, MA DEP
Deb Hadden, Deputy Director of Maritime
Massport
Vin Malkoski, Fisheries Biologist
Division of Marine Fisheries

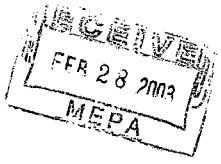
DB

MASSACHUSETTS WATER RESOURCES AUTHORITY
Charlestown Navy Yard
100 First Avenue
Boston, Massachusetts 02129

Telephone: (617) 242-6000
Facsimile: (617) 788-4899

Frederick A. Laskey
Executive Director

February 28, 2003



Ms. Ellen Roy Herzfelder, Secretary
Executive Office of Environmental Affairs
MEPA Unit
251 Causeway Street, Suite 900
Boston, MA 02114

Attn: Dierdre Buckley, EOEA No. 12958

Re: Massport's Boston Harbor Deep Draft Navigational Improvement Project - EOEA #12958

Dear Secretary Roy Herzfelder:

Staff at the Massachusetts Water Resources Authority (MWRA) have reviewed the Environmental Notification Form (ENF) for Massport's Boston Harbor Deep Draft Navigational Improvement Project and attended the scoping session held on Tuesday, February 25, 2003 at the Black Falcon Terminal. Massport and the U.S Army Corps of Engineers (Corps) plan to conduct a feasibility study of potential deep draft navigation channel improvements in Boston Harbor. The study will examine the Port of Boston's current and likely future role in the maritime commerce of the nation and identify likely levels of future navigation traffic and commerce through the port. The costs of implementing alternative options will be measured against estimated benefits in reduced transportation costs in order to identify whether improvements are warranted consistent with Corps policies.

MWRA's comments and concerns are specifically related to the impacts to the existing cross-harbor electric cable that provides power to the Deer Island Treatment plant, the second largest treatment plant in the country. While the cable is owned by Harbor Electric Energy Corp. (a wholly owned subsidiary of Nstar), the cost of construction, operation and maintenance of the cable and associated substations is borne entirely by the MWRA and its ratepayers. The cable and substations were installed at a cost of approximately $40 million as part of the $3.5 billion Federal court mandated Boston Harbor Project.

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The proposed limit of this project partially coincides with the current location of Nstar's 115Kv Submarine Power Cable which feeds the MWRA's Treatment Plant. As indicated in the ENF, there appears to be an overlap in the proposed deep draft dredging of the Reserve Channel and adjacent entrance to the Reserve Channel and the "as-installed" location of the Submarine Cable. Nstar documents indicate that this cable was installed at –50 feet and that the new dredging project proposes to increase the cut from the existing depth of –40 to the new depth of –42 to –50. It should be noted that the dredging process might result in areas being deepened an additional two feet beyond what is actually proposed.

Therefore, the dredging in the immediate area of the 115Kv Submarine Cable to the new proposed depths may lead to possible damage to the cable, resulting in the release of the insulating oil in the cable to the waters of the harbor and the potential long term disruption of the primary source of power to the treatment plant servicing over 43 cities and towns in metropolitan Boston.

Staff at MWRA need to have serious discussions with the Project Proponents on identifying and examining alternatives to dredging at the Reserve Channel so that impacts to the submarine cable are avoided. In addition, MWRA requests that the EIR/S identify the cost/benefits of moving the cable, if necessary, determine who pays for this undertaking, and include a contingency plan in the event of damaging the cable (loss of power to the treatment plant as well as water quality impacts with the release of oil contained in the cable.) MWRA cannot over emphasize the importance of the electric cable in the daily operation of the treatment plant, which services over 2.5 million people. MWRA looks forward to working with the proponents to assure that MWRA's electric source is not jeopardized and to assure that any costs associated with the project are not passed on to MWRA ratepayers.

Thank you for the opportunity to comment.

Yours truly,

Marianne Connolly

Marianne Connolly
Program Manager, Regulatory Compliance

cc: Senator Robert Travaglini
Representative Robert A. DeLeo
Maggie Debbie, MWRA
David Finlay, MWRA
Jeff McLaughlin, MWRA

C: MEPA12958BosHarDredging

DB

Massachusetts Turnpike Authority
Central Artery/Tunnel Project

MAR 13 2003
MEPA

February 27, 2003

Secretary Ellen Roy Herzfelder
Executive Office of Environmental Affairs
Attention: MEPA Office
Ms. Deirdre Buckley, EOEA #12958
251 Causeway Street, Suite 900
Boston, MA 02114

Subject: Boston Deep Draft Navigation Improvement Project
Environmental Notification Form (ENF)

Dear Secretary Roy Herzfelder:

The Central Artery/Tunnel (CA/T) Project staff has reviewed the subject document. The proposed Navigation Improvement Project is located adjacent to the CA/T Project's Ted Williams Tunnel and our Excavated Materials Handling Site at Subara Pier.

The ENF notes that the Ted Williams Tunnel limits channel depths above the Tunnel to the 40 feet now provided; however, our design allows for accommodation of an approximately 600-foot wide, 45-foot deep channel over the Tunnel. In the future, if the channel depth is proposed to be deepened over the Tunnel, these dimensions should be verified.

Our only concern with the proposed dredging project is the deepening next to the Tunnel, especially any blasting in the vicinity of the Tunnel. We request documentation and close coordination with our Project and the MTA to ensure that the channel deepening and any associated construction activities such as blasting will not effect the Ted Williams Tunnel.

Massport officials have maintained a cooperative relationship over the years with the CA/T Project and the Massachusetts Turnpike Authority. We anticipate this ongoing cooperative relationship effort will continue during the design review, permitting, and construction processes for the Navigation Improvement Project.

185 Kneeland Street • Boston • Massachusetts • 02111 • Phone 617-951-6000 • Fax 617-457-8198

Massachusetts Turnpike Authority
Central Artery/Tunnel Project

Secretary Ellen Roy Herzfelder
February 27, 2003
Page Two

If you have any questions, please contact Ronald Killian, Manager of Environmental Permits and Procedures, at (617) 556-2453.

Sincerely,

MASSACHUSETTS TURNPIKE AUTHORITY

Paul A. Stakutis
Director of Environmental Affairs

PAS/AR/mal

cc: Mr. Michael A. Leone, Massport
Mr. James F. Cashman, MTA

2003-256K
AD-2.1.2
AL-1.2

FEB-28-2002 17:07 617 635 3435 617 635 3435 P.01/02

CITY OF BOSTON
THE ENVIRONMENT DEPARTMENT
Boston City Hall, Room 805 • Boston, MA 02201 • 617/635-3850 • FAX: 617/635-3435

DB

February 28, 2002

Ellen Roy Herzfelder, Secretary
Executive Office of Environmental Affairs
251 Causeway Street, 9th Floor
Boston, MA 02114
Attention: Deirdre Buckley, MEPA Office

FEB 28 2002
MEPA

Re: Boston Harbor Deep Draft Navigation Improvement Project, Environmental Notification Form, EOEA #12958

Dear Secretary Roy Herzfelder:

The City of Boston Environment Department has reviewed the Environmental Notification Form (ENF). We hereby submit the following comments to promote the use of proven environmental strategies and technologies in fulfilling environmental requirements.

PROJECT DESCRIPTION

The U.S. Army Corps of Engineers, and the Massachusetts Port Authority (Massport) propose to conduct a feasibility study of potential deep draft navigation channel improvements to Boston Harbor, known as the Boston Harbor Deep Draft Navigation Improvement Project ("BHDDNIP"). This study will include an examination of the current and likely future role of the Port of Boston in national maritime commerce and identify likely levels of maritime traffic. The study will also investigate alternatives for accommodating increased deep draft vessel traffic and a cost-benefit analysis of these alternatives to include channel deepening, cargo diversion, and no action.

RESPONSE

This Department supports the proposed study to assess the needs of the Port of Boston to accommodate increased maritime commerce. This project will require Orders of Conditions issued by the Boston Conservation Commission ("BCC") pursuant to the Massachusetts Wetlands Protection Act, M.G.L. Ch. 131, s. 40 ("the Act"). The involvement of BCC staff on the Technical Working Group ("TWG") for the recently completed Boston harbor Navigation Improvement Project proved very useful in designing the project to conform with performance

standards set by the Act and it s regulations; the Executive Secretary of the BCC has accepted the proponent's invitation to join the TWG for the BHDDNIP.

Several utility crossings were damaged or destroyed during dredging operations of the BHNIP. Repair efforts sometimes involved alteration of wetlands resources protected by the Act. The applicants should work with all affected utility owners to identify the location and depth of utility crossings to prevent unnecessary damage to them during the BHDDNIP.

In the past decade, the land under Boston Harbor, which provides habitat to a diverse community of fish and marine invertebrates, some of which are commercially viable species, has been frequently disturbed by major projects, including the construction of the Ted Williams Tunnel crossing, the BHNIP, and the Algonquin Gas Hubline Project. The environmental documentation required under the Massachusetts Environmental Policy Act and the National Environmental Policy Act should carefully assess the cumulative effects of these disruptive projects and consider appropriate mitigation for destruction of marine species habitat that would occur as a result of the BHDDNIP.

Thank you for the opportunity to offer comment.

Sincerely,

Bryan Glascock
Acting Director

BHDDNIP.doc.DBG;TJF.tjf/03.02.010

03/06/03 THU 12:51 FAX 617 727 1998 EXEC.OFC.ENVIR L.AFFRS. 004

FROM : THE BOSTON HARBOR ASSOCIATION PHONE NO. : 6174829750 MAR. 05 2003 02:25PM P2

DB

The Boston Harbor Association
for a clean, alive and accessible Boston Harbor

28 February 2003

RECEIVED
MAR 5 2003
MEPA

Secretary Ellen Roy Herzfelder
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston, MA 02114
Att: MEPA Office

12958

RE: Environmental Notification Form, Boston Harbor Deep Draft Navigation Improvement Project, Boston

Dear Secretary Herzfelder:

The Boston Harbor Association, a non-profit, public interest organization founded in 1973 by the League of Women Voters and the Boston Shipping Association, strongly supports the Massachusetts Port Authority and the U.S. Army Corps of Engineers' efforts to conduct a feasibility study of potential deep-draft navigation channel improvements to Boston Harbor.

The Boston Harbor Association was an active participant in the environmental oversight and planning for the Boston Harbor Navigation Improvement Project completed in 2001. That project deepened the main shipping channel to 40 feet and the associated berths to depths of 35 to 40 feet. Since completion of that project, however, the continued silting of the main shipping channel in other portions of the Harbor now require maintenance dredging to restore the shipping channel to a minimum 40 feet depth.

The economics and efficiencies of cargo transport currently and in the coming decade require the use of larger, state-of-the-art vessels. The Massachusetts Port Authority has done an excellent job of attracting new service to the Port of Boston, most recently, direct outbound ocean service to Asia. In order to be able to continue to attract and keep such cargo service coming to the Port of Boston, however, the shipping channel must be deepened to accommodate larger vessels.

The proposed feasibility study is a much-needed and welcomed step towards deepening of Boston Harbor. We have reviewed the Environmental

374 Congress Street, Suite 609 ■ Boston, Massachusetts ■ 02210-1807 ■ Telephone (617) 482-1722 ■ Fax (617) 482-9750 ■ www.tbha.org

Notification Form, including the attached outline of the feasibility study, and offer the following comments:

Project schedule: The estimated commencement date for the deepening is 2009, with completion in 2011. While we understand that the study will require more than a year to complete, followed by the need for budget appropriations, it is our hope that commencement of the deepening can occur before 2009 if the study supports such action and if funding is available. Any delay beyond then will adversely impact the viability of the Port of Boston.

Study introduction: The outline for the feasibility study suggests a section on the "Historical Importance of the Port of Boston" within the chapter on "Project Purpose and Need". We believe that only minimal attention should be given the role of the Port in the 18th, 19th, or even early 20th centuries, and that this section on project purpose and need should focus on the future of the Port of Boston, and the measures that need to be taken to sustain it.. A more crucial discussion is why the region needs to have a Port of Boston, and the economic impacts to the region as a whole without a viable Port. We believe that this section is important in helping to justify the need for funding of the project, and should be written with sufficient facts and details to support the project.

We would also suggest that "Discussion of Previous Dredging Projects in the Port of Boston" be moved from the section on Project Purpose and Need to the section on History or Summary of Major Changes from the 1995 EIR/S for the previous project.

Sediment Disposal: Regarding the disposal of dredged sediments, we assume that disposal methods used for the previous dredging projects will be considered, in addition to other ocean or land disposal sites.

Environmental Consequences: Regarding environmental consequences of dredging, we urge that short-term impacts from dredging be identified, as well as the longer-term impacts.

During the previous dredging project, a Technical Advisory Group (TAG) was convened to regularly review the monitoring data with the project's independent environmental observer. We have recently been asked to participate on a similar Advisory Group for this project, and would

anticipate that such a group will meet regularly and be an active participant in the environmental oversight of this project, similar to the past TAG.

Coordination with other projects: We urge close coordination between the Algonquin HubLine Project- Everett Extension and this project, in the event that the timing of the projects should overlap. A Notice of Project Change for the Everett Extension of the HubLine Project was recently filed with the Massachusetts MEPA Program and a filing was submitted to the U.S. Federal Energy Regulatory Commission, and it is not clear how long the federal and state regulatory review processes will take before construction of the Extension Project could begin.

Coordination with other projects during the time of the project (currently estimated to be 2009 to 2011) should also occur, to minimize any adverse impacts.

Thank you for your consideration.

Sincerely,

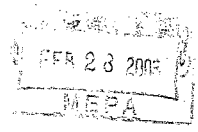
Vivien Li
Executive Director

VL: pr

NSTAR One NSTAR Way, Westwood, MA 02090-9230

Philip B. Andreas
Vice President Electric Operations

DB



February 28, 2003

Ellen Roy Herzfelder, Secretary
Executive Office of Environmental Affairs
MEPA Office
251 Causeway Street, Suite 900
Boston, MA 02114

RE: Boston Harbor Deep Draft Navigation Improvement Project
EOEA No. 1295251
Deirdre Buckley, Analyst

Dear Secretary Roy Herzfelder:

Harbor Electric Energy Company ("HEEC"), a wholly-owned subsidiary of Boston Edison Company, an NSTAR Company, operates a 115 kV electric distribution cable within the Reserve Channel and the Main Ship Channel in Boston Harbor. The cable is the principal supply route for electricity to MWRA's Deer Island Wastewater Treatment Plant.

NSTAR inquired about future dredging plans by the US Army Corps of Engineers (Corps) and Massachusetts Port Authority (Massport) in 1988, prior to the installation of the cable. NSTAR was told the Main Ship channel could eventually be dredged from 45 to 50 ft. below mean low water. However, our records do not indicate that the Corps had any plans for additional dredging in the Reserve Channel. This information was used to determine an appropriate depth to place the 115kV Cable and to provide adequate cover after future dredging. This depth was approved through the permitting process, as well.

Our as-built drawings show that the cable is located approximately 53 feet below mean low water (MLW) in the Reserve Channel and 63 feet below MLW in the Main Ship channel. For the remaining portion of the route the cable is 15 ft below the seabed. These depths allow for approximately 15 ft of cover. If Massport and the Corps dredge the Reserve Channel below the 40 ft. MLW, there will be inadequate cover to protect the cable from cruise ship anchors, etc.

In addition, we are concerned about the dredging and anchoring process. During the 2001 dredging in the Reserve Channel, we were told by the Corp's contractor that something, possibly our 115 kV cable, was snagged by an anchor. If so, the cable may not still be located in the area indicated on the enclosed as-built drawings. We request that the Corps be required to fund the process of locating and documenting the precise location of the cable.

If the cable is severed during or after any additional dredging, several environmental impacts could occur including the release of some dielectric fluid from inside the cable and significantly increase air emissions resulting from the MWRA's use of on-site generators, until the cable is repaired or replaced. A repair would likely take over a month to complete and during that time, the waste treatment capability would be at heightened risk because of this reliance on a single source. Replacement of the cable would take several years.

Bedrock is located at approximately 53 ft below MLW in the Reserve Channel. That shallow depth to bedrock would make it easier for a moving anchor to snag the cable. Because of the degree to which the MWRA relies upon the cable, if it were proposed that a new cable be installed at greater depth that installation would have to precede the dredging. Licensing and installation could take up to 4 years and cost + $35,000,000.

The Corps' 2001 dredging in the Chelsea River made it clear that the serious concerns we have regarding further dredging in the Reserve Channel are reasonable and could result in dire consequences. Two separate cable crossings existed in the river that provided the only electrical supply to East Boston and Massport's Logan International Airport. One crossing included a set of set of three 13.8kV submarine cables. These were snagged and destroyed. The second crossing included a bundled set of sixteen 5-inch ducts with nine 13.8kV cables. We believe the ducts were damaged by the Corp's dredging operation. Upon subsequent examination by divers, we found the conduits had been damaged just outside the shipping channel. The conduits were repaired and the three additional cables were added to replace the destroyed submarine cables. We have been working with our consultants and the regulatory authorities to evaluate the supply to East Boston and the Airport.

We request that MEPA not allow for additional dredging in the Reserve Channel. We also request that the In-Channel Disposal Cells be made available to private parties to minimize disposal cost of contaminated sediment that is now prohibitively expensive.

If you have any questions or would like more information please do not hesitate to contact Beverly Schultz, at (781) 441-3809.

Sincerely,

Philip B. Andreas,
Vice President
Electric Operations

Cc: Massachusetts Port Authority
Massachusetts Water Resources Authority
US Army Corp of Engineers
Boston Conservation Commission

Aviation Division
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston, MA 02128-2909
TEL (617) 428-2800
www.massport.com

January 31, 2003

Ms. Ellen Roy Herzfelder, Secretary
Executive Office of Environmental Affairs
Attn: MEPA Office
251 Causeway Street, Suite 900
Boston, MA 02114

RE: Boston Harbor Deep Draft Navigation Improvement Project
Environmental Notification Form Submittal

Dear Secretary Roy Herzfelder:

On behalf of the Massachusetts Port Authority (Massport), I am pleased to submit two (2) complete copies of an Environmental Notification Form (ENF) for the Boston Harbor Deep Draft Navigation Improvement Project (BHDDNIP), and a third copy of the first three pages, for inclusion in the *Environmental Monitor* to be published on February 8, 2003. The project is needed to accommodate larger cargo vessels that currently utilize Massport's Conley Container Terminal and that are anticipated to call at the Port of Boston in the future.

Project Description

The U.S. Army Corps of Engineers (Corps), in partnership with Massport as the non-federal sponsor, plans to conduct a feasibility study of potential deep draft navigation channel improvements to the Boston Harbor. The study will examine the Port of Boston's current and likely future role in the maritime commerce of the nation, and identify likely levels of future navigation traffic and commerce through the port. In addition, the study will investigate alternatives for accommodating increased deep draft vessel traffic at Boston Harbor, including channel deepening, cargo diversion, and no action. The costs of implementing alternative options will be measured against estimated benefits to improving commercial transportation costs in order to identify whether improvements are warranted consistent with Corps policies. Environmental documentation as required under the Massachusetts Environmental Policy Act (MEPA) and under the National Environmental Policy Act (NEPA) will be conducted as part of the feasibility study.

Project Need

Cargo vessels frequenting the Port of Boston have grown larger such that many of the vessels that now call at Conley Terminal require more than 40 feet of water, the current authorized depth for the Main Shipping Channel. Although these vessels can "ride the tide" into the terminal since the berths were dredged to 45 feet as part of a prior dredging

project described below, the need to wait for a high tide to move to and from the terminal results in costly delays and in some cases vessels have ceased container loading operations in order to depart before the tide changed. In addition to the need for deeper water to Conley Terminal, the December 2002 Massport Marine Terminal (MMT) Development Issues and Alternatives Analysis indicates that bulk cargo vessels expected to call at MMT/North Jetty will benefit from 45-foot deep channels and berthing areas.

Background Information

In addition to the BHDDNIP which is the subject of this ENF, two additional dredging projects are worth noting for clarification: the now-completed Boston Harbor Navigation Improvement Project and Berth Dredging Project (BHNIP), and a federal maintenance dredging project of the main shipping channel to be undertaken solely by the Corps beginning this summer (2003). Massport has no role in the maintenance dredging project. A brief background discussion may provide useful context concerning the latter two projects.

In late 2001, the Corps completed dredging for the BHNIP. Massport was an active co-sponsor for this project (EOEA# 8695), which resulted in deepening of key tributaries and portions of the main shipping channel to 40 feet[1] and related berths to depths ranging from 35 to 45 feet.

While the planning, permitting, design and construction process for the BHNIP was underway, the main shipping channel into Boston Harbor continued to silt in such that it now needs maintenance dredging to restore it to 40 feet. The Corps is actively moving forward with the maintenance dredging of the federal channels up to the Ted Williams Tunnel Crossing and plans to begin construction in 2003. The proposed maintenance work is a fully federal activity with no associated dredging of berths or other local navigation features. Because all of the material to be removed has been found by the Corps and approved by the EPA to be suitable for ocean disposal, the proposed Boston Harbor maintenance dredging project will involve the disposal of dredged material into ocean waters outside the three-mile limit of the territorial sea. The Corps is currently preparing an Environmental Assessment (EA) for this project.

Coordinated Review Requested

The BHDDNIP is categorically included for the preparation of an Environmental Impact Report (EIR) under MEPA pursuant to Regulation 11.03(3)(a)b, in that it involves dredging greater than ten acres of non-vegetated wetlands. It also will be the subject of an Environmental Impact Statement (EIS) under NEPA. The Corps will be conducting the NEPA review as a Supplement (SEIS) to the EIS prepared for the BHNIP. It is our intent to satisfy both state and federal environmental impact review concurrently, as was done for

[1] Chelsea Creek was only deepened to 38 feet due to certain utility crossings that could not cost-effectively be relocated to a deeper elevation.

the now-completed BHNIP. To that end, we have included a proposed scope and outline for the DEIR/DSEIS as an attachment to the ENF. Further, through early coordination with the MEPA Director and his staff, we were able to schedule a scoping meeting ahead of time as follows:

Date:	Tuesday, February 25, 2003
Location:	Massport Black Falcon Terminal
Time:	11 AM

Technical Working Group

As was done with the BHNIP, we intend to establish a Technical Working Group (TWG), comprised of representatives from the regulatory and Port-of-Boston stakeholders, to assist in the planning and review of the EIR/EIS for the BHDDNIP. A list of the organizations invited to participate on the TWG is enclosed.

Please feel free to contact Deb Hadden (617) 946-4435, or Jacki Wilkins (617) 568- 3558, if you have any questions regarding this filing. For copies of the ENF, please call Cheryl Washington at (617) 568-3525.

Sincerely,

Michael A. Leone
Port Director

Enclosures
ENF Distribution List
TWG List

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
251 Causeway Street, Suite 900
Boston, Massachusetts 02114-2119

BOARD OF
UNDERWATER
ARCHAEOLOGICAL
RESOURCES

Tel. (617) 626-1000
Fax (617) 626-1181
http://www.magnet.state.ma.us/envir

August 26, 2002

Mr. Marco Paiva
Engineering/Planning Division
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

RE: *Draft Scope of Work – Geophysical Explorations: Remote Sensing Archaeological Survey and Geologic Interpretation - Boston Harbor Navigation Improvement Study – Boston Harbor, Boston, Massachusetts*

Dear Mr. Paiva:

The Massachusetts Board of Underwater Archaeological Resources has reviewed the above referenced draft scope of work and finds the methodology for both the remote sensing archaeological survey and the literature review and assessment adequate for the archaeological objectives of the project (as stated on pg.1 of document):

(1) To locate objects or magnetic anomalies representing historic period and/or prehistoric archaeological resources and evidence of sunken vessels.
(2) Make recommendations for future archaeological studies based upon survey data and literature review to include inspection of identified anomalies at the intensive survey level and for the potential for submerged prehistoric resources.

Should you have any questions or comments regarding this correspondence, please do not hesitate to contact the Board at the address above, by telephone at (617) 626-1141 or my email at Victor.Mastone@state.ma.us.

Sincerely,

Victor T. Mastone
Director

VTM/dwt
Cc: Brona Simon, Massachusetts Historical Commission

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Avenue, Suite 130, West Palm Beach, FL 33401.

(5) Palm Beach County Government Center, Front Lobby Information Desk, 215 North Olive Avenue, West Palm Beach, FL 33401.

After the public comment period ends, USACE will consider all comments received, revise the Draft SEIS as appropriate, and issue a Final Supplemental Environmental Impact Statement. As part of the public involvement process, notice is hereby given by the USACE-Jacksonville District of a public meeting to be held at Town Hall Council Chambers, 360 S. County Road, Town of Palm Beach, Florida, beginning at 7 p.m. on September 12, 2002. The public meeting will allow participants the opportunity to comment on the Draft SEIS.

John A. Hall,

Alternate Federal Register Liaison Officer.

[FR Doc. 02–21481 Filed 8–22–02; 8:45 am]

BILLING CODE 3710–AJ–M

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent To Prepare a Draft Supplemental Environmental Impact Statement for the Boston Harbor Navigation Improvement Project

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DOD.

ACTION: Notice of intent.

SUMMARY: The U.S. Army Corps of Engineers (Corps), New England District is conducting a feasibility study and Supplemental Environmental Impact Statement (SEIS) to determine the navigation-related needs of the harbor, port facilities, and harbor users of Boston Harbor. This study will analyze deepening various shipping channels in Boston Harbor, Massachusetts. These include the entrance channel, main ship channel, Presidents Roads anchorage area, and the lower Reserved Channel, all from −40 feet mean lower low water (MLLW) up to −50 feet MLLW, the Chelsea River from −38 feet to −40 feet MLLW, and a portion of the Mystic River channel from −35 to −40 feet MLLW. Without deepening portions of Boston Harbor, the ships and port of Boston will be affected in three ways. (1) Existing shippers and their vessels will continue to experience tidal related inefficiencies with the current channel depths, including negating the full advantage of Massport's deeper 45-foot berths at the Conley Terminal. (2) The port will be unable to accommodate the very large container vessels now beginning to serve the east coast of the United States from southern Asia via the Suez Canal. These vessels will not be able to use Boston efficiently with the current −40-foot channel depth. (3) As larger container and bulk vessels continue to come into service to replace existing vessels, Boston's lack of channel depth will erode its share of tonnage as New England cargo is redirected to the ports of New York-New Jersey and Halifax, Nova Scotia, and transported to New England by other means. Deepening the navigation channels in Boston Harbor would allow Boston to maintain a safe and efficient port.

DATES: September 5, 2002 from 1 to 4 p.m. at the Black Falcon Cruise Ship Terminal in South Boston, MA.

ADDRESSES: If you wish to be placed on the mailing list for this project, contact Mr. Michael Keegan, Project Manager, U.S. Army Corps of Engineers, New England District, Navigation Section, 696 Virginia Road, Concord, MA 01742.

FOR FURTHER INFORMATION CONTACT: If you have questions about the proposed action and the Draft SEIS, contact Mr. Keegan at (978) 318–8087.

SUPPLEMENTARY INFORMATION: The Corps participation in this study is authorized by a resolution of the Senate Subcommittee on Public Works dated September 12, 1969. This study was initiated at the request of the Massachusetts Port Authority (Massport), the study sponsor, using funds provided in the Fiscal Year 2000 Energy and Water Development Appropriations Bill.

Major navigation channel improvements (deepening) were made in 1999 through 2002 in the Reserved Channel, the Mystic River, Inner Confluence and the Chelsea River. A final Environmental Impact Statement (EIS) was prepared for the previous navigation improvement project in June of 1995. The current study would investigate the feasibility of deepening the main shipping channels in the port of Boston to a depth greater than the current authorized depths. This study, which will include the preparation of SEIS to the 1995 Record of Decision, will examine the engineering feasibility, economic justification, social and cultural resource impacts, and environmental acceptability of the proposed channel deepening. The existing −40-foot MLLW main harbor entrance channel from Broad Sound, through President Roads, and up to the Marine Terminal just seaward of the Ted Williams Tunnel will be examined for depths up to −50 feet MLLW, as will the Reserved Channel. Deepening of a small area of the Mystic River Channel upstream of the Moran Terminal, from the current −35-foot depth to −40 feet will also be examined, as will deepening the Chelsea River Channel from the current −38-foot depth to −40 feet.

Alternatives: Dredging alternatives would examine the incremental depths from −40-feet to −50-feet MLLW (−38 feet in Chelsea River, and −35 feet in portions of the Mystic River) to determine the optimum economic plan. In addition, disposal alternatives would be determined based on the suitability of the material for open water disposal. Material suitable for ocean disposal would likely be disposed at the Massachusetts Bay Disposal Site. Material unsuitable for ocean disposal would most likely be disposed within a confined aquatic disposal (CAD) cell within the federal navigation channels above the Ted Williams Tunnel. The draft and final EIS for the previous Boston Harbor navigation improvement project investigated other alternative disposal sites for the disposal of dredged material.

The study will take about three years to complete and Massport and the Corps will share the study cost.

Scoping: Full public participation by interested federal, state, and local agencies as well as other interested organizations and the general public is invited. All interested parties are encouraged to submit their names and addresses (*see* **ADDRESSES**), to be placed on the mailing list for reviewing any fact sheets, newsletters, and related public notices. Massport will host a public meeting on the study on September 5, 2002 (*see* **DATES**). The public is invited to attend and further identify issues that should be addressed in the SEIS.

Dated: August 12, 2002.

Thomas L. Koning,

Colonel, Corps of Engineers, New England District.

[FR Doc. 02–21308 Filed 8–22–02; 8:45 am]

BILLING CODE 3710–24–M

DEPARTMENT OF ENERGY

National Energy Technology Laboratory; Notice of Availability of a Financial Assistance Solicitation

AGENCY: National Energy Technology Laboratory, Department of Energy (DOE).

ACTION: Notice of availability of a Financial Assistance Solicitation.

SUMMARY: Notice is hereby given of the intent to issue Financial Assistance

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

August 20, 2002

Engineering/Planning Division
Evaluation Branch

Mr. Victor Mastone, Director
Board of Underwater Archaeological Resources
241 Causeway Street, Suite 900
Boston, Massachusetts 02114-2136

Dear Mr. Mastone:

The U.S. Army Corps of Engineers, New England District, has prepared a draft Statement of Work (SOW) for a proposed remote sensing archaeological survey of portions of Boston Harbor that may be subject to modifications from a navigation improvement study. A copy of this SOW is enclosed for your review and comment.

Please direct any comments or questions, directly to Mr. Marc Paiva, project archaeologist of the Evaluation Branch, at (978) 318-8796. We look forward to your participation in this important study.

Sincerely,

John R. Kennelly
Chief, Planning Branch

Enclosure

Copy Furnished (with enclosure):
Ms. Cara Metz, Executive Director and SHPO
Massachusetts Historical Commission
The Massachusetts State Archives Building
220 Morrissey Boulevard
Boston, Massachusetts 02125

US Army Corps
of Engineers®
New England District

News release

Date: Aug. 7, 2002
For Immediate Release
Release No. MA 2002-99
Contact Tim Dugan 978-318-8264
timothy.j.dugan@usace.army.mil
696 Virginia Road, Concord, Massachusetts 01742-2751

Public meeting on Sept. 5

Massport, Corps of Engineers to conduct study of deepening of Boston Harbor

CONCORD, Mass. -- The New England District, U.S. Army Corps of Engineers, in partnership with the Massachusetts Port Authority (Massport), will begin studies this summer to investigate the feasibility of deepening the main shipping channels in the port of Boston to a depth greater than the current authorized 40-foot depth. Massport views channel deepening as necessary to safely and efficiently accommodate the larger containerships and other vessels now calling at the Conley and Marine Terminals in South Boston.

The study, which will include preparation of a Supplemental Environmental Impact Statement, will examine the engineering feasibility, economic justification, social and cultural resource impacts, and environmental acceptability of the proposed channel deepening. The main harbor entrance channel from Broad Sound, through President Roads, and up to the Marine Terminal just seaward of the Ted Williams Tunnel will be examined for deepening to about 45 feet, as will the Reserved Channel.

Deepening of a small area of the Mystic River Channel upstream of the Moran Terminal, from the current 35-foot depth to 40 feet will also be examined. The study will take about three years to complete, and the study cost, estimated at approximately $4 million, will be shared by Massport and the Corps.

Massport will host a public meeting on the study at the Black Falcon Cruise Ship Terminal in South Boston on September 5, 2002, from 1-4 p.m. *(Directions to the Black Falcon Terminal are attached).*

-- 30 --

Directions to the Black Falcon Cruise Terminal for Parking during the Meeting

Parking generally available at the EDIC (Economic Development Industrial Corporation) garage, a five-story, indoor parking facility owned by the City of Boston and operated by EDIC. It is located across from the Black Falcon Cruise Terminal

From the North (coming south on I93):

From the Expressway downtown, take exit marked "South Station". At the top of the exit ramp, turn left onto Summer Street. Continue on Summer Street as it merges with Congress Street. Continue on Congress to "D" Street, turn right onto "D" then left at the next light onto Summer Street (again). At the next light on Summer Street is a left turn into the Boston Marine Industrial Park. This is Dry Dock Ave. Continue down Dry Dock Ave take the garage is on the left, directly across from the entrance to Design Center Way.

From the South:

Traveling on Interstate 95 North, Interstate 93 North, or the Southeast Expressway, pass through the South Station tunnel underneath downtown Boston/Chinatown. In the tunnel's right lane will be an off-ramp for Atlantic Avenue/Northern Avenue. Take this ramp, staying to the right and at the top of the ramp travel through the light onto the new Northern Avenue bridge. Follow Northern Avenue into the Boston Marine Industrial Park. At the second right on Northern Avenue after the entrance to the park, **turn right.** This is the entrance into the garage.

From Ted Williams Tunnel:

When you exit the Ted Williams Tunnel take a right onto "D" Street. At the end of "D" Street take a right onto Northern Avenue. Follow Northern Avenue into the Boston Marine Industrial Park. Follow Northern Avenue into the Boston Marine Industrial Park. At the second right on Northern Avenue after the entrance to the park, **turn right.** This is the entrance into the garage.

Public Transportation

Public transportation is available via the #7 MBTA bus from South Station to the entrance of the Boston Marine Industrial Park at 660 Summer Street, entailing a walk of approximately 4.5 blocks. There is a #6 MBTA bus from South Station to the Boston Design Center, which is adjacent to the Black Falcon Cruise Terminal. For more information on fares and schedules, call 1 (800) 392-6100 or check the MBTA website (www.mbta.com).

# # #

PART 6

CORRESPONDENCE RECEIVED DURING APPROVAL OF THE RECONNAISSANCE REPORT AND FEASIBILITY COST-SHARING AGREEMENT

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO ATTENTION OF

April 30, 2002

Engineering/Planning Division
Planning Branch

Mr. Michael A. Leone, Port Director
Massachusetts Port Authority
Logan Office Center
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Dear Mr. Leone:

Both Massport and the New England District have worked diligently in developing the Feasibility Cost Sharing Agreement (FCSA) and Project Study Plan (PSP) that will be used in moving forward with the feasibility investigation of navigation improvements to Boston Harbor. We are pleased to inform you that we have received approval to execute the FCSA and initiate our feasibility investigation. Enclosed are four original copies of the FCSA for the cost-shared feasibility study which require signature by Massport. The study will be cost-shared equally by Massport and the Federal government, with credit to Massport for in-kind services as outlined in the PSP attached to the FCSA. Please execute the four originals and return all four to the New England District where they will be signed. A completed, signed FCSA will then be furnished to your office.

As shown in Table 3 of the PSP, Massport's cash contribution towards the work scheduled for Federal fiscal year 2002 is estimated at $207,560. Our schedule for the feasibility study calls on us to begin work before the end of May 2002. These funds must be available to the Corps prior to initiating work on the study. Please provide a check in the amount of $207,560, in accordance with paragraph III.B.2 of the FCSA, for Massport's share of this fiscal year's study activities.

If there are any questions or further information is required, please contact me at (978) 318-8220, or Mark Habel, the study manager, at (978) 318-8871.

Sincerely,

for Brian E. Osterndorf
Colonel, Corps of Engineers
District Engineer

Enclosures

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CECW-PM

17 APR 2002

MEMORANDUM FOR Commander, North Atlantic Division (CENAD-ET-P)

SUBJECT: Boston Harbor, Massachusetts, Navigation Improvement Study

1. Reference is made to the following:

a. CENAE-EP-P memorandum, dated 28 July 2000, transmitting the Section 905(b) analysis for the subject study to Headquarters for review and approval;

b. CECW-PM memorandum, dated 11 August 2000, approving the Section 905(b) analysis and requesting supplemental information on the feasibility scope, cost and schedule; and

c. CENAE-EP-PN e-mail, dated 29 March 2002, providing the supplemental information.

2. The Boston Harbor, Massachusetts, Navigation Improvement Study is approved for proceeding into the feasibility phase of planning. The district should plan to convene an in-progress-review meeting early in the study to ensure the study is focused and tailored to meet the specific study objectives. Based on results of the in-progress-review, the project management plan may need to be revised to better define the depth of analysis required and/or refine study constraints.

3. Submission of the model feasibility cost sharing agreement is not required, provided no deviations are requested.

FOR THE COMMANDER:

James O. Johnson

JAMES F. JOHNSON
Chief, Planning and Policy Division
Directorate of Civil Works

Maritime Division
Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston MA 02128-2909
TEL (617) 946-4413 FAX (617) 946-4422 (617) 946-4466
www.massport.com

March 1, 2002

Colonel Brian E. Osterndorf
District Engineer
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Osterndorf:

I and my staff have received and reviewed the New England District's Project Study Plan, Feasibility Phase regarding our request to deepen the Boston Harbor navigation channels between the harbor entrance and our South Boston terminals to 45 feet. In addition, Massport has reviewed the draft model Feasibility Cost Sharing Agreement (FCSA) that has been developed and furnished to my office. We greatly appreciate the efforts of you and your staff in preparing this report. On February 21, 2002 the Board authorized Massport to execute the agreement for this project. On behalf of the Massachusetts Port Authority (Massport) and other Port of Boston beneficiaries, I am writing to request that you proceed immediately with the feasibility study and to reiterate Massport's intent to execute the feasibility Study Cost Sharing Agreement and fund 50 percent (estimated at $2 million) of the study.

I am pleased to inform you that the Mediterranean Shipping Company (MSC) announced on December 12, 2001, that they would begin a second weekly call at the Port of Boston. In addition to MSC's weekly inbound service to Boston, MSC has added a direct weekly outbound service which started in January 2002. The direct service, with Boston as the last port outbound, calls at the Ports of Antwerp, Bremerhaven/Hamburg, Felixstowe, and LeHavre. This new service will benefit the Port of Boston and the region.

We have also completed negotiations with China Ocean Shipping Company (COSCO), Kawasaki Kien Kaisha, Ltd. (K-Line), and Yangming Maritime Transport Corporation (Yangming) for a weekly vessel call as part of their U.S. East Coast Pendulum Service. This service will bring Asian cargo directly to the U.S. East Coast. After transiting the Panama Canal, the vessels will be stopping at Charleston, Norfolk, New York and Boston. From Boston, the vessels will proceed to ports in the Mediterranean and then return to Asian ports via the Panama Canal after stopping in New York. There will be twelve 3,800 TEU vessels in this service. The first Boston call will be on March 21,2002. It is an expression of the confidence by MSC, COSCO, K-Line and Yangming, that New England shippers will recognize the benefits and value of their services. It is important to note that these carriers have numerous vessels in service that draw more than 40 feet (some of which already call Boston regularly).

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RECYCLED PAPER

Further, we have launched several strategic marketing initiatives to attract other direct call vessels. In addition, we will be leasing a portion of the North Jetty for salt imports and are pursuing several other bulk cargo opportunities for the North Jetty/Massport Marine Terminal that would benefit from channels deeper than 40 feet. We will continue to keep your staff appraised of the status of these efforts as we know they will affect the feasibility study conclusions and recommendations.

Of great importance, as we pursue these and other port initiatives, is the current depth of the harbor entrance channels. While I am extremely happy that the Boston Harbor Navigation Improvement Project (BHNIP) is completed, I was very disappointed to learn that shoaling in the entrance channels and the channel off Castle Island could not be removed as part of this project. As I have stated before, this effectively limits the navigable draft to 36 feet below mean sea level. In essence, this means that we have gained only one foot of additional navigable water from BHNIP in exchange for the years of hard work and significant public expense from both of our agencies and many others. This draft limitation is causing significant economic and schedule impacts. MSC, COSCO, K-Line, and Yangming expect their vessels to arrive and depart Boston at drafts of 42'. To do so at this time means they will restrict their ships to tidal sailings. I trust you can see the importance of conducting the maintenance dredging as quickly as possible. Failure to do so could seriously jeopardize our ability to retain these new services and the Port of Boston's future in general. The recent meeting to phase this project into two parts was a first step in resolving this depth issue. Massport is more than willing to assist your office in getting the necessary funding for this project. I hope that our agencies can work together to expedite the maintenance dredging project so that we can fully realize the benefits of the BHNIP before it is too late.

Thank you very much.

Sincerely,

MASSACHUSETTS PORT AUTHORITY

Michael A. Leone
Port Director

cc: M. Hable, Army Corps
D. Hadden, Massport
M. Keegan, Army Corps

Massachusetts Port Authority
One Harborside Drive, Suite 200S
East Boston MA 02128-2909
Telephone (617) 428-2800
www.massport.com

Mark E. Robinson Chairman
Virginia Buckingham Executive Director and CEO

October 12, 2000

Colonel Brian E. Osterndorf
District Engineer
U.S. Army Corps of Engineers
New England District
696 Virginia Road
Concord, MA 01742-2751

Dear Colonel Osterndorf:

I and my staff have received and reviewed the New England District's July 2000 Expedited Reconnaissance Report regarding our request to deepen the Boston Harbor navigation channels between the harbor entrance and our South Boston terminals to 45 feet. This is an informative and high quality document, and we greatly appreciate the efforts of you and your staff in preparing this report. On behalf of the Massachusetts Port Authority (Massport) and other Port of Boston beneficiaries, I am writing to request that you proceed immediately with the feasibility study and to reiterate Massport's intent to fund 50 percent (estimated at $1 million) of the study.

As you are undoubtedly aware, the container business in the Port of Boston is currently in a state of flux. With the expiration of the Vessel Sharing Agreement last summer, and the consolidation of many of the major steamship lines over the past few years, many questions remain as to how the North Atlantic trade lanes will be served. Based on the recently completed Marine Transportation System report, the amount of cargo shipped by vessel is predicted to double over the next 20 years. Presently, Boston is served by two vessels per week from northern Europe via the Mediterranean Shipping Company (MSC) and Maersk-Sealand. However, Maersk-Sealand has expressed uncertainty regarding their long-term intention to provide direct all water service to the Port of Boston. We continue to work with them to secure a long-term commitment, and at the same time have launched several strategic marketing initiatives to attract other direct call vessels on this and other trade lanes. We are confident that these efforts will be successful. In addition, we are pursuing several bulk cargo opportunities for the North Jetty/Massport Marine Terminal that would benefit from channels deeper than 40 feet. We will continue to keep your staff appraised of the status of these efforts as we know they will affect the feasibility study conclusions and recommendations.

Of great importance as we pursue these and other port initiatives is the current depth of the harbor entrance channels. While I am extremely happy that the Boston Harbor Navigation Improvement Project (BHNIP) is virtually completed, I was very disappointed to learn from the Boston Harbor Pilots last week that shoaling in the entrance channels effectively limits the navigable draft to 36 feet below mean sea level. In essence, this means that we have gained only

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DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF
Engineering/Planning Division
Planning Branch

September 20, 2000

Mr. Michael A. Leone, Port Director
Massachusetts Port Authority
Logan Office Center
One Harborside Drive, Suite 200S
East Boston, Massachusetts 02128-2909

Dear Mr. Leone:

I am writing concerning the ongoing study of your proposal to deepen the principal entrance and lower main shipping channels of Boston Harbor to 45 feet. Enclosed are five copies of the Reconnaissance Report recently approved by the North Atlantic Division. The report examined further deepening of the harbor's main channels below the new Ted Williams (I-90) Tunnel, including the Reserved Channel. The report concludes, based on a preliminary examination of costs and anticipated benefits, that the project would be economically justified, and that Corps participation in further feasibility level investigation is in the Federal interest.

The next steps in the process are as follows:

- The Corps will prepare a draft Project Management Plan (PMP) for the Feasibility Study, including a scope, timeline, and cost estimate for the study effort. The Corps and Massport will review and concur in the draft PMP, then seek further input from other Federal and State agencies before jointly preparing the final PMP.
- The Corps will prepare a draft Feasibility Cost Sharing Agreement (FCSA) for review by Massport and Corps Headquarters.
- Corps Headquarters and North Atlantic Division approval of the PMP and FCSA will be secured.
- Execution of the FCSA by the Corps and Massport.
- Secure Corps and Massport funds to begin feasibility investigations.

Prior to initiating preparation of the PMP next month, I request that Massport provide a letter stating its intent to proceed with the cost-shared feasibility study and to provide the required 50 percent study cost-share. I anticipate initiating feasibility investigations in early 2001. If there are any questions or further information is required, please contact me at (978) 318-8220.

Sincerely,

Brian E. Osterndorf
Colonel, Corps of Engineers
District Engineer

Enclosures

CENAD-ET-P (CECW-PM/11 Aug 2000) 1st End Dr. Groh/ (718) 491-8724
SUBJECT: Boston Harbor, Massachusetts, Section 905(b) Analysis Fact Sheet

Commander, North Atlantic Division, Corps of Engineers, ATTN: CENAD-ET-P, FT. Hamilton Military Community, 301 General Lee Avenue 301, Brooklyn, New York 11252 18 August 2000

FOR Commander New England District, ATTN: CENAE-EP-P, 696 Virginia Road, Concord Massachusetts 01742-2751

1. The Section 905(b) Analysis for the Boston Harbor, Massachusetts has been approved. The Reconnaissance Phase will be certified upon HQUSACE review and approval of supplemental information which includes; the major feasibility phase assumptions, discussion of alternatives that will be considered, and estimate of the feasibility study cost and schedule. Please provide this supplemental data to HQUSACE with copy furnished NAD.

2. If you have any questions, please contact Dr. Groh at (718) 491-8724.

SAMUEL P. TOSI
Chief, Planning Division
Directorate of Engineering and Technical Services

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CECW-PM

11 AUG 2000

MEMORANDUM FOR COMMANDER, NORTH ATLANTIC DIVISION,
ATTN: CENAD-ET-P

SUBJECT: Boston Harbor, Massachusetts, Section 905(b) Analysis Fact Sheet

1. Reference CENAE-EP-P memorandum dated 28 July 2000, subject: Boston Harbor, Massachusetts, Navigation Improvement Study Expedited Reconnaissance Report, transmitting the Boston Harbor Section 905(b) Analysis Fact Sheet.

2. The Section 905(b) Analysis for Boston Harbor, Massachusetts is approved.

3. Pursuant to Planning Guidance Memorandum 99-01 -- Reconnaissance Phase Guidance, dated 3 March 1999, please provide supplemental information to HQUSACE describing the major feasibility phase assumptions that will provide the basis for the study, discussion of alternatives that will be considered, and estimate of the feasibility study cost and schedule. The reconnaissance phase will be certified upon receipt of HQUSACE review and approval of the supplemental information.

FOR THE COMMANDER:

JAMES F. JOHNSON
Chief, Planning and Policy Division
Office of Deputy Commanding General
for Civil Works

BOSTON HARBOR
MASSACHUSETTS

NAVIGATION IMPROVEMENT STUDY

FINAL FEASIBILITY REPORT
AND FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
AND MASSACHUSETTS
FINAL ENVIRONMENTAL IMPACT REPORT

APPENDIX B

PROJECT AUTHORIZATION
AND WORK HISTORY

THIS APPENDIX UPDATED JANUARY 2013

BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT STUDY

APPENDIX B
PROJECT AUTHORIZATION AND WORK HISTORY

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APPENDIX B
PROJECT AUTHORIZATION AND WORK HISTORY

Summary of Prior Reports and Improvements

The Port of Boston covers a wide geographical area and includes several distinct sections, most of which have been the subject of Corps studies and projects. Records concerning the Works of Preservation of Navigation for the harbor islands and adjacent headlands are also listed separately.

Separate records are provided for the Chelsea River, Mystic River, Island End River, Charles River and the Weir River (Nantasket Channel, Hull) to provide an easier reference for these projects and project features.

The original natural mouth of the Mystic River was located together with the mouth of the Charles River at the confluence bordered by the North End of Boston, Charlestown and East Boston. With the Deepening of the Port, the accepted "mouth" of the Mystic became viewed as being what is now known as the Inner Confluence at the head of the harbor between Chelsea and Charlestown. Accordingly, early authorizations and work for the improvement of harbor areas above the North End are also referenced to the Mystic River.

Early improvements to harbors such as Hingham Harbor, Weir River and Charles River were made under the Authority for Boston Harbor. At later times these projects were the subject of their own named authorizations. Where a duality was noted, applicable authorizations and work were included in both the Boston Harbor and other individual harbor records.

Records are provided in the tables included in this appendix under the following headings:

Boston Harbor – Main Ship Channels
Boston Harbor – Charles River Channel - Boston, Cambridge, Charlestown, Arlington
Boston Harbor – East Boston Channels – Jeffries Point & Governor's Island Channels
Boston Harbor – Fort Point Channel & South Bay – Boston and South Boston
Boston Harbor – Reserved Channel and Drydock Channel – South Boston
Boston Harbor – Seaplane Channels – East Boston
Boston Harbor – Works of Preservation - Seawalls on Harbor Islands & Headlands, Boston, South Boston, Hull & Winthrop
Chelsea River – East Boston, Chelsea & Revere
Island End River – Chelsea and Everett
Mystic River – Charlestown, Chelsea, Everett, Somerville and Medford
Weir River – Nantasket Channel, Hull

Reports have also been prepared for a number of projects and project segments in and around Boston Harbor that were never authorized and constructed, and therefore these projects are not included in this appendix. These reports include the following harbor areas:

Allerton Harbor – Hull (Hog Island Channel constructed for Coast Defense)
Belle Isle Inlet – East Boston and Winthrop – 1919
Boston Harbor Debris Studies – 1973 to 1979

Columbia Point Channel – Dorchester – 1980
Little Mystic Channel – Charlestown – 1911 & 1957
Pleasure Bay and Old Harbor – South Boston – 1942

There are also a number of projects around Boston Harbor that were studied, authorized and constructed under their own individual authorities. Records of these projects are not included in this appendix. These projects include:

Dorchester Bay and Neponset River – Boston, Quincy and Milton
Hingham Harbor – Hingham
Malden River – Malden and Everett
Weymouth Fore River – Weymouth, Quincy and Braintree
Weymouth Back River – Weymouth and Hingham
Winthrop Harbor – Winthrop

TABLE B-1
LIST OF PROJECT AUTHORIZATIONS

BOSTON HARBOR, MASSACHUSETTS, DEEP DRAFT CHANNELS
MAIN SHIPPING CHANNELS & ANCHORAGES
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction
River & Harbor Act of 2 March 1867	23-Foot MLW Channel, 685 Feet Wide through the Narrows and 1,000 Feet Wide in the Main Channel of the Upper Harbor, Removal of Tower and Corwin Rocks from the Narrows, and Seawalls at Point Allerton, Long Island Head and Gallops Island	July 1867 – June 1906
River & Harbor Act of 2 March 1867	Removal of Barrel Rock from the Approach to the Broad Sound South Channel to –22.5 Feet	July 1869 – Aug 1869
River & Harbor Act of 18 June 1878 20 Stat. 152, Ch. 264	Removal of the Man-of-War Shoal, at the Old Confluence of the Charles and Mystic Rivers to -23 Feet MLW over a 10-Acres	Aug 1878 – March 1880
River & Harbor Act of 3 March 1879	Removal of Anchorage Shoal and Bird Island Flats to Widen the 23-Foot Channel to 1,100 Feet, and also Increase the Width of the Channel through the Lower Middle Shoal to 600 Feet	Anchorage Shoal: Sept 1879 – June 1880 Lower Middle: June 1880 - ?
River & Harbor Act of 3 March 1879	Removal of the Shoal at the Mouth of the Mystic River Opposite the Navy Yard to -23 Feet MLW by 400 Feet Wide	Oct 1879 – June 1883 (to 375 Feet Wide)
Annual Report for 1883, Appendix B-4	Nubble Channel between Nixes Mate and the Head of Long Island, -12 Feet MLW by 200 Feet	Sept 1883 – Oct 1883
Annual Report for 1887, Appendix B-7	Increasing the Width of the Nubble Channel to 300 Feet, at -15 Feet MLW	Sept 1891 – Jan 1892
River & Harbor Act of 13 July 1892	A -27-Foot MLW by 1,000-Foot Wide Channel through the Narrows and up into the Upper Harbor to the Wharves at the North End of Boston	Dec 1892 – 1906 (Full Width Achieved Concurrent with 35-Foot Channel)
River & Harbor Act of 3 March 1899	New Entrance Channel through Broad Sound South Channel -30 Feet MLW by 1,200 Feet Wide	July 1900 – Oct 1905

River & Harbor Act of 13 June 1902	A 35-Foot 1500 Foot Wide Entrance Channel by the Broad Sound North Route and then 1,200 Feet Wide into the Inner Harbor up to the Pier Head Lines and First Bridges in the Charles, Mystic and Chelsea Rivers	April 1903 – 1915???
Annual Report for 1907, Appendix B-9, Page 907	The Lower Reaches of the Mystic River below the Chelsea Bridge were Incorporated into the Project for the Main Ship Channel of Boston Harbor as Authorized by the River & Harbor Act of 2 March 1907. Further Work on the 25-Foot Lower Mystic Channel Authorized by the River & Harbor Act of July 1902 Transferred to Boston Harbor Project	Modification – No Further Mystic River Work below Chelsea Bridge
Chief of Engineer's Special Authoriz'n., 11 March 1913	Elimination of the Removal of Finn's Ledge from the 35-Foot Broad Sound North Channel (Annual Report for 1913, Appendix B-9)	Abandonment of Unconstructed Feature
River & Harbor Act of 8 August 1917	Deepen the Southerly 900-Foot Width of the Broad Sound North Entrance Channel to -40 Feet MLW (-45 Feet in Rock) with an Outer Bend Easterly to Clear Finn's Ledge at a Width of 1,100 Feet	June 1926 – Aug 1930
River & Harbor Act of 30 August 1935 and National Industrial Recovery Act of 6 September 1933	Deepen a 600-Foot Width of the Main Ship Channel to -40 Feet MLW Up to Pier #1 in East Boston, along the South Channel Limit from President Roads to the Commonwealth Pier in South Boston, then along the North Limit up to Pier #1, and Providing an Anchorage at the North Side of President Roads, -40 Feet MLW, 2,000 Feet by 5,500 Feet	Anchorage: Oct 1933 – March 1937 Main Ship Channel: March 1936 – Jan 1941
River & Harbor Act of 30 August 1935	Deepen the US Navy Drydock #3 Approach Channel in South Boston to -40 from the Main Ship Channel to the US Harbor Line, with the Navy Funding the Remainder of the Channel Landward of the Harbor Line to the Drydock	January 1937 – August 1939
River & Harbor Act of 17 October 1940	Reserved Channel -30 Feet MLW 300 Feet Wide West from the 40-Foot Main Ship Channel to about 250 Feet Downstream of the L Street Bridge	June 1941 – Sept 1941
River & Harbor Act of 17 October 1940	Seaplane Channel to East Boston	Never Constructed
Act of 7 September 1944	Abandoned the Unconstructed Project for a Seaplane Channel to East Boston	Deauthorization

River & Harbor Act of 2 March 1945	Extension of the 40-Foot Main Ship Channel up-Harbor to Commonwealth Mystic Pier #1 in Charlestown	March 1951 – Oct 1951
River & Harbor Act of 24 July 1946	Expand the 40-Foot President Roads Anchorage by 100 Acres, 700 Feet North and 500 Feet West, Flared 45° to Join the 40-Foot Channel and Cut Off in the Northeast Corner for a Total of about 353 Acres, and a New -35-Foot MLW Anchorage West of President Roads Anchorage 800 Feet Wide by 5,000 Feet Long along the North Limit of the 35-Foot Main Ship Channel with Disposal East of Governor's Island to Enlarge the Airport.	Nov 1956 – May 1960
River & Harbor Act of 3 July 1958	Reserved Channel at -35 Feet MLW by 430 Feet Wide up to the L Street Bridge	May 1960 – Aug 1960
Water Resources Development Act of 31 October 1992, Section 116(2)	Deauthorizes the Portion of the 35-Foot Main Ship Channel Lane West of the 40-Foot Channel along the Charlestown Shore between the Inner Confluence and the 35-Foot Charles River Channel	Deauthorization
1 January 1990, Federal Register, Vol. 55, #194, 5 Oct 1990, Pg. 40906-40908	Deauthorizes the Uncompleted Portion of the 40-foot Main Ship Channel Deepening Project along the East Boston Shore below the Inner Confluence as Authorized by the River & Harbor Act of 2 March 1945	Deauthorization
Water Resources Development Act of 28 November 1990, Section 101(a)(13)	Reserved Channel: Deepen the Lower 3,160 LF of Channel to -40 Feet MLW 400 Feet Wide, a 40-Foot Turning Basin Including a Portion of the 35-Foot Main Ship Channel Lane and an Area between the Reserved Channel and Drydock Channel Inner Confluence: Deepen to -40 Feet, and Widen Approach along the East Boston Shore Mystic River: Deepen the Lower River Channel and Northern Half of the Upper Channel Area to 40 Feet Chelsea River: Deepen the Entire 35-Foot Channel to –38 Feet President Roads: Establish Limits for the 40-Foot 1,200 Foot Wide Channel to Enlarge the Available Anchorage by about 84 Acres	Mystic River: Aug 1998 – Feb 2000 Reserved Channel and Turning Area: Oct 1998 – Feb 2000 Chelsea River: Aug 1999 – Sept 2001 Inner Confluence: Mar 1999 – Feb 2000
Design Memorandum, 5 June 1996	Reserved Channel: Narrows the 40-Foot Lower Channel to 380 Feet to Permit Wider Berth at Conley Terminal	See Above

Water Resources Development Act of 25 September 1996, Section 364(12) & 364(16)	Reserved Channel: Deauthorizes a 54-Foot Wide Strip along the Southern Limit of the 40-Foot Channel for Berthing Chelsea Creek: Deauthorizes a Triangular Area on Chelsea Side Upstream of McArdle Bridge for berth Encroachment	Deauthorizations

BOSTON HARBOR - CHARLES RIVER CHANNEL
BOSTON, CHARLESTOWN, CAMBRIDGE AND ARLINGTON
MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction Dates
River & Harbor Act of 14 June 1880	7-Foot MLW Channel 200 Feet Wide up to Western Avenue, then a 6-Foot 100-Foot Wide Channel up to Market Street, and a 2-Foot MLW 75-Foot Wide Channel up to the Dam at Watertown	Nov 1880 – June 1884
Unknown	Unknown whether or Not this Project was Formally Abandoned with the Construction of the Charles River Dams. There is no record of Deauthorization.	

BOSTON HARBOR - EAST BOSTON CHANNEL
(JEFFRIES POINT & GOVERNORS ISLAND CHANNELS)
EAST BOSTON, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Note: These channels, while never deauthorized, were abandoned and partly filled for the construction of the State Piers at East Boston and the expansion of Logan Airport.

Authorization	Work Authorized & Constructed	Construction
River & Harbor Act of 19 September 1890	Channel –18 Feet MLW by 400 Feet Wide from the Grand Junction Wharves East to the Simpson Drydock, then –15 Feet by 250 Feet Wide to Deep Water East of Jeffries Point	FY 1892 – Nov 1893

BOSTON HARBOR - FORT POINT CHANNEL
BOSTON AND SOUTH BOSTON, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction Dates
River & Harbor Act of 5 August 1886	Channel -23 Feet MLW by 175 Feet Wide Extending 4,200 LF Upstream to the Mount Washington Avenue Bridge	Dec 1886 – Nov 1907
P.L. 84-34, 58 Stat. 728 13 May 1955	Declared Non-Navigable the Fort Point Channel and South Bay above Dorchester Avenue, Abandoning those Project Features	Abandonment
PL 91-624, 31 December 1970	Deauthorized the Channel above Summer Street to Dorchester Avenue	Deauthorization
PL 97-128 § 4(c), 29 December 1981	Deauthorized the Portion of the Channel Above Northern Avenue to Allow Replacement with a Fixed Span	Deauthorization

BOSTON HARBOR - RESERVED CHANNEL AND DRYDOCK CHANNEL
SOUTH BOSTON, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction
River & Harbor Act of 30 August 1935	Deepening the Approach to the US Navy Drydock #3 in South Boston to -40 from the Main Ship Channel to the Drydock	1941
River & Harbor Act of 17 October 1940	Reserved Channel -30 Feet MLW 300 Feet Wide West from the 40-Foot Main Ship Channel to about 250 Feet Downstream of the L Street Bridge	June 1941 - Sept 1941
River & Harbor Act of 3 July 1958	Deepen the Channel to -35 Feet MLW, Widened along Its Northern Limit to 430 Feet, to about 250 Feet Downstream from the L Street Bridge	May 1960 – Aug 1960
Water Resources Development Act of 28 November 1990, Section 101(a)(13)	Reserved Channel: Deepen the Lower 3,160 LF of Channel to -40 Feet MLW 400 Feet Wide, a 40-Foot Turning Basin Including a Portion of the 35-Foot Main Ship Channel Lane and an Area between the Reserved Channel and the Drydock Channel	Reserved Channel and Turning Area: Oct 1998 – Feb 2000

Water Resources Development Act of 1996, §364 (16)	Deauthorized a 54-Foot Wide Strip along the Southern Limit of the 40-Foot Channel to Widen Berths at the Conley Terminal	Deauthorization

BOSTON HARBOR - SEAPLANE CHANNELS
EAST BOSTON, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction
River & Harbor Act of 17 October 1940	Construction of a Seaplane Channel Extending about 17,500 LF Northwesterly from the President Roads Anchorage to a Basin at East Boston at 1,500 Feet Wide by -12 Feet MLW	Never Constructed
Act of 7 September 1944	Abandoned the Unconstructed Project for a Seaplane Channel to East Boston	Deauthorized

BOSTON HARBOR - BOSTON HARBOR WORKS OF PRESERVATION
(SEAWALLS ON HARBOR ISLANDS AND HEADLANDS)
BOSTON, SOUTH BOSTON, HULL AND WINTHROP, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed		Construction
2 March 1825 and 23 May 1828	Construction of Stone Seawalls at Deer Island		1827 - 1869
Act of 2 March 1825		Georges Island Seawalls	1827 – 1835
Act of 23 May 1828 Act of 2 July 1864 Act of 28 Feb 1865 Act of 12 June 1866		Deer Island Seawalls	1828 – 1830 Repaired 1869
Annual Report of the Chief of Engineers, 13 November 1832		Castle Island Seawall	1835
Act of 4 July 1836 Act of 7 July 1838		Rainsford Island Seawall	1836 – 1838 Repaired 1879
Act of 20 July 1848 Act of 2 July 1864 Act of 28 Feb 1865 Act of 12 June 1866		Lovell's Island Seawalls	

Act of 30 Aug 1852 Act of 28 Feb 1865 Act of 12 June 1866		Great Brewster Island Seawalls	1849 - 1869
River & Harbor Act of 2 March 1867	Construction of Stone Seawalls at Point Allerton, Long Island Head and Gallups Island		
		Gallops Island Seawall	1868, Repaired 1873-1874
		Long Island Head Seawall	Unknown
		Point Allerton Seawall	1871 – 1874

CHELSEA RIVER
EAST BOSTON, CHELSEA & REVERE, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction
River & Harbor Act of 3 June 1896	Channel -18 Feet MHW (-8.4 Feet MLW) by 150 Feet Wide (234,000 cy Estimated), above the Grand Junction Railroad Bridge to the Head of Navigation	Nov 1896 - 1907
River & Harbor Act of 25 July 1912	25-Foot MLW Channel in Chelsea Creek between the Meridian Street and Old East Boston Bridges (Lower River only)	July 1915 – April 1916
River & Harbor Act of 26 August 1937	Channel -30 Feet MLW by 200 Feet Wide, Widened in the Bends, from Boston Harbor Upstream to the Upper Oil Wharf at Revere	Oct 1938 - FY 1940 Sewer Lowered in 1946
River & Harbor Act of 23 October 1962	Channel -35 Feet MLW 225 to 250 Feet Wide below Chelsea Street Bridge and 250 to 430 Feet Wide above the Bridge, with a 35-Foot Turning/ Maneuvering Basin Upstream Limit at Revere 800 Feet Wide by 1,000 Feet Long. Remaining Upstream Portions of the 30-Foot Project of 1937 and the 8.4-Foot Project of 1896 were Deauthorized and Abandoned.	July 1965 – May 1966
Water Resources Development Act of 28 November 1990, Section 101(a)(13)	Deepen the Entire 35-Foot Channel and Turning Basin to –38 Feet MLW	April 1999 – Dec 2001

Water Resources Development Act of 25 September 1996, Section 364(12)	Deauthorizes a Triangular Area of the 38-Foot Channel on Chelsea Side Upstream of the McArdle Bridge	Deauthorization

ISLAND END RIVER, CHELSEA & EVERETT, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction
Chief of Engineers, 6 April 1981, under §107 of the River & Harbor Act of 14 July 1960	Channel, -6 Feet MLW by 100 Feet Wide, Extending about 2,500 LF from the Mystic River Channel to a Public Marina Site in Chelsea at the Head of the Island End River	September 1981 – April 1982
Water Resources Development Act of 9 November 2007, Section 3181	Deauthorizes a portion of the upper reach of the Channel alongside the Municipal Marina to Resolve an Encroachment Issue	Deauthorization

MYSTIC RIVER
CHARLESTOWN, CHELSEA, EVERETT, SOMERVILLE, MEDFORD, ARLINGTON & WATERTOWN, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Note: Prior to the 20th Century, the mouth of the Mystic River was at its confluence with the Charles River at the Head of Boston Harbor. As port improvements pushed deep water upstream the accepted mouth of the Mystic River became instead its confluence with the Chelsea River at today's Inner Confluence. Mystic River records through about 1907 include the lower reaches of the Mystic River above the mouth of the Charles River.

Authorization	Work Authorized & Constructed	Construction
River and Harbor Act of 13 July 1892	Channel -6 Feet MLW by 100 Feet Wide from the B&M Bridge Extending 6,300 LF Upriver to the Turn at the Somerville/Medford Line above Dunnings Wharf, then at -4 Feet MLW a Further 2 Miles, Diminishing in Width until 50 Feet at the Head of Navigation at Craddock Bridge at Medford	July 1895 – Nov 1906
River & Harbor Act of 3 March 1899	Channel -25 Feet MLW 300 Feet Wide 2,650 LF Upriver from Boston Harbor to the Chelsea Bridge and then 3,500 LF up to a Point 800 Feet above the Island End River	Jan 1900 -

Annual Report for 1907, Appendix B-9, Page 907	Incorporates the Lower Reaches of the Mystic River below the Chelsea Bridge into the -35-Foot MLW Main Ship Channel Project for Boston Harbor as Authorized by the River & Harbor Act of 2 March 1907	Modification
River & Harbor Act of 25 June 1910	Abandoning the 800 LF of the -25-Foot Channel above the Island End River, Deepen the Remaining Channel to -30 Feet MLW, and Widen the Channel at its Upper End in the Approach to the Mystic Wharf to 600 Feet	Nov 1910 –
River & Harbor Act of 30 August 1935 and the Emergency Relief Appropriations Act of 28 May 1935	A 2,800 LF Extension of the 30-Foot MLW Channel above Island End River Upriver to the Playground at Charlestown at -30 Feet MLW by 500 Feet Wide	Sept 1935 – Feb 1938
River & Harbor Act of 20 June 1938	Assuming Maintenance Responsibility and Improving a State Dredged Channel -20 Feet MLW 270 Feet Wide from the 30-Foot Channel 1,200 LF Upstream to the Malden Bridge, 75 Feet Wide through Span, and Widened above the Bridge for a Turning Basin 340 Feet Wide Ending about 800 Feet above the Malden Bridge	Oct 1939 – Jan 1940
River & Harbor Act of 17 May 1950	A 35-Foot MLW Channel from the 35-Foot Main Ship Channel in Boston Harbor up to the Malden Bridge, for a Width to within 100 Feet of the Bulkhead Lines on Both the North and South Shorelines, Narrowing in the Approach to the Malden Bridge	Jan 1956 - June 1958 (Except for the Upper Section along the Charlestown Shore, that Remained at 30 Feet)
Design Memorandum, 1 July 1955	35-Foot Channel Widths Specified as 940 Feet at Lower End, Widening to 1,060 Feet at about 1,200 LF below the Malden Bridge, then Narrowing to 150 Feet Wide at the Malden Bridge	See above
Water Resources Development Act of 28 November 1990, Section 101(a)(13)	Mystic River: Deepen the Lower River Channel and Northern Half of the Upper Channel Area to 40 Feet	Mystic River: Aug 1998 – Feb 2000
Water Resources Development Act of 12 October 1996,	Deauthorizes a 40-Foot Wide Strip 1000 Feet Long along the Northern Limit of the 35-Foot Channel (Authorized by Section 101 of the	Deauthorization

P.L. 104-303, Section 364(15)	River and Harbor Act of 1950, 64 Stat. 164), in Order to Permit Berthing of Larger Vessels at Facilities in Everett	
Water Resources Development Act of 9 November 2007, Section 3181	Realigns and Narrows a Portion of the Upper 4-Foot Channel to Resolve a Marina Encroachment Issue	Deauthorization and Realignment

WEIR RIVER, HULL, MASSACHUSETTS
LIST OF AUTHORIZATIONS

Authorization	Work Authorized & Constructed	Construction
River & Harbor Act of 14 June 1880	Channel -9½ Feet MLW by 100 Feet Wide to the Pier at Nantasket Beach	Dec 1880 – Sept 1882
Annual Report of 1890, Page 497	Widening the Channel in a Key Turn to 250 Feet	May 1890 – June 1890
River & Harbor Act of 19 September 1890	Widen the -9½ Foot MLW Channel to 150 Feet Wide	March 1891 – April 1891 Ledge - Nov 1894
Chief of Engineers 25 July 1892, Annual Report of 1893, Page 763	Channel -12 Feet MLW by 150 Feet Wide to Nantasket Pier	June 1893 – Nov 1894

TABLE B-2
PROJECT CONSTRUCTION AND MAINTENANCE HISTORY

BOSTON HARBOR, DEEP DRAFT CHANNELS
MAIN SHIPPING CHANNELS & ANCHORAGES
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
July 1867 – Fall 1869	Improvement Dredging of the 23-Foot Narrows Channel at Reduced Width of 625 Feet and Reduced Depth of –21.5 Feet	159,809 cy 47,294
July 1867 – Sept 1867	Removal of Tower Rock from Narrows Channel Approach off Hull to –23 Feet MLW	150 Tons Ledge

Oct 1867 – Dec 1968 and June 1869	Removal of Corwins Rock from Narrows to –23 Feet MLW	1,356 Tons Ledge (609 cy)
FY 1869	Improvement Dredging with Experimental Plant of the 23-Foot Channel at Middle Ground	450 cy Hardpan
July 1869 – Aug 1869	Removal of Barrel Rock from the Approach to the Broad Sound South Channel to –22.5 Feet	225 Tons Rock
Aug 1869 – Dec 1870	Removal of Kelly's Ledge from Narrows Approach	509 Tons Ledge
July 1870 - June 1871	Continue Improvement Dredging of the 23-Foot Harbor Channel at Upper Middle Ground	26,120 cy Yellow Hard Pan
Dec 1871 – June 1872	Continue Improvement Dredging of the 23-Foot Harbor Channel at Upper Middle Ground	20,305 cy
November 1872	Removal of a Large Boulder from Upper Middle Shoal	6 cy Boulder
May 1873 – June 1873	Removal of Wreck of Schooner *Delos* from Nantasket Roads	Wreck Removal
June 1873 – July 1873	Continue Removal of Kelly's Rock from the Narrows Channel	118 Tons Ledge
April 1874 – July 1876	Continue Improvement Dredging of the 23-Foot Harbor Channel at Upper Middle Ground	90,860 cy
Aug 1874 – Sept 1874	Removal of the Ledge Southwest of Bug Light from the Narrows Approach	16 cy Ledge
Sept 1874 – June 1875	Removal of State Rock and Palmyra Rock from the Lower Middle Ground Bar to –23 Feet	62 cy Rock
Oct 1874 – Sept 1875	Continue Improvement Dredging of the 23-Foot Narrows Channel at Lovells Island and Great Brewster Spit	60,284 cy
Oct 1874 – Dec 1875	Continue Improvement Dredging of the 23-Foot Harbor Channel at the Upper Middle Ground	42,844 cy
May 1875 – Sept 1875	Continue Removal of Kelly's Rock from the 23-Foot Narrows Channel	80 cy Ledge
September 1875	Removal of another Ledge from the Narrows East of Georges Island	16 cy Ledge
May 1876 – Nov 1876	Continue Improvement Dredging of the 23-Foot Harbor Channel at the Upper Middle Ground	88,150 cy

FY 1876 – Sept 1876	Removal of Nash's Rock from the Narrows Channel to –21 Feet	200 cy Ledge Estimated
June 1876 – Nov 1876	Removal of Ledge from Dredged Area in Narrows at Great Brewster Spit	96 cy Ledge
July 1876 – August 1876	Removal of Ledge from Dredged Area in 23-Foot Upper Middle Bar Channel	37 cy Ledge
June 1877 – Sept 1877	Continue Improvement Dredging of the 23-Foot Narrows Channel at Lovells Island	29,134 cy
June 1877 – Dec 1877	Partial Removal of Additional Ledges from the Narrows Channel near Kelly's Rock	76 cy Ledge
April 1878 – Aug 1878	Removal of Ledges from the Upper Middle Shoal to –23 Feet	82 cy Ledge
Sept 1877 – Nov 1877	Continue Removal of Nash's Rock from the Narrows Channel to –21 Feet	320 Tons Ledge and Boulders
Aug 1878 – March 1880	Improvement Dredging to Remove the Man-of-War Shoal at the Mystic-Charles Confluence to –23 Feet	85,917 cy
Aug 1878 – June 1879	Partial Removal of Additional Ledges from the Narrows Channel near Kelly's Rock	132 cy Ledge
August 1878	Complete the Removal of Nash's Rock from the Narrows Channel to –21 Feet	45 Tons Ledge and Boulders
July 1879 – Nov 1879	Complete Removal of Kelly's Rock from the Narrows to –23 Feet MLW	146 cy Ledge
Sept 1879 – June 1880	Improvement Dredging of Anchorage Shoal to Widen the 23-Foot Upper Harbor to 1,100 Feet	21,054 cy
June 1880 – Aug 1880	Improvement Dredging to Widen the 23-Foot Lower Middle Channel to 600 Feet	5,007 cy Hardpan
Oct 1879 – March 1880	Begin Improvement Dredging to Remove the Shoal at the Mouth of the Mystic River Opposite the Navy Yard to -23 Feet MLW	47,953 cy
Nov 1880 – June 1881	Continue Improvement Dredging of the Shoal at the Mouth of the Mystic River -23 Feet	48,343 cy
Aug 1880 – April 1883	Continue Improvement Dredging of Anchorage Shoal to Widen the 23-Foot Upper Harbor	155,243 cy
Dec 1881 – June 1883	Continue Improvement Dredging of the Shoal at the Mouth of the Mystic River -23 Feet	82,020 cy

Sept 1883 – Oct 1883	Improvement Dredging of the 12-Foot Nixes Mate Channel	19,900 cy
Sept 1883 – Nov 1883	Improvement Dredging to Remove a Spur Shoal off Castle Island to Widen the 23-Foot Channel	31,950 cy Plus 20 Tons Ledge
Oct 1887 – June 1888	Continue Improvement Dredging of the 23-Foot Channel at the Lower Middle Shoal	65,576 cy
Oct 1887 – June 1888	Continue Improvement Dredging of the 23-Foot Channel at the Narrows	3,430 cy
July 1888 – May 1889	Removal of Ledge from the 23-Foot Channel at the Lower Middle Shoal to Complete the 1,000 Foot Width	375 cy Rock
Dec 1888 – May 1889	Continue Improvement Dredging of the 23-Foot Channel at the Upper and Lower Middle Shoal	146,556 cy
August 1889	Continue Improvement Dredging of the 23-Foot Channel at the Upper Middle Shoal	5,942 cy
April 1890 – June 1890	Continue Improvement Dredging of the 23-Foot Channel at the Upper Middle Shoal	111 cy Ledge
June 1891 – July 1891	Continue Improvement Dredging to Widen the 23-Foot Channel in the Narrows at Great Brewster Spit to 625 Feet	28,510 cy
Sept 1891 – Jan 1892	Improvement Dredging of the 15-Foot Nubble (Nixes Mate) Channel	7,674 cy
FY 1892	Improvement Dredging of the 18-Foot and 15-Foot Jeffries Point Channel	139,962 cy
April 1892 – Nov 1892	Continue Improvement Dredging of the 23-Foot Channel at the Upper Middle Shoal	211,992 cy
Dec 1892 – April 1895	Begin Improvement Dredging of the 27-Foot Narrows Channel along Lovells Island	580,048 cy Plus 31 cy Boulders & 9,000 cy Ledge
April 1895 – Sept 1895	Continue Improvement Dredging of the 27-Foot Narrows Channel along Lovells Island to a Minimum Width of 550 Feet	149,479 cy
May 1895 – Nov 1897	Begin Improvement of the 27-Foot Channel at the Lower Middle Ground and Elsewhere in the Main Channel by Removal of Ledge	6,721 cy Ledge

Oct 1897 – June 1899	Continue Improvement Dredging to Widen the 27-Foot Narrows Channel to 1,000 Feet	1,150,703 cy
July 1899 – Dec 1902	Improvement Dredging of the 27-Foot Channel from President Roads to Boston through the Upper and Lower Middles and Shoals	1,830,653 cy Plus 159 cy Boulders & 3,505 cy Rock
July 1900 – May 1904	Begin Improvement Dredging of the 30-Foot Broad Sound South Entrance Channel	888,957 cy Plus 166 cy Boulders
Oct 1902 – May 1906	Continue Ledge Removal from the 27-Foot Narrows Channel	19,008 cy Ledge (in-place)
December 1902	Removal of a Ledge from President Roads Channel to –30 Feet MLW	21 cy Ledge
April 1903 – Jan 1912	Begin Improvement Dredging of the 35-Foot Main Ship Channel at 600 Feet Wide	7,478,102 cy Plus 19 cy Boulders
Sept 1903 – Nov 1903	Maintenance Dredging of the 27-Foot Narrows Channel	23,147 cy
Sept 1903 – Nov 1910	Improvement Dredging of the 35-Foot Broad Sound North Entrance Channel at 600 Feet	2,101,912 cy Plus 116 cy Boulders
Nov 1903 – Fall 1904	Continue Ledge Removal from the 27-Foot Narrows Channel	223 cy Ledge (in-place)
FY 1904 – March 1906	Continue Ledge Removal from the 27-Foot Lower Main Harbor Channel	2,066 cy Ledge (in-place)
Aug 1904 – Oct 1905	Continue and Complete Improvement Dredging and Ledge Removal from the 30-Foot Broad Sound South Entrance Channel	76,427 cy Plus 156 cy Ledge and 15 cy Boulders
August 1904 – Dec 1904	Maintenance Dredging of the 27-Foot Narrows Channel by Contract	26,600 cy
Jan 1905 – April 1905	Maintenance Dredging of the 27-Foot Narrows Channel by US Hydraulic Dredge Gillespie	46,841 cy
July 1905 – Aug 1908	Removal of Ledge from the 35-Foot Channel off Governors Island (also Completes the 27-Foot Upper Main Ship Channel)	1,338 cy Ledge above –27 Feet & 15,217 cy below 27 Feet (in-place)
Nov 1906 – Jan 1907	Complete Ledge Removal from the 27-Foot Lower Main Ship (Narrows) Channel	25 cy Ledge
Aug 1907 – Aug 1909	Removal of Ledge from the 35-Foot Main Ship Channel in the Lower Harbor	15,200 cy Ledge (in-place)

Annual Report for 1907, Appendix B-9, Page 907	The Lower Reaches of the Mystic River below the Chelsea Bridge were Incorporated into the Project for the Main Ship Channel of Boston Harbor as Authorized by the River & Harbor Act of 2 March 1907	Modification – No Further Mystic River Work below Chelsea Bridge
Nov 1907 – June 1908	Continued Improvement Dredging of the 25-Foot Channel in the Mystic River Mouth below the Chelsea Bridge. Further Work in the Reach Accomplished under the 35-Foot Project	38,732 cy
Oct 1907 – Jan 1912	Improvement Dredging to Widen the 35-Foot Channel to its 1,500 and 1,200 Foot Widths (Divisions 5, 6, 7 & 8 - MSC, and 5a, 6a, 7a & 8a - BSNC)	MSC: 9,169,600 cy Plus 5 cy Boulders BSNEC: 2,625,190 cy Plus 234 cy Boulders
March 1910 – April 1910	Continued Improvement Dredging of the 25-Foot Channel in the Mystic River Mouth below the Chelsea Bridge	24,942 cy
FY 1911	Continued Improvement Dredging of the 25-Foot Channel in the Mystic River Mouth below the Chelsea Bridge	55,853 cy
FY 1911	Removal of 20 Small Ledge Pinnacles from the Upper 35-Foot Main Ship Channel	Unknown
July 1911 - Aug 1911	Shoal in the Old Dump Ground in Broad Sound was Removed to a Depth of -45 Feet MLW	140,000 cy
July 1911 – March 1915	Continue Removal of Ledge from the 35-Foot Main Ship Channel in the Lower Harbor and Inner End of the 35-Foot Broad Sound North Entrance Channel	110,601 cy Ledge
April 1913 – June 1913	Maintenance Dredging of the 35-Foot Broad Sound North Entrance Channel by U.S. Hopper Dredge *Atlantic*	189,744 cy
July 1913 – Dec 1913	Maintenance Dredging of the 30-Foot Broad Sound South Entrance Channel and 35-Foot Broad Sound North Entrance Channel by U.S. Hopper Dredge *Atlantic*	358,839 cy
March 1915	Removal of Ledge from the 35-Foot Inner Confluence	800 cy Ledge
May 1915 – July 1917	Maintenance Dredging of the 35-Foot Main Ship Channel	901,353 cy

May 1915 – July 1917	Maintenance Dredging of the 35-Foot Broad Sound North Entrance Channel	141,162 cy
May 1916 – June 1916	Maintenance Dredging of the 15-Foot Nubble or Nixes Mate Channel	19,494 cy
June 1926 – Oct 1929	Begin Improvement Dredging of the 40-Foot Broad Sound North Entrance Channel Lane	826,773 cy
July 1930 – Aug 1930	Continue and Complete Improvement Dredging of the 40-Foot Broad Sound North Entrance Channel Lane	21,832 cy Plus 39 cy Boulders
March 1933 – Jan 1934	Maintenance Dredging of the 35-Foot Main Ship Channel	714,546 cy
Oct 1933 – April 1935	Improvement Dredging of the 40-Foot President Roads Anchorage	2,853,342 cy Plus 5 cy Boulders
March 1936 – Jan 1937	Begin Improvement Dredging of the 40-Foot Main Ship Channel as Far as South Boston Pier #6 (Commonwealth Pier)	1,714,698 cy
January 1937	Improvement Dredging of the 40-Foot Navy Drydock #3 Channel in South Boston	39,700 cy Estimated
Oct 1936 – March 1937	Improvement Dredging of the Northwest Corner of the 40-Foot President Roads Anchorage	249,529 cy
Feb 1938 – Aug 1939	Improvement - Removal of Ledge from the 40-Foot Navy Drydock #3 Channel in South Boston	6,800 cy Ledge Estimated
Feb 1938 – Aug 1939	Improvement - Removal of Ledge from the Lower 40-Foot Main Ship Channel up to South Boston	61,778 cy Plus 44,171 cy Ledge
Jan 1939 – July 1940	Improvement Dredging of the 40-Foot Main Ship Channel Reach from Commonwealth Pier up to East Boston Pier #1	778,620 cy
Dec 1939 – Jan 1940	Maintenance Dredging of the 40-Foot Main Ship Channel by U.S. Hopper Dredge *Marshall*	52,533 cy
Sept 1939 – Jan 1941	Improvement Dredging and Ledge Removal from the 40-Foot Main Ship Channel above the Drydock to South Boston Commonwealth Pier	35,643 cy Plus 31,757 cy Ledge 43,281 cy Plus 37,165 cy Ledge
June 1941 – Sept 1941	Initiate and Complete Improvement Dredging of the 30-Foot Reserved Channel	152,163 cy

May 1946 – June 1946	Improvement Dredging of the 30-Foot Channel over the Sewer Siphon below Chelsea Street Br.	7,359 cy
Nov 1950 – Dec 1950	Miscellaneous Debris Removal and Minor Associated Maintenance Dredging from the 30-Foot Reserved Channel	Unknown
March 1951 – Oct 1951	Improvement Dredging of the 40-Foot Main Ship Channel Extension up to Mystic Pier #1 in Charlestown	913,073 cy
July 1951 – Oct 1951	Maintenance Dredging of the 35-Foot Sections of the Main Ship Channel	153,020 cy
Nov 1951 – Feb 1952	Maintenance Dredging of the 23-Foot Fort Point Channel to Reduced Depth of –21 Feet	12,450 cy
May 1952 – Aug 1952	Maintenance Dredging of the 30-Foot Reserved Channel	48,182 cy
July 1956	Maintenance Dredging of the 35-Foot Channel in the Inner Confluence to Connect with the New 35-Foot Mystic River Channel by U.S. Hopper Dredge *Comber*	65,871 cy
Nov 1956 – Oct 1958	Improvement Dredging to Extend the 40-Foot President Roads Anchorage North and West and Dredging the 35-Foot Middle Ground Anchorage to the West	4,382,016 cy
Oct 1959 – May 1960	Continue Improvement Dredging to Extend the 40-Foot President Roads Anchorage North and West and Dredging the 35-Foot Middle Ground Anchorage	682,400 cy
May 1960 – Aug 1960	Improvement Dredging of 35-Foot by 430 Foot Wide Reserved Channel	335,000 cy
Feb 1963 – Aug 1963	Maintenance Dredging of the 40-Foot President Roads Anchorage	750,051 cy
August 1963	Maintenance Dredging of a Small Shoal from the 35-Foot Reserved Channel	200 cy
May 1965 – Nov 1965	Maintenance Dredging of the 40-Foot Main Ship Channel Lanes	867,000 cy
April 1966 – June 1966	Maintenance Dredging of the 35-Foot Turning Basin at the Mystic River (Inner Confluence)	92,900 cy
March 1967 – Sept 1967	Maintenance Dredging of the 35-Foot Main Ship Channel Lanes	801,850 cy

June 1968 – FY 1969	Maintenance Dredging of the 40-Foot Broad Sound North Entrance Channel and the 40-Foot Main Ship Channel	300,043 cy Plus 7,250 cy Hard Material
August 1973	Removal of an Isolated Rock Pinnacle from the 40-Foot Main Ship Channel	Unknown ("Several Hundred cy")
July 1973 – Sept 1973	Removal of Sunken Barge from Harbor	Wreck Removal
June 1982 – March 1983	Maintenance Dredging of the 40-Foot President Roads Anchorage	441,000 cy
June 1982 – Sept 1982	Maintenance Dredging of the 35-Foot Mystic River Channel	308,000 cy
June 1982 – March 1983 June 1984 – July 1984	Maintenance Dredging of the 35-Foot Chelsea River Channel	126,586 cy
FY 1985	Removal of the Sunken Wreck of the *Rose Anna* from the Harbor Area off Jeffries Point	Wreck Removal
Aug 1998 – Aug 1999	CAD Cell Excavation in the Mystic and Chelsea Rivers	1,369,000 cy
Aug 1998 – Dec 1998 and May 1999 Maintenance Sept 1998 – Feb 2000 Improvement	Maintenance and Improvement Dredging for the 40-Foot Lower Mystic River Channel Deepening with Maintenance Dredging to Overlying 35-Foot Depth	Maintenance: 269,743 cy Improvement: 337,861 cy Rock: 24,378 cy
Oct 1998 – Jan 1999 Maintenance May 1999 – Feb 2000 Improvement	Maintenance and Improvement Dredging and Ledge Removal for the 40-Foot Reserved Channel and Turning Basin Deepening with Maintenance Dredging to Overlying 35-Foot Depth and Limited Maintenance Dredging of Adjacent Areas of the Main Ship Channel	Maintenance: 213,680 cy Improvement: 237,978 cy Rock: 15,670 cy
Nov 1998 – Sept 2000	Capping of Mystic River CAD Cells using Sand Dredged from Cape Cod Canal Maintenance	162,200 cy Deposited
Aug 1999 – Jan 2000 Maintenance Feb 2000 – April 2000 Improvement	Maintenance and Improvement Dredging for the 38-Foot Chelsea River Channel Deepening with Maintenance Dredging to Overlying 35-Foot Depth	Maintenance: 218,413 cy Improvement: 176,571 cy Rock: 6,000 cy
1999	Removal of §8 MWRA Water Tunnel from beneath the Chelsea River Channel	N/A

March 1999 and Aug 1999 – Dec 1999 Maintenance Sept 1999 - Feb 2000 Improvement	Maintenance and Improvement Dredging and CAD Cells Excavation for the 40-Foot Inner Confluence Deepening with Maintenance Dredging to Overlying 35-Foot Depth	Maintenance: 148,239 cy Improvement: 193,603 cy Rock: 12,420 cy
June 2001 – Sept 2001	Ledge Removal for 38-Foot Chelsea Creek Deepening at 3 Areas in the Upper Channel and Turning Basin	6,700 cy Plus 6,000 cy Rock
June 2001 – Dec 2001	Improvement Dredging over the MWRA Water Tunnel in Chelsea River, Removal of Portions of the Water Tunnel, Removal of Damaged Electrical Cable & Improvement Dredging Near the McArdle Bridge, and Dredging Small Shoal Areas in the Mystic River	N/A Mystic River Quantity Unknown
September 2001 – December 2001	Maintenance and Improvement Dredging to 38 Feet beneath the A.P. McArdle Bridge	2,735 cy + an Unknown Quantity for FY02
March 2003	Filling of Bridge Utility Trench beside the McArdle Bridge	Backfill Quantity Unknown
August 2004 – June 2005	Maintenance Dredging of the 40-Foot President Roads Anchorage Area to –41 Feet	989,000 cy 1,166,447 cy Pay
September 2004 – June 2005	Maintenance Dredging of the 40-Foot Lanes of the Broad Sound North Entrance Channel to –41 Feet	60,000 cy 74,178 cy Pay
September 2004	Removal of Three Large Boulders from the Broad Sound North Entrance Channel	Quantity Unknown
May 2005	Removal of a Sunken Steel Barge from the Broad Sound North Entrance Channel	Wreck Removal
October 2004 – June 2005	Maintenance Dredging of the 40-Foot and 35-Foot Lanes of the Main Ship Channel Reaches from President Roads up to Spectacle Island Turn	40-Foot Channel: 39,240 cy 35-Foot Channel: 18,480
October 2007 – December 2007	Removal of Ledge Pinnacles from Three Areas: (1) Western Side of the President Roads Anchorage, (2) Main Ship Channel at the 35/40-Foot Lanes Slope Transition between Castle and Spectacle Islands, (3) Broad Sound North Entrance Channel	PRA: 1,029 CY MSC: 235 CY BSNEC: 42 CY BSNEC Not yet Completed

June 2008 – August 2008	Resumed Removal of Ledge Pinnacles from the North Entrance Channel and President Roads Anchorage Area (Total 2035 CY Removed under the Contract from All Areas)	729 CY Rock
April 2008	Dredging of a CAD Cell in the Lower Mystic River beneath the 40-Foot Channel	322,970 cy
April 2008	Dredging of a CAD Cell beneath the 40-Foot Upper Main Ship Channel below the Inner Confluence	393,330 cy
May 2008 – December 2008	Maintenance Dredging of the 35 and 40-Foot Main Ship Channel Lanes between Spectacle Island and the Ted Williams Tunnel, including the Reserved Channel Turning Area	319,800 CY including 156,925 CY to CAD Cell and 162,955 to MBDS CAD Cells Capped with Sand from CCC
May 2008 – December 2008	Maintenance Dredging of the 40-Foot Navy Drydock Approach Channel – CAD Disposal	
May 2008 – December 2008	Maintenance Dredging of the 35-Foot Upper Reach of the Reserved Channel	
May 2008 – December 2008	Maintenance and Improvement Dredging to -38 Feet in the Chelsea River in the Area of the Keyspan Gas Siphon and beneath the Chelsea Street Bridge, and Removal of the Old Gas Siphon, all to Complete the 1990 Project	7,973 CY
May 2008 – December 2008	Removal of the Wreck of a Small Craft from the Chelsea River Channel between the Bridges	Wreck Removal
August 2012 - October 2012	Removal of Rock Pinnacles from 7 Areas of the 40-Foot Main Ship Channel between Spectacle Island and Castle Island	416 CY Rock

BOSTON HARBOR - CHARLES RIVER CHANNEL
BOSTON, CAMBRIDGE, CHARLESTOWN AND ARLINGTON
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
Nov 1880 – Oct 1881	Improvement Dredging of the 7-Foot Channel up to Western Avenue	62,999 cy
June 1883 – June 1884	Improvement Dredging of the 6-Foot Channel above Western Avenue to Arsenal Street at 80 Feet Wide, 100 Feet in Bends	57,623 cy

BOSTON HARBOR - EAST BOSTON CHANNEL
EAST BOSTON (JEFFRIES POINT & GOVERNORS ISLAND CHANNELS)
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Note: These channels, while never deauthorized, were abandoned and partially filled for the construction of the State Piers at East Boston and the expansion of Logan Airport.

Work Dates	Work Accomplished	Quantities
FY 1892	Improvement Dredging of the Jeffries Point Channel -18 Feet MLW by 275 Feet Wide from the Grand Trunk Wharf to Simpson's Dry Docks, then Narrowing to 250 Feet at -15 Feet to East of Jeffries Point	139,962 cy
Oct 1892 – Nov 1892	Improvement Dredging to Widen the 18-Foot Channel Reach	20,697 cy
Sept 1893 – Nov 1893	Continue Improvement Dredging to Widen the 18-Foot Channel Reach to 400 Feet	39,196 cy

BOSTON HARBOR - FORT POINT CHANNEL
BOSTON AND SOUTH BOSTON
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
Dec 1886 – April 1887	Improvement Dredging of the 23-Foot MLW Channel below Congress Street	94,211 cy
FY 1907 – Nov 1907	Continue Improvement Dredging of the 23-Foot Channel up to Federal Street	157,940 cy
FY 1909 – FY 1910	Improvement Dredging to Widen the 23-Foot Channel through the Area of the Recently Removed Mt. Washington Street Bridge	17,457 cy
Nov 1951 – Feb 1952	Maintenance Dredging of the 23-Foot Fort Point Channel to Reduced Depth of –21 Feet	12,450 cy

BOSTON HARBOR - RESERVED CHANNEL, SOUTH BOSTON
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
1918 - 1919	U.S. Army Quartermaster Department Dredged the Access and Berths at the New Army Base to –30 and –35 Feet MLW	Unknown – Not a Civil Works Project
June 1941 – Sept 1941	Initiate and Complete Improvement Dredging of the 30-Foot by 300-Foot Wide Reserved Channel below L Street	152,163 cy
Nov 1950 – Dec 1950	Miscellaneous Debris Removal and Minor Associated Maintenance Dredging from the 30-Foot Reserved Channel	Unknown
May 1952 – Aug 1952	Maintenance Dredging of the 30-Foot Reserved Channel	48,182 cy
May 1960 – Aug 1960	Improvement Dredging of 35-Foot by 430 Foot Wide Reserved Channel	335,000 cy
August 1963	Maintenance Dredging of a Small Shoal from the 35-Foot Reserved Channel	200 cy
Oct 1998 – Jan 1999 Maintenance May 1999 – Feb 2000 Improvement	Maintenance and Improvement Dredging and Ledge Removal for the 40-Foot Reserved Channel and Turning Basin Deepening with Maintenance Dredging to Overlying 35-Foot Depth and Limited Maintenance Dredging of Adjacent Areas of the Main Ship Channel	Maintenance: 213,680 cy Improvement: 237,978 cy Rock: 15,670 cy
May 2008 – December 2008	Maintenance Dredging of the 35-Foot Upper Reach of the Reserved Channel	See Main Channels

BOSTON HARBOR - BOSTON HARBOR WORKS OF PRESERVATION (SEAWALLS ON HARBOR ISLANDS AND HEADLANDS) BOSTON, SOUTH BOSTON, HULL AND WINTHROP
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
1825 – 1827	Begin Construction of Georges Island Seawalls	Unknown
1828 - 1830	Begin Construction of Deer Island Seawalls	Unknown
1829	Continued Work on Georges Island Seawall	Unknown

1831	Repairs to Seawalls at Deer Island	Unknown
1831 - 1832	Completion of Georges Island Seawall	Unknown
1832 - 1834	Continued and Completed Construction of the Deer Island Seawall	Unknown
1833 - 1834	Begin Construction of Castle Island Seawall	2,342 CY Stone
1836 - 1837	Begin Construction of Rainsford Island Seawall at 1,537 LF, 7 to 12 Feet High, 7 Feet Thick	Unknown
1843	Lovell Island Seawall - +22.5 Feet MLW Top Elevation.	Unknown
Summer 1849 – Fall 1850	Great Brewster Island: Stone Seawall +24 Feet MLW Elevation, 18 Feet High, in Two Section – North Head 375 LF, South Head 342 LF	Unknown
May 1851	Great Brewster Island: Repairs to Stone Seawall and 50 LF Stone Jetty built at South Head Wall	Unknown
1853 - 1854	Great Brewster Island: Extend the North Head Wall 640 LF	Unknown
1864 – June 1865	Great Brewster Island: Extend the South Head Wall 145 LF	Unknown
July 1865 – March 1866	Great Brewster Island: Extend the South Head Wall to +24 Feet MLW for 260 LF	Unknown
FY 1865 – Nov 1865	Deer Island: Repairs and Rebuilding the North Seawall	Unknown
Aug 1866 – June 1867	Deer Island: Repairs and Rebuilding 340 LF of the Middle Seawall + 200 LF	Unknown
FY 1868	Deer Island: Repairs and Rebuilding 420 LF of the South Seawall and 206 LF of the North Seawall	Unknown
Aug 1866 – June 1867 -	Great Brewster Island: Extend the North Head Wall 550 LF	Unknown
FY 1868	Gallups Island Seawall: Stone and Materials Delivered in FY 1868	Unknown
	Lovells Island Seawall: Stone Delivered in FY 1868	Unknown
1992	Point Allerton Seawall Repairs	Unknown

CHELSEA RIVER
EAST BOSTON, CHELSEA & REVERE
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
Nov 1896 – March 1897	Improvement Dredging of the –18-Foot MHW (-8.4 Feet MLW) Channel to Head of Navigation in Revere	21,000 cy
June 1902 – FY 1903	Continue Improvement Dredging of the –18-Foot MHW (-8.4 Feet MLW) Channel	17,987 cy
Summer 1906 – FY 1907	Continue Improvement Dredging of the –18-Foot MHW (-8.4 Feet MLW) Channel	195,091 cy Plus 4 cy Boulders
Aug 1915 – Oct 1915	Maintenance Dredging of the 8.4 Foot MLW Channel in the Upper Reaches	95,021 cy
July 1915 – April 1916	Initiate and Complete Improvement Dredging of the 25-Foot MLW Channel	227,840 cy
Oct 1938 – Dec 1939	Improvement Dredging of the 30-Foot MLW Channel	944,343 cy Plus 75 cy Boulders
May 1946 – June 1946	Removal of Sewer Siphon and Improvement Dredging of Siphon Area below Bridge	7,359 cy
Sept 1951 – Nov 1951	Maintenance Dredging of the 30-Foot MLW Channel and Removal of Dolphins and Concrete Pipeline	25,615 cy
April 1953 – July 1953	Maintenance Dredging of the 30-Foot MLW Channel	98,076 cy
Nov 1960 – June 1961	Removal of the Grand Junction Railroad Bridge	Bridge Removal
Feb 1961 – Oct 1961	Replacement of the Timber Fender System for the Chelsea Street Bridge by the City of Boston to Give a Horizontal Clearance of 96 Feet	Fender Replacement
July 1961 – Aug 1961	Maintenance Dredging of the 30-Foot MLW Channel between the Chelsea Street Fenders	5,924 cy
July 1965 – May 1966	Improvement Dredging of the 35-Foot Chelsea Creek Channel	1,425,000 cy
June 1982 – March 1983	Maintenance Dredging of the 35-Foot Chelsea River Channel	126,586 cy
June 1984 – July 1984	Maintenance Dredging of the 35-Foot Chelsea River Channel	25,000 cy Est.

April 1999 - May 2000	Maintenance and Improvement Dredging to Deepen the Channel and Turning Basin to -38 Feet MLW	218,413 cy O&M Plus 176,571 cy Improvement
June 2001 – Sept 2001	Removal of Ledge and Overburden from the Upper 38-Foot Channel along the East Boston Side below the Turning Basin	6,700 cy Plus 6,000 cy Rock
September 2001	Maintenance Dredging to 35 Feet beneath the McArdle Bridge	2,735 cy
September 2001 – December 2001	Improvement Dredging to 38 Feet beneath the McArdle Bridge at MWRA Water Line	Unknown
FY 2002	Replacement of Power Cable at McArdle Bridge Snagged and Cut by Dredge	Cable Replacement
March 2003	Filling of Bridge Utility Trench beneath the McArdle Bridge	Backfill
May 2008 – December 2008	Maintenance and Improvement Dredging to 38 Feet in the Area of the Keyspan Gas Siphon and beneath the Chelsea Street Bridge with Disposal in the Chelsea CAD Cell, and Removal of the Old Gas Siphon as WFO	7,973 CY
May 2008 – December 2008	Removal of the Wreck of a Small Craft from the Chelsea River Channel between the Bridges	Wreck Removal
Counterweight & Debris Removal Jan 2012 – March 2012 Dredging March 2012 – April 2012	Maintenance and Improvement Dredging to Widen the Channel through and in the Approaches to the New Chelsea Street Bridge to a Minimum of 175 Feet. Includes Removal of the Concrete Counterweight, Pilings, and other Debris from the Adjacent Former Grand Trunk Railroad Bridge, and Removal of Abandoned Sheet Pile and Pilings from the Vicinity of the East Boston MWRA Property, and Sections of Abandoned Gas Siphon.	4,651 CY Silt to Chelsea CAD Cell and 27,178 CY Hard Parent Material to MBDS

ISLAND END RIVER, CHELSEA & EVERETT
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
Sept 1981 – April 1982	Improvement Dredging of 6-Foot Channel, 100 Feet Wide, 2,500 LF from the Mystic River Channel to the Public Marina at the Head of the	55,500 cy

	River	
Sept 1981 – April 1982	Improvement Dredging – Work for Others – 6-Foot Marina Basin at the Head of the Channel	80,000 cy

MYSTIC RIVER, CHARLESTOWN, CHELSEA, EVERETT, SOMERVILLE, MEDFORD, ARLINGTON & WATERTOWN PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Note: Prior to the 20th Century, the mouth of the Mystic River was at its confluence with the Charles River at the Head of Boston Harbor. As port improvements pushed deep water upstream the accepted mouth of the Mystic River became instead its confluence with the Chelsea River at today's Inner Confluence. Mystic River records through about 1907 include the lower reaches of the Mystic River above the mouth of the Charles River.

Work Dates	Work Accomplished	Quantities
Nov 1880 – June 1881	Improvement Dredging of the 23-Foot MLW Channel through the Shoal at the River's Mouth off Charlestown	48,343 cy (to 250 Feet Wide)
Dec 1881 -	Continued Improvement Dredging of the 23-Foot MLW Channel through the Shoal at the River's Mouth off Charlestown	48,530 cy 33,490
July 1895 – Nov 1895	Improvement Dredging of the 6-Foot and 4-Foot MLW Channels above the B&M Bridge to Medford	37,614 cy
June 1897 -	Continued Improvement Dredging of the 6-Foot and 4-Foot Channels to Medford	13,222 cy
Jan 1900 – Dec 1900	Begin Improvement Dredging of the 25-Foot Channel from Boston Harbor to above the Island End River	282,017 cy
Feb 1903 – June 1903	Continue Improvement Dredging of the 25-Foot Channel from Boston Harbor to above the Island End River	81,242 cy
July 1905 – April 1906	Continue Improvement Dredging to Widen the 25-Foot Channel from Boston Harbor to above the Island End River	88,641 cy
FY 1906 – Nov 1906	Resume and Complete Improvement Dredging of the 6-Foot and 4-Foot Channels above the B&M Railroad Bridge to Medford	28,765 cy

Annual Report for 1907, Appendix B-9, Page 907	The Lower Reaches of the Mystic River below the Chelsea Bridge were Incorporated into the Project for the Main Ship Channel of Boston Harbor as Authorized by the River & Harbor Act of 2 March 1907	Modification – No Further Mystic River Work below Chelsea Bridge
Nov 1907 – Jan 1908	Maintenance Dredging of the 25-Foot Channel above the Chelsea Bridge	18,215 cy
Nov 1910 – June 1911	Begin Improvement Dredging of the 30-Foot MLW Lower Channel from Chelsea Bridge to the Island End River	226,924 cy
July 1912 – Aug 1912	Improvement Dredging of the 30-Foot MLW Channel to Widen the Cut through the New Chelsea Bridge Drawspan	19,744 cy
March 1913 – March 1914	Improvement Dredging of the 30-Foot MLW Lower Channel from Chelsea Bridge to the Island End River	304,546 cy
Aug 1913 – Dec 1913	Ledge Removal for the 30-Foot MLW Channel	293 cy Rock
May 1916	Maintenance Dredging of the 30-Foot Channel	46,695 cy
Sept 1935 – April 1937	Improvement Dredging to Extend the 30-Foot MLW Channel Upriver to the Charlestown Playground Site 500 Feet Wide	1,406,556 cy
Dec 1937 – Feb 1938	Removal of Ledge to Complete Improvement of the 30-Foot Channel	10,388 cy Plus 2,910 cy Rock
Oct 1939 – Jan 1940	Improvement Dredging of the 20-Foot Channel and Basin at Somerville	74,291 cy
Dec 1943 – Feb 1944	Maintenance Dredging of the 30-Foot Channel	30,481 cy
FY 1948	Maintenance Dredging of the 20-Foot Channel and Basin at Somerville and Widening a Bend	6,033 cy
Feb 1952 – July 1952	Maintenance Dredging of the 30-Foot Channel	132,057 cy
Jan 1956 – March 1957	Improvement Dredging of the 35-Foot MLW Channel 940 to 1,060 Feet Wide	1,729,902 cy Plus 40 cy Boulders
May 1958 – June 1958	Removal of Ledge to Complete Improvement of the 35-Foot Channel Except for the Upper Reach along the South Bank.	23,200 cy (1/3 was Ledge)
June 1966 – FY 1967	Maintenance Dredging of the 35-Foot Channel	291,700 cy
May 1982 – FY 1983	Maintenance Dredging of the 35-Foot Channel	211,000 cy Estimated

Aug 1998 – Feb 2000	Maintenance Dredging of the 35-Foot Channel and Improvement Dredging of the 40-Foot Channel up to the LNG and Scrap Wharves	269,743 cy O&M 337,861 cy Improvement and 24,378 cy Rock

WEIR RIVER, HULL
PROJECT CONSTRUCTION & MAINTENANCE HISTORY

Work Dates	Work Accomplished	Quantities
Dec 1880 – May 1881	Improvement Dredging of the -9½ Foot Channel to Nantasket Pier (at 70 Feet Wide)	21,924 cy
April 1882 – May 1882	Continue Improvement Dredging of the -9½ Foot Channel 100 Feet Wide	19,998 cy Plus 4 cy Rock
September 1882	Removal of Additional Ledge from the 9½-Foot Channel	50 cy Ledge
May 1890 – June 1890	Maintenance and Improvement Dredging to Restore the -9½ Foot Channel and Widen the Channel to 250 Feet in "The Dolphin" Turn	9,025 cy
March 1891 – April 1891	Improvement Dredging to Widen the -9½ Foot Channel to 150 Feet Wide	19,724 cy
June 1893 – July 1893	Improvement Dredging of the 12-Foot MLW 150-Foot Wide Channel (No CY for FY 1894)	21,594 cy
Oct 1894 – Nov 1894	Removal of Additional Ledge from the 12-Foot Channel Completing the Projects of 1890 and 1892	395 cy Ledge

BOSTON HARBOR
MASSACHUSETTS

DEEP DRAFT
NAVIGATION IMPROVEMENT STUDY

FINAL FEASIBILITY REPORT
AND FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
AND MASSACHUSETTS FINAL
ENVIRONMENTAL IMPACT REPORT

APPENDIX C

ECONOMIC ASSESSMENT

UPDATED NOVEMBER 2012

Introduction

The purpose of this appendix is to determine the economic benefits to deepening portions of the Boston Harbor Federal Navigation Project in Boston, Massachusetts. Economic benefits were calculated in accordance with current Corps of Engineers guidance contained in ER 1105-2-100, Appendix E, Section II, Navigation (April 22, 2000), and additional guidance contained in the Institute for Water Resources Report 91-R-13, National Economic Development Procedures Manual, Deep Draft Navigation (November 1991). Benefits are calculated in annual terms, and are converted to average annual equivalents using the FY13 Federal interest rate for water resources projects of 3.75 percent. All benefits are presented at the 2011 price level. The base year of the analysis is 2016, and a 50 year period of analysis is used.

Existing Project

A detailed description of the many elements of the existing Federal Navigation Project in Boston Harbor and detailed maps are contained in the Main Report. A Map showing Boston Harbor and the proposed areas for channel deepening is shown in Figure C-1 at the back of this appendix. The existing Federal project in Boston Harbor includes the following elements: a main ship channel with an authorized depth of 40 feet from deep water into the inner harbor; the President Roads anchorage area with a depth of 40 feet; a channel in the Reserved Channel to the Conley Container Terminal with a depth of 40 feet; a channel in the Mystic River with depths of 35 and 40 feet; and a channel in the Chelsea River with an authorized depth of 38 feet. Boston Harbor has a tidal range of about 9 feet.

The local sponsor for the proposed improvement project is Massport, the Massachusetts Port Authority. Massport is an independent public agency which manages Logan Airport, several smaller airports in Massachusetts, and the Port of Boston. Massport owns and manages the Conley Container Terminal on the Reserved Channel in South Boston.

Proposed Navigation Improvements

The proposed navigation improvement project includes multiple elements. The primary improvement project consists of deepening the main ship channel from deep water into the Conley Container Terminal on the Reserved Channel to depths greater than 40 feet. Depths from 41 to 50 feet are examined to determine the economically optimal channel depth. The primary project also includes deepening the President Roads anchorage area, located adjacent to the main ship channel to the north, to depths of 41 to 50 feet to match the main channel depth. The primary deepening project is shown in Figure C-2 at the back of this appendix.

Three small additional project increments are also examined in this analysis. These increments include the following: deepening a short length of the main ship channel north of the Reserved Channel to provide deep-water access to a new terminal being developed by Massport, the Massport Marine Terminal; deepening a small portion of the channel in the Mystic River to provide 40-foot access to the Medford Street Terminal in Charlestown; and deepening the channel in the Chelsea River from the current authorized depth of 38 feet to a depth of 40 feet. These additional channel segments are detailed in Figures C-3, C-4 and C-5, respectively, at the back of this appendix.

Methodology

The purpose of this economic analysis is to estimate the economic benefits of the proposed deepening project. The primary benefits calculated for this study are National Economic Development (NED) benefits. NED benefits are contributions to national economic development that increase the value of the national output of goods and services. For deep-draft navigation projects, the most common type of NED benefit is transportation cost savings. For this project, both waterborne and landside transportation cost savings are estimated. Benefits from the Regional Economic Development and Other Social Effects accounts are also examined, but in less detail.

Corps of Engineers regulations require that separable elements of a project be separately justified. A project element is considered separable if it could be implemented at a later date as a separate project. In this case, the primary improvement project consists of deepening the main ship channel into the Conley Containership Terminal on the Reserved Channel. The remaining smaller project increments are separable elements.

The primary focus of the economic analysis conducted for this study is to determine the economic benefits of deepening the main ship channel into Conley Terminal in order to provide improved access for containerships. As a result, the most significant portion of economic study time and funds were allocated to the containership analysis, which is contained in Attachment C-1. A detailed analysis of containership traffic and containership benefits from channel deepening was conducted by David Miller and Associates, a private consulting firm based in Vienna, Virginia, under contract to the Corps.

The remaining analyses for the separable project elements are smaller and were conducted by the New England District of the Corps. The economic analyses for the smaller project elements are contained in Attachment C-2. The benefits to deepening the channel to the Massport Marine Terminal and the Medford Street Terminal in the Mystic River are somewhat uncertain because neither terminal is currently in use. The benefits for deepening the channel in the Chelsea River are more certain because they are based on existing oil tanker traffic and existing oil terminals.

Economic Study Area

Greater Boston is a generally affluent area with a full range of industries, employers, and services. The area contains all modes of public, private, and commercial transportation, including extensive highway and road systems, passenger and freight rail service, and multiple airports. Brief summary statistics describing the economy of Boston and the six states of New England are shown below in Table C-1.

Table C-1
Socioeconomic Data
Economic Study Area

Geographic Area	Population	Housing Units	Median Family Income	Employers	Payroll (in $ Millions)	Employees
Boston, city	625,304	260,619	$59,347	19,388	$41,451	585,268
Massachusetts	6,511,176	2,727,374	$80,822	174,290	$161,821	3,074,569
Rhode Island	1,057,381	450,769	$71,037	29,759	$17,469	433,562
New Hampshire	1,315,419	592,898	$75,552	38,906	$24,970	595,384
Maine	1,316,380	696,948	$57,257	41,755	$17,685	509,093
Vermont	620,414	311,617	$63,482	22,121	$9,467	272,488
Connecticut	3,494,487	1,437,133	$83,797	92,597	$82,769	1,551,305

Population, Housing Units, and Median Family Income
Source: 2009 estimates from the American Community Survey, US Census Bureau
Employers, Payroll and Employees
Source: 2008 County Business Patterns, US Census Bureau

Boston Harbor is the largest port in New England, and the Boston area is the largest metropolitan area in New England. For containerized cargo, the hinterland of the port consists of the six New England states, although the largest proportion of containerized cargo shipped through the port originates in or has a destination of Massachusetts. For petroleum products and bulk cargo, the hinterland of the port is better defined as the greater Boston area and, secondarily, Massachusetts. Other New England ports are significant distribution centers for petroleum products, including the ports of Portland and Searsport (Maine), Portsmouth (New Hampshire), Providence (Rhode Island), and several smaller ports in Connecticut. Table C-2 shows recent historical waterborne commerce through the Port of Boston over the last 10 years. Total waterborne commerce in 2009, the most recent year for which summary Waterborne Commerce Statistics data is available, was 20,456,000 tons.

Table C-2
Port of Boston
Waterborne Commerce of the United States

Commodity Classification	all data in thousand short tons										
	2009	**2008**	**2007**	**2006**	**2005**	**2004**	**2003**	**2002**	**2001**	**2000**
Petroleum and Petroleum Products	15,365	15,782	17,233	17,018	16,992	19,951	18,762	14,805	14,865	16,397
Chemicals and Related Products	877	843	951	711	225	236	151	230	160	148
Soil, Sand, Gravel, Rock and Stone	11	57	189	188	231	243	626	476	356	383
Iron Ore and Scrap	941	706	608	691	382	367	424	349	569	416
Other non-metal Minerals (Road Salt)	1,260	1,293	797	595	1,531	844	1,085	565	916	634
Cement, Glass and Lime	130	665	796	907	1,051	1,064	907	1,102	1,220	1,214
Food and Farm Products	430	417	470	423	419	422	374	435	299	286
Manufactured Equipment and Machinery	496	531	585	670	521	522	422	673	784	276
Waste and Scrap not elsewhere classified	0	0	0	0	146	1,327	1,352	1,150	1,181	625
All Other Categories	946	741	741	650	880	821	730	569	231	372
Total, All Commodities	20,456	21,035	22,370	21,853	22,378	25,797	24,833	20,354	20,581	20,751

Alternatives Examined

Alternative improvement plans were examined for this Feasibility study, as described below.

Plan ABC consists of deepening the main ship channel from deep water into the Conley Containership Terminal in the Reserved Channel. The lower reach of the Reserved Channel and the turning area outside the channel would also be deepened. In the draft Feasibility Report three depth alternatives were presented in detail: Plan A at 45 feet, Plan B at 48 feet, and Plan C at 50 feet. In the final report the main channels plan is displayed in ten one-foot increments from 41 to 50 feet and referred to as Plan ABC. Channel deepening would allow larger containerships to call the Conley terminal, and allow them to load more deeply. The benefit analysis for Plan ABC is contained in Attachment C-1.

The remaining plans represent smaller, add-on project increments which are only a small portion of total project costs. Plan D consists of extending the main ship channel north of the Reserved Channel to provide deeper access to the Massport Marine Terminal. This would provide deep water access to a bulk terminal to be built at the site. Plan E consists of deepening a small portion of the Mystic River that was not deepened to 40 feet in the previous improvement project and so has a depth of only 35 feet. Plan F consists of deepening the channel in the Chelsea River from 38 feet to 40 feet to provide improved access to the oil terminals along the river. The benefit analyses for Plans D, E and F are contained in Attachment C-2.

Benefits Framework

Annual benefits to channel deepening are estimated by comparing the expected without project transportation costs to the expected with project transportation costs. Net benefits equal the difference between those costs, if any. Transportation costs are estimated based on information about the types of vessels, the origin/destination locations, operating procedures, and typical vessel routes. This information was obtained from interviews with current carriers, shipping agents, terminal operators, harbor pilots, and Massport personnel, and from detailed vessel and trip data obtained from the Corps of Engineers Waterborne Commerce Statistics Center. The benefit analyses focus on those vessels currently using the harbor channels to capacity. The main ship channel is authorized to a depth of 40 feet, but until only recently some areas were limited to 38 feet due to areas of rock and ledge. Maintenance dredging of the main ship channel was completed in 2008, and work to remove remaining rock and ledge was completed in 2012. All without project conditions and projections assume that the existing authorized channel depths are available over the period of analysis.

Benefits to Alternative ABC

Alternative ABC, deepening the main harbor channels into the Reserved Channel to the Conley Container Terminal, would improve the efficiency of container shipping to

the port of Boston. This is the primary purpose of the project, and was the primary focus of the economic analysis. A detailed analysis of container shipping in Boston Harbor and the benefits to channel deepening was performed by a consultant to the Corps of Engineers, David Miller Associates, and is contained in Attachment C-1. The estimated annual benefits for channel deepening to Conley Terminal are summarized below in Table C-3.

Table C-3
Primary Channel Deepening, Boston Harbor
Alternative ABC
Annual Transportation Cost Savings
Base Case

Condition	Channel Depth	Annual Benefits
	(feet)	
Without Project	40	-
With Project (A)	41	$2,578,000
With Project (A)	42	$6,627,000
With Project (A)	43	$8,611,000
With Project (A)	44	$10,049,000
With Project (A)	45	$91,222,000
With Project (B)	46	$96,306,000
With Project (B)	47	$100,176,000
With Project (B)	48	$102,555,000
With Project (C)	49	$103,426,000
With Project (C)	50	$103,720,000

Benefits to Alternatives D, E and F

The potential economic benefits for the smaller channel increments of Alternatives D, E and F were analyzed by New England District of the Corps. The channel extension with Alternative D would allow larger bulk carriers to use the future Massport Marine Terminal. Alternative E would allow larger vessels to use the Medford Street Terminal, and Alternative F would allow larger oil tankers to transit the Chelsea River to reach the multiple terminals located there. The benefit analysis for these smaller channel increments is contained in Attachment C-2. The estimated annual benefits for Alternatives D, E and F, are shown below in Table C-4.

Table C-4 Additional Channel Segments, Boston Harbor Alternatives D, E and F Annual Transportation Cost Savings		
Condition	Channel Depth	Annual Benefits
	(feet)	
With Project (D)	42	$444,047
With Project (D)	43	$800,215
With Project (D)	44	$966,894
With Project (D)	45	$1,162,906
With Project (E)	37	$97,872
With Project (E)	38	$140,082
With Project (E)	39	$167,678
With Project (E)	40	$221,382
With Project (F)	39	$1,242,500
With Project (F)	40	$1,936,200

Project Costs and Economic Justification

Project costs are detailed in the Main Report and Appendix D, Engineering Design and Cost Estimates. Determination of economic justification for each alternative examined is contained in the Main Report.

Regional Economic Development Benefits

New Corps Guidance, EC 1105-2-409, "Planning in a Collaborative Environment," 31 May 2005, allows new studies to include benefits from the Regional Economic Development (RED) and Other Social Effects (OSE) accounts. While project justification and the determination of economic feasibility (positive benefit to cost ratio) are still determined using National Economic Development (NED) benefits as calculated in the sections above, benefits identified in the RED and OSE accounts can be used to guide selection of a recommended plan, to integrate Corps planning goals with the goals of the local sponsor, and to show the complete benefits of a project. RED benefits are derived from the impacts of a project on local income and employment, even if the project would cause no net change in income or employment on a national level. RED benefits are often a primary factor motivating local development projects. OSE benefits are those effects that are not captured in the NED, RED or environmental quality

accounts, and can include effects relating to community cohesiveness, health and safety, energy conservation, emergency preparedness, and security.

Massport recently completed two studies which analyze in detail the regional economic benefits provided by the Port of Boston and, more specifically, by Massport's facilities in the port. The first study, "Economic Impact Study of Massachusetts Port Authority" was completed in March 2006 by Leigh Fisher Associates for Massport and the Greater Boston Chamber of Commerce. The second study, "Economic Impacts of the Port of Boston", was completed by Martin Associates, also in March 2006. Both studies are based on detailed input-output modeling that was conducted for the Martin Associates analysis. The study analyzed the economic impact of the port by examining the size and interconnectedness of the economic sectors dependent on the port, sectors including transportation, cargo handling, maritime services, cruise ship operations, and fish and seafood processing. The total impacts generated by port activity in 2004, for Massport terminals and for private terminals, are summarized in Table C-5, below. Economic impacts generated by activities at Massport terminals include economic activity at the Conley Container Terminal, the Autoport on the Mystic River, the Black Flacon Cruise Terminal, the Boston Fish Pier, and bulk salt and cement activities at Massport terminals. Economic impacts generated by activities at private terminals include impacts from the multiple oil terminals on the Chelsea and Mystic Rivers, at privately owned bulk and scrap terminals, at the private LNG terminal, and at various private recreational marinas.

The Martin study further breaks down the economic impact generated by activities at Massport terminals by type of activity. Four categories are examined, including Cargo (primarily Conley Container Terminal but also including bulk cargo and vehicles), Harbor Tours and Marinas (recreational), Fish and Seafood Processing, and Cruise Ships. These impacts by type of economic activity are shown in Table C-6. Together these make up the total Massport terminal impacts shown in the first column of Table C-5. Direct impacts are the jobs and income directly generated by activities at port facilities. Indirect impacts are additional jobs and income generated in the local economy as the businesses directly dependent on port activities purchase goods and services in the local economy. Induced impacts are the additional economic activity generated from the increased income of households due to port activities, as they spend their increased disposable income in the economy. Together, the indirect and induced impacts make up the multiplier effects of the terminals.

Table C-5 Regional Economic Impacts Generated by Port Activity Port of Boston, 2004			
Impact Category	Massport Terminals	Private Terminals	All Terminals
Jobs			
Direct	2,247	2,680	4,927
Induced	1,751	2,513	4,263
Indirect	860	1,070	1,930
Total	4,857	6,263	11,120
Personal Income ($1,000)			
Direct	$79,690	$118,279	$197,969
Induced	$227,954	$338,338	$566,292
Indirect	$65,284	$49,747	$115,031
Total	$372,929	$506,365	$879,294
Business Revenue ($1,000)	$274,104	$815,654	$1,089,758
Local Purchases ($1,000)	$76,353	$86,831	$163,184
State/Local Taxes ($1,000)	$33,821	$49,447	$83,268

Source: "Economic Impact of the Port of Boston" Martin Associates, Lancaster PA, March 2006

Table C-6
Regional Economic Impacts by Type of Activity
Massport Terminals Only

Impact Category	Cargo	Harbor Tours & Marinas	Fish & Seafood Processing	Cruise Ships	Total, Massport Terminals
Jobs					
Direct	1,474	84	271	418	2,247
Induced	1,267	58	186	239	1,750
Indirect	719	19	74	48	860
Total	3,461	161	531	704	4,857
Personal Income ($1,000)					
Direct	$58,779	$2,559	$8,255	$10,098	$79,690
Induced	$168,138	$7,319	$23,612	$28,885	$227,954
Indirect	$32,746	$698	$2,955	$28,885	$65,284
Total	$259,664	$10,576	$34,822	$67,867	$372,929
Business Revenue ($1,000)	$156,441	$10,174	$90,514	$16,975	$274,104
Local Purchases ($1,000)	$46,878	$2,661	$8,740	$18,074	$76,354
State/Local Taxes ($1,000)	$25,394	$1,034	$3,406	$3,987	$33,821

Source: "Economic Impact of the Port of Boston" Martin Associates, Lancaster PA, March 2006

Activities at the Conley Container Terminal contribute a large portion of the economic benefits due to cargo-related activities, including an estimated 3,461 jobs and nearly $260 Million in personal income, as listed in the first column of Table C-6. With the deepening project, the Conley terminal would handle significant additional volumes of cargo, which would most likely result in a corresponding increase in jobs and incomes in the region. With the project, total cargo volumes handled are projected to increase from 38 to 57 percent, depending on the depth of the channel. For the purpose of this analysis, it is estimated that 75 percent of the economic activity included in the Cargo sector in the Martin Analysis is a result of activity at Conley. As a rough estimate of the potential regional economic benefits from the deepening project, the portion of economic benefits attributed to Conley (75 percent of the Cargo sector) were increased by the degree to which cargo volumes are expected to increase with the project. The resulting figures are shown below in Table C-7.

Using this method, the project could increase employment in the region by up to 555 jobs and increase incomes in the region by up to $22.1 Million. The estimated increase in employment assumes that all of the increased economic activity at the terminal with the project results in increases in employment and not capital expenditures. The exact capital to labor ratio with the project will depend on conditions prevailing at the time. Including induced and indirect effects further increases these benefits. The benefits would result from the shift of cargo handling and related economic activity from the Port of New York and New Jersey, where the cargo would be shipped in the without project condition, to the Port of Boston, where the cargo would be shipped in the with project condition. From a national perspective, the employment and income effects of the project would be simply a shift in economic activity from one region (New York/New Jersey) to another (Boston), and so the benefits are considered regional, not national, benefits. However, these benefits would be significant to Massport and to residents of the region.

Table C-7
Estimated Regional Economic Benefits
Boston Harbor

	Without Project	With 45' Channel	With 48' Channel
Cargo Volume (TEUs), Conley	172,346	224,540	258,829
With Project Increase (TEUs)		52,194	86,483
% With Project Increase		30.3%	50.2%
Direct Impacts Only			
Jobs, Cargo Sector	1,474		
Jobs, Conley (75%)	1,106	1,809	2,029
With Project Increase		335	555
Income, Cargo Sector ($1,000)	$58,779		
Income, Conley (75%) ($1,000)	$44,084	$72,130	$80,900
With Project Increase ($1,000)		$13,351	$22,121
All Impacts (Direct, Induced, Indirect)			
Jobs, Cargo Sector	3,461		
Jobs, Conley (75%)	2,596	3,382	3,898
With Project Increase		786	1,303
Income, Cargo Sector ($1,000)	$259,700		
Income, Conley (75%) ($1,000)	$194,775	$253,761	$292,513
With Project Increase ($1,000)		$58,986	$97,738

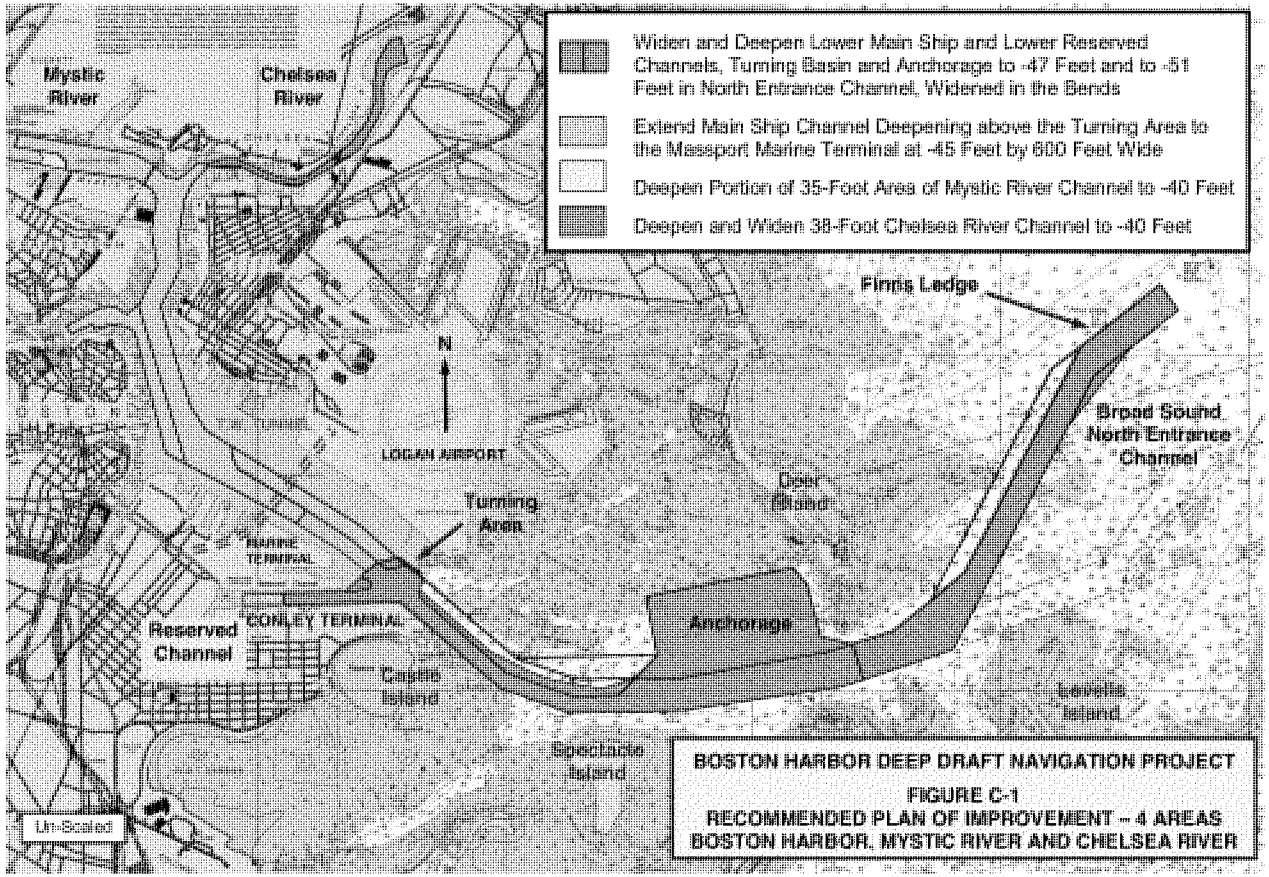
Environmental Quality (EQ) Benefits

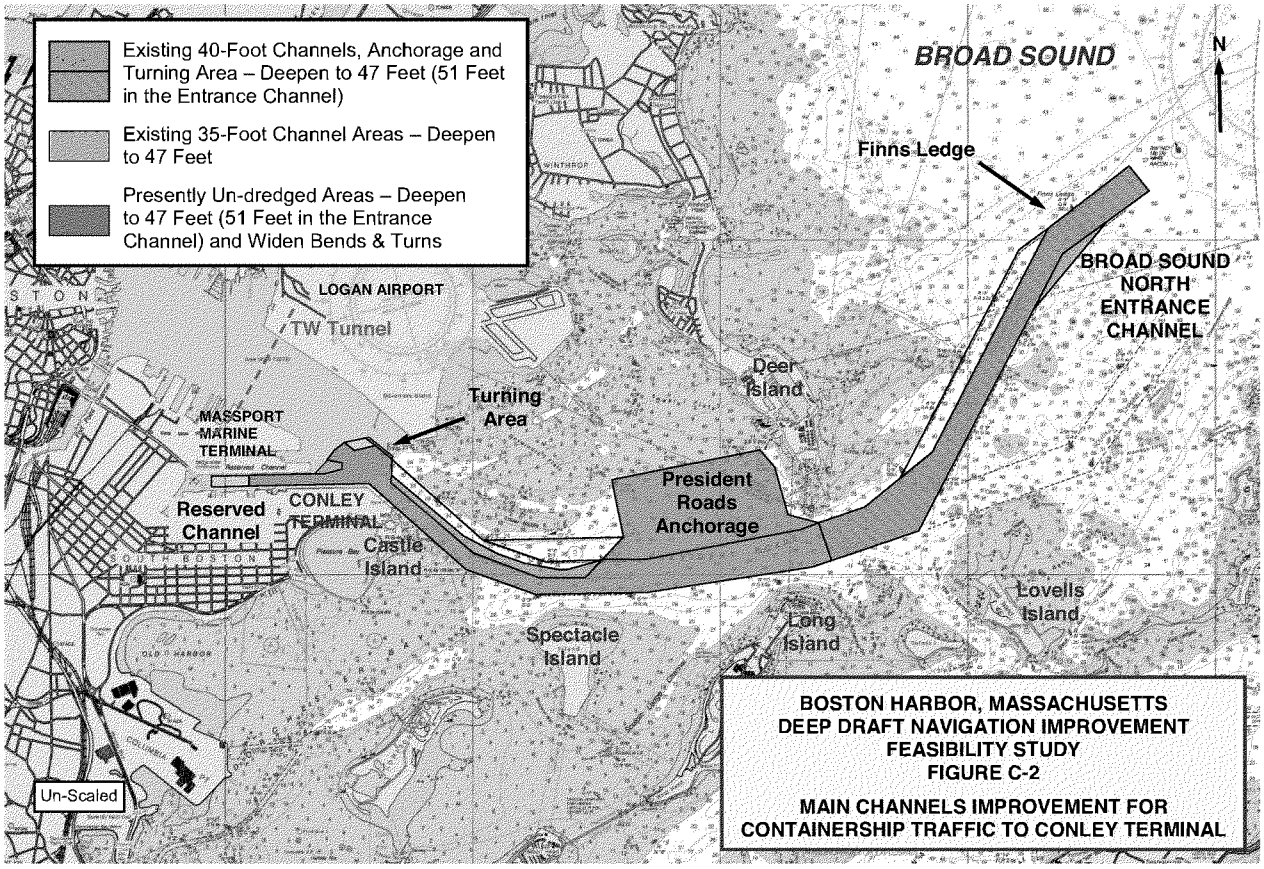
Although not quantified, the reduction in air emissions from reduced truck traffic with the project will greatly benefit the northeastern region of the US. Currently, the New York to Massachusetts transportation corridors are in "Non-Attainment" status under the Clean Air Act.

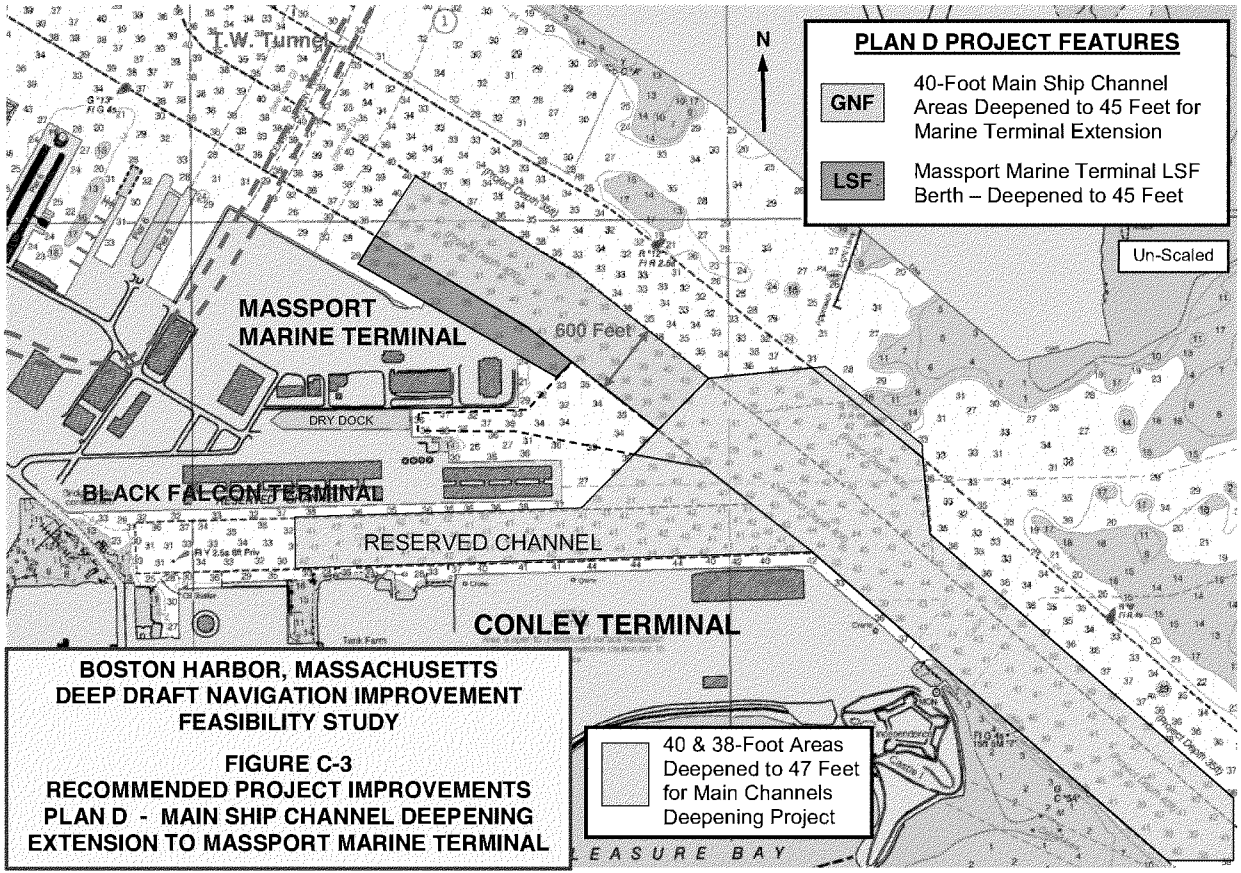
Other Social Effects

The primary beneficial social effects expected with the channel deepening project are the economic benefits previously described, including both the National Economic Development benefits of reduced transportation costs which will lower the cost of New England imports and exports, and the Regional Economic Development benefits of increased employment and income in the region with the increase in cargo traffic at Conley Terminal.

Two other benefit categories in the Other Social Effects account were identified in this analysis. The first is that the project would improve the security of the energy distribution system in Massachusetts. The Chelsea River is a major distribution point for a large portion of oil in the state. Safe navigation to terminals in the Chelsea River is critical to the region, particularly in the winter months when demand for heating oil is high. With the project, a deeper channel in the Chelsea River would improve the efficiency of oil deliveries to the Boston area, and would also increasing the ability of the system to absorb and adjust to changes in demand and supply, reducing the likelihood of supply disruptions. The second benefit category in the Other Social Effects account is that the project would improve emergency preparedness in the containerized cargo sector. For containerized cargo, the ability to bring larger ships into Boston will enable Boston to better function as a back-up port to the Port of New York and New Jersey, allowing Boston to be used as an alternative port in the event of a disruption in service or capacity at New York or other east coast ports. After September 11, 2001, the Port of Boston received cruise ships originally scheduled to call on New York, since the New York dock was being used for clean-up efforts. Increased channel depth into Boston Harbor would increase the degree to which Boston could perform a similar function for New York-bound containerships if needed. Similarly, if the Port of New York and New Jersey reaches capacity in the future as some predict, the Port of Boston will be critically needed to handle overflow cargo volumes. Boston is one day closer in sailing time to Europe, and so Boston is especially well-positioned to handle overflow cargo from European routes.

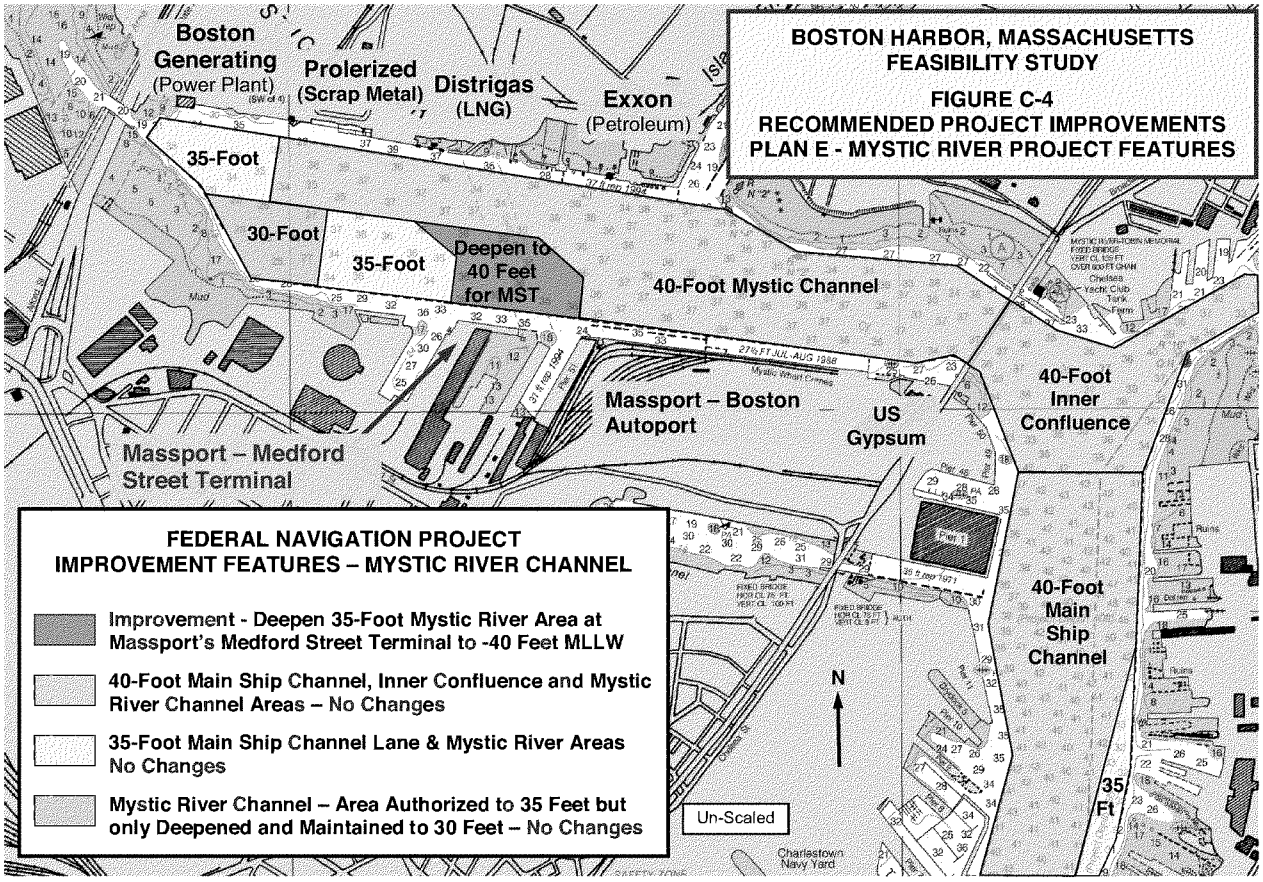

Widen and Deepen Lower Main Ship and Lower Reserved Channels, Turning Basin and Anchorage to -47 Feet and to -51 Feet in North Entrance Channel, Widened in the Bends
Extend Main Ship Channel Deepening above the Turning Area to the Massport Marine Terminal at -45 Feet by 600 Feet Wide
Deepen Portion of 35-Foot Area of Mystic River Channel to -40 Feet
Deepen and Widen 38-Foot Chelsea River Channel to -40 Feet
Mystic River
Chelsea River
Finns Ledge
N
LOGAN AIRPORT
Broad Sound North Entrance Channel
Deer Island
Turning Area
MARINE TERMINAL
CONLEY TERMINAL
Reserved Channel
Anchorage
Castle Island
Lovells Island
Spectacle Island
Un-Scaled
BOSTON HARBOR DEEP DRAFT NAVIGATION PROJECT
FIGURE C-1
RECOMMENDED PLAN OF IMPROVEMENT – 4 AREAS
BOSTON HARBOR, MYSTIC RIVER AND CHELSEA RIVER


Existing 40-Foot Channels, Anchorage and Turning Area – Deepen to 47 Feet (51 Feet in the Entrance Channel)
Existing 35-Foot Channel Areas – Deepen to 47 Feet
Presently Un-dredged Areas – Deepen to 47 Feet (51 Feet in the Entrance Channel) and Widen Bends & Turns
BROAD SOUND
N
Finns Ledge
BROAD SOUND NORTH ENTRANCE CHANNEL
LOGAN AIRPORT
TW Tunnel
Deer Island
Turning Area
MASSPORT MARINE TERMINAL
President Roads Anchorage
CONLEY TERMINAL
Reserved Channel
Castle Island
Lovells Island
Long Island
Spectacle Island
Un-Scaled
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
FIGURE C-2
MAIN CHANNELS IMPROVEMENT FOR CONTAINERSHIP TRAFFIC TO CONLEY TERMINAL



BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY

FIGURE C-3
RECOMMENDED PROJECT IMPROVEMENTS
PLAN D - MAIN SHIP CHANNEL DEEPENING
EXTENSION TO MASSPORT MARINE TERMINAL


BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY STUDY
FIGURE C-4
RECOMMENDED PROJECT IMPROVEMENTS
PLAN E - MYSTIC RIVER PROJECT FEATURES
Boston Generating (Power Plant)
Prolerized (Scrap Metal)
Distrigas (LNG)
Exxon (Petroleum)
35-Foot
30-Foot
35-Foot
Deepen to 40 Feet for MST
40-Foot Mystic Channel
Massport – Medford Street Terminal
Massport – Boston Autoport
US Gypsum
40-Foot Inner Confluence
40-Foot Main Ship Channel
35 Ft
N
Un-Scaled
Charlestown Navy Yard
FEDERAL NAVIGATION PROJECT
IMPROVEMENT FEATURES – MYSTIC RIVER CHANNEL
Improvement - Deepen 35-Foot Mystic River Area at Massport's Medford Street Terminal to -40 Feet MLLW
40-Foot Main Ship Channel, Inner Confluence and Mystic River Channel Areas – No Changes
35-Foot Main Ship Channel Lane & Mystic River Areas No Changes
Mystic River Channel – Area Authorized to 35 Feet but only Deepened and Maintained to 30 Feet – No Changes

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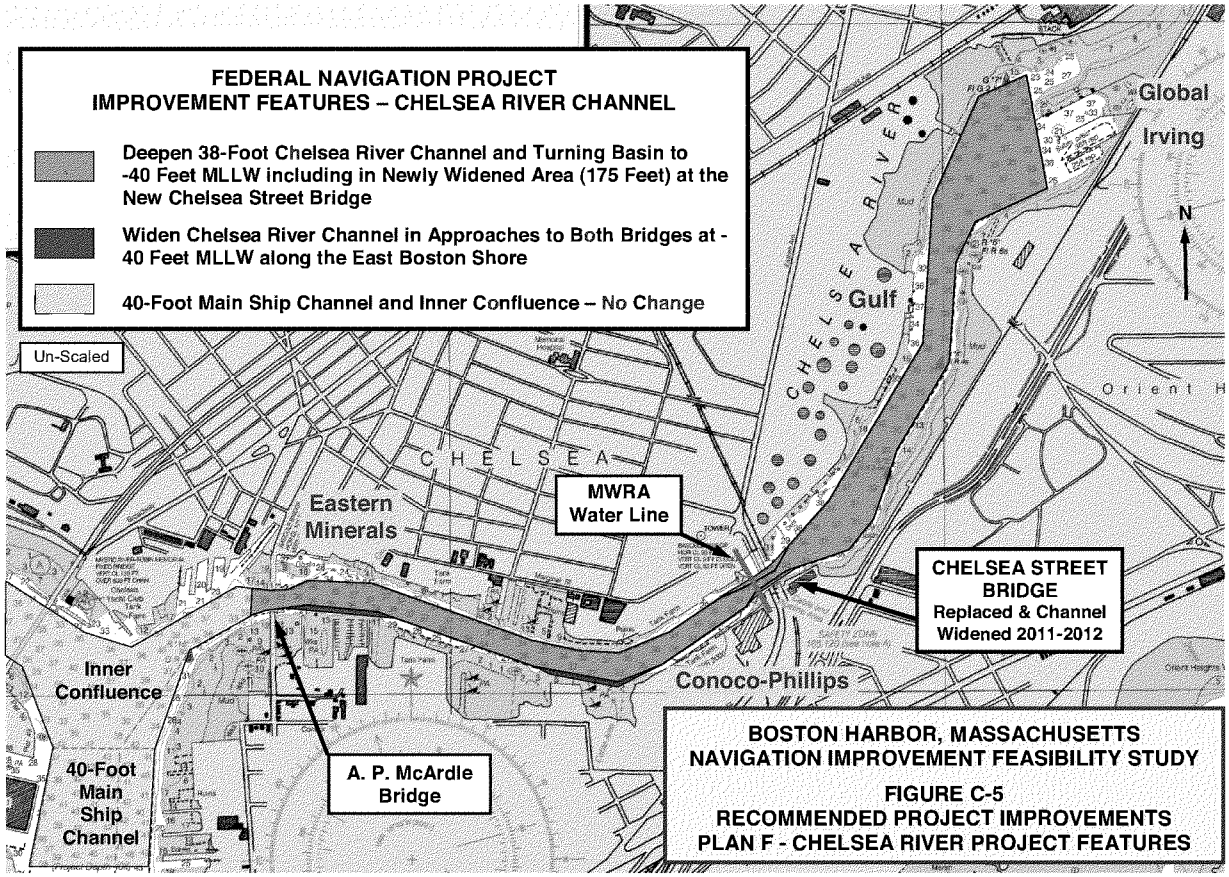
FEDERAL NAVIGATION PROJECT
IMPROVEMENT FEATURES – CHELSEA RIVER CHANNEL
Deepen 38-Foot Chelsea River Channel and Turning Basin to -40 Feet MLLW including in Newly Widened Area (175 Feet) at the New Chelsea Street Bridge
Widen Chelsea River Channel in Approaches to Both Bridges at -40 Feet MLLW along the East Boston Shore
40-Foot Main Ship Channel and Inner Confluence – No Change
Un-Scaled
N
Global
Irving
Gulf
CHELSEA RIVER
CHELSEA
Eastern Minerals
MWRA Water Line
CHELSEA STREET BRIDGE
Replaced & Channel Widened 2011-2012
Conoco-Phillips
Inner Confluence
40-Foot Main Ship Channel
A. P. McArdle Bridge
BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT FEASIBILITY STUDY
FIGURE C-5
RECOMMENDED PROJECT IMPROVEMENTS
PLAN F - CHELSEA RIVER PROJECT FEATURES

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Boston Harbor Deep Draft Navigation Improvement Project Feasibility Study

Appendix C-1

Containerized Cargo Benefits Analysis

Main Report Revised Draft

08 May 2012

Executive Summary

The purpose of this economic analysis is to quantify the potential containerized cargo-related benefits of deepening Boston Harbor's six-mile long main channel to a depth greater than the currently authorized depth of -40 feet. The section of the main channel that would be deepened reaches from the outer harbor to the Conley Marine Terminal, which is owned and operated by the Massachusetts Port Authority (Massport) and is Boston Harbor's only container-port. The economic benefits quantified in this analysis are National Economic Development (NED) benefits consistent with the national objective for Federal project planning. The NED benefits that typically result from general navigation features, such as channels, dredged material disposal facilities, turning basins, etc. are transportation cost savings. Transportation cost savings are calculated as reductions in the cost of transporting goods from their ultimate origin to their ultimate destination.

This Boston Harbor Container Benefits Analysis was conducted in accordance with the "Framework for Additional Economic Analysis" (revised final 06Aug09), which was developed by the New England District, North Atlantic Division, OWPR, and the Institute for Water Resources.

In 2010, Boston Harbor was served by three liner services: one each from Europe, the Mediterranean, and Asia. Boston Harbor handled only 38% of all New England containerized cargo in 2007 (Table 3-1), with 62% handled at the Port of New York and New Jersey (PONYNJ) even though the domestic origins and destinations of most New England cargo is considerably closer to Boston Harbor than to the PONYNJ. Since 2007, each of the three liner services calling at Boston Harbor is using newer and larger vessels (Table 3-6). On average and in terms of dead weight tonnage, vessels on the Europe service are 49% larger, vessels on the Mediterranean service are 47% larger, and vessels on the Asian service are 18% larger (Table 3-6) in 2010 than they were in 2007. The vessels on these liner services are operating at Boston Harbor as deeply as channel conditions allow and have increased vessel arrival and departure drafts (Table 3-11) in response to a single additional foot of depth resulting from the first phase of maintenance dredging. A new Asia Suez service using small Post-Panamax vessels (5,500 – 6,100 TEU) began calling at Boston Harbor in May 2011 and although the service greatly increased TEU throughput at Boston Harbor in 2011, it was suspended after six months and a date for its return has not yet been established.

Nearly all of Boston Harbor's containerized cargo was moved on Panamax-sized vessels in 2010, and often the largest Panamax-sized vessels in the world fleet. The smaller-sized vessel feeder services which have historically called at Boston Harbor, including a coastal barge service, have stopped calling at Boston Harbor because they cannot compete with the more efficient Panamax vessel fleet. In 2011, the Asia via the Suez Canal service brought Post-Panamax vessels (5,500 – 6,100 TEU) vessels to Boston Harbor and in 2012 MSC intermittently schedules a Post-Panamax vessel for Boston Harbor. The deployment of Post-Panamax vessels to Boston Harbor is a result of the industry trend of carriers collaborating in the deployment of larger more efficient vessels where ever possible. The deployment of a new service to Boston Harbor is also indicative of the market for New England cargo. The containership fleet servicing the US east coast is continuously transitioning to even larger, more efficient Post-Panamax vessels.

The primary problems identified in this analysis relate to the inefficient operation of containerships in the Federal channel at Boston Harbor, which affect the Nation's international trade transportation costs. The following problem statements describe these inefficiencies:

1. Existing carriers are experiencing increased/ inflated operations costs due to light loading and tidal delays;
2. Channel depth constraints preclude the use of larger, more efficient ships at Boston Harbor which are replacing smaller, less efficient vessels on services to other US east coast ports; and
3. Existing shippers are experiencing increased origin to destination transportation costs for New England containerized cargo because the Port of New York and New Jersey is used as an alternative to Boston Harbor;

The opportunities identified in this appendix are limited to opportunities related to containership operations at Boston Harbor. The opportunity identified in terms of the Federal interest includes:

- Reduce the transportation cost of import and export trade through Boston Harbor and contribute to increases in national net income (NED).

The potential for substantial landside transportation cost savings, based on shorter distances from domestic origins and destinations to Boston Harbor for New England cargo, indicates there is an economic incentive for shippers to shift some New England containerized cargo from using the PONYNJ to using Boston Harbor. This economic incentive is identified and quantified by the trucking cost analysis (Chapter 7.1). The shipper survey conducted in 2010, as instructed by the "Framework for Additional Economic Analysis", indicates that a substantial number of New England TEUs currently using the PONYNJ appear to have the potential to shift to Boston Harbor (Appendix A: Revised R-1 Report). Some carriers are reluctant to call at Boston Harbor because of the light loading and tide delays that are a regular component of Panamax vessel operations at Boston Harbor (Chapter 3.2). Interviews with the carriers, also conducted in accordance with the "Framework for Additional Economic Analysis", indicate that channel depth constraints are the reason for historically pulling Boston Harbor out of the liner service rotation and for not including Boston Harbor in the rotation today and under without-project conditions (Appendix C: Carrier Interviews).

Several management measures were assessed for their potential as building blocks of alternative plans for potential navigation improvements at Boston Harbor. Equal consideration was given to structural and non-structural measures during the evaluation of management measures.

Non-structural management measures considered include:

- Time arrivals and departures with optimal tide height;
- Reduce underkeel clearance requirement;
- Increase efficiency of landside operations to decrease turn-around time;
- Use feeder vessels in a hub and spoke system;
- Use smaller vessels;
- Coastal barge service;
- Increase capability of landside operations to accommodate larger vessels;

- Load vessel so that it fits within channel constraints;
- Load more New England cargo on existing vessels that call at Boston Harbor;
- Add more vessel calls to services already calling at Boston Harbor; and
- Add Boston Harbor as a port of call.

Structural measures considered include:

- Channel deepening;
- Increased/Improved landside infrastructure capacity; and
- Improve landside infrastructure to accommodate larger vessels.

Under with-project conditions the existing fleet of Panamax vessels calling at Boston Harbor would be able to load more deeply (Chapter 6.3). Large Post-Panamax vessels (8,000 TEU; 48-foot maximum draft) are projected to use Boston Harbor at controlling depths of -45 feet and deeper, because Boston Harbor with a controlling depth of -45 feet would not impact the operating drafts of vessels calling at the PONYNJ as a next or preceding port of call . Base case Boston Harbor TEU amounts and transportation cost savings (presented below) are alternatively calculated assuming no large Post-Panamax vessels call at Boston Harbor under with-project conditions (Table 6-4: Number of TEUs; Table 7-10 Transportation Cost Savings) and assuming that an Asia Suez service calls at Boston Harbor at channel depths of -45 feet and deeper (Table 6-5: Number of TEUs; Table 7-11 Transportation Cost Savings). Vessels are projected to use tidal advantage under both without-project conditions and with-project conditions in the same way that vessels were observed using tidal advantage in 2010, which includes greater reliance on tidal advantage than was observed in 2007. Projected operating draft distributions for large Post-Panamax vessels at Boston Harbor (Tables 7-1 and 7-2) are based on observed Boston Harbor Panamax vessel operating drafts (Tables 3-10 and3-11). In a sensitivity analysis, large Post-Panamax vessel operations at Boston Harbor are modeled after observed 2010 vessel operations at the Port of Oakland for similar vessels under similar operating conditions.

Some of the additional cargo carried on vessels using the Federal channel at Boston Harbor under with-project conditions is projected to be New England containerized cargo, which switched from using the PONYNJ to using Boston Harbor (Chapter 6.4). Under with-project conditions, the total amount of Boston Harbor cargo carried on the vessel is calculated based on the 2010 observed proportion of Boston Harbor cargo. The total amount of cargo projected to shift under the base case with-project condition (at the deepest assessed depth of -51 feet) is 218,892 New England TEUs (Table 6-2). The total amount of New England TEUs projected to shift from the PONYNJ to Boston Harbor includes 87,333 TEUs that are handled at Boston Harbor under existing conditions but are projected to shift to the PONYNJ in 2015 under without-project conditions. Therefore, the projected total number of shifting cargo exclusive of returning cargo is 131,496 TEUs. This projected total number of shifting TEUs is less than the shipper survey-based mid-range estimate number of TEUs available to shift (152,488 TEUs at 2007 trade levels) and approximates the shipper survey-based lower limit estimate of TEUs available to shift (131,049 TEUs at 2007 trade levels). The base case projected number TEUs shifting from the PONYNJ to Boston Harbor (131,496 TEUs) is also less than the number of New England TEUs using the PONYNJ in 2007, which are closer to Boston Harbor than to the PONYNJ (181,371).

Base Case: With-Project Condition TEU Volumes

Depth	Europe	Mediterranean	Asia	Total	Increment
40*	42,526	20,072	-	62,598	
41	46,837	21,127	-	67,965	5,367
42	49,967	26,608	-	76,574	8,610
43	52,825	27,853	-	80,678	4,104
44	54,636	28,962	-	83,598	2,920
45	56,112	29,907	170,927	256,946	173,348
46	57,321	30,647	179,525	267,492	10,546
47	58,097	31,102	186,062	275,261	7,769
48	58,509	31,307	190,034	279,850	4,589
49	58,725	31,485	191,074	281,284	1,435
50	58,784	31,568	191,074	281,427	143
51	58,784	31,568	191,074	281,427	-
*Without Project Condition		**Total Additional With-Project TEUs (51 feet)**			**218,829**

Total transportation cost savings are calculated as the reduction in trucking costs resulting from the switch from using the PONYNJ to using Boston Harbor and the net addition of waterborne transportation costs for containers that do not get offloaded or loaded at the PONYNJ, but instead make the additional ocean voyage to Boston Harbor. Benefits are calculated at the projected base-year (2015) level of containerized traffic and do not include additional potential future growth. A sensitivity analysis is conducted to assess the effects of cargo growth through the deployment of an additional service to Boston Harbor. Base case transportation cost savings are alternatively calculated with the PONYNJ Container Unit Assessment fee excluded as a component of origin to destination costs for New England cargo using the PONYNJ (Chapter 7.4). Sensitivity analyses (Chapter 8) are performed to assess the influence of vessel size (using smaller and larger Post-Panamax vessels and no large Post-Panamax vessels) and to assess the influence of various deployment scenarios. An additional sensitivity analyses assesses the change in with-project condition benefits due to delaying the deployment of large Post-Panamax vessels by five years.

Base Case Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	256,946	173,348	$91,222,428	$81,173,612
46	267,492	10,546	$96,305,684	$5,083,256
47	275,261	7,769	$100,176,470	$3,870,786
48	279,850	4,589	$102,554,678	$2,378,208
49	281,284	1,435	$103,426,171	$871,493
50	281,427	143	$103,719,909	$293,738
51	281,427		$103,858,939	$139,030

Overall, the benefits analysis is based on observed vessel operations, vessel deployment, and industry trends. The dominant trend in the container shipping industry for the past decade and likely into the next decade, based on planned new vessel construction, is the deployment of very efficient, very large vessels. In the time that this analysis has been conducted (2006 – 2012), the largest container ships in the world have increased in size from the 11,000 TEU Emma Maersk to 18,0000 TEU vessels currently being built for Maersk. Carriers are consolidating efforts by sharing space on each other's vessels, by partnering on shared services, and by mixing vessels on shared services. Consolidation is a way to maximize vessel utilization, which increases operating efficiency.

High levels of vessel utilization require ports that are deep enough to accommodate highly utilized (deeply loaded) vessels. Ports that do not provide sufficient channel depth are by-passed by the most efficient vessels. Boston Harbor, under without-project conditions will be 10 feet shallower than the PONYNJ and will not be a viable port of call for large, efficient vessels that will also call at the PONYNJ. The without-project channel depth at Boston Harbor is a strong disincentive for carriers that would otherwise call at Boston Harbor. New England cargo, which is closer to Boston Harbor and which can get to Boston Harbor at a lower cost than it can get to the PONYNJ, will have to incur the higher cost of getting to and from the PONYNJ.

The high landside transportation costs for New England cargo using the PONYNJ under without-project conditions will be substantially reduced under with-project conditions because a deeper channel will allow carriers to operate their vessels more efficiently at Boston Harbor. Increased efficiency at Boston Harbor will allow carriers to include Boston Harbor as a port of call, which provides importers and exporters the opportunity to use Boston Harbor for their New England cargo. All but one of the components needed to realize substantial transportation cost savings exist at Boston Harbor. These existing factors, which are available to support transportation cost savings include:

- Boston Harbor's hinterland (New England), which provides sufficient cargo;
- Large containerships are currently calling at the PONYNJ and larger vessels will be calling there in the future;
- Carriers are looking to diversify to ports other than the PONYNJ to generate competition and to develop alternative markets; and
- New England cargo pays a high landside transportation cost to get to the PONYNJ, which is an incentive to switch to a closer, lower cost port.

The missing component is sufficient channel depth at Boston Harbor. The without-project channel depth at Boston Harbor constrains the transportation system and creates economic inefficiencies.

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1 Introduction

The purpose of this economic analysis is to quantify the potential containerized cargo-related benefits of deepening Boston Harbor's main channel for a length of approximately six miles to a depth greater than the currently authorized depth of -40 feet. The economic benefits quantified in this analysis are National Economic Development (NED) benefits consistent with the national objective for Federal project planning. Regional or local economic benefits are not pursued in this analysis.

The section of the main channel that would be deepened reaches from the outer harbor to the Conley Marine Terminal, which is Boston Harbor's only container-port. Conley Terminal is owned and operated by the Massachusetts Port Authority (Massport). The section of the main channel that would be deepened also approaches the Massport Marine Terminal, which is a bulk cargo terminal. Benefits to bulk cargo operations are addressed in a separate appendix.

The National Environmental Policy Act (NEPA) of 1969 and the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (U.S. Water Resources Council, 10 May 1983) provide the basis for Federal Policy concerning multi-objective planning. The Federal objective of water and related land resources project planning is to contribute to NED consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Water and related land resources project plans are formulated to alleviate problems and take advantage of opportunities in ways that contribute to this objective.

Contributions to NED are increases in the net value of the national output of goods and services expressed in monetary units. Contributions to NED are the direct net economic benefits that accrue in the planning area and in the rest of the Nation[1]. The NED benefits that typically result from general navigation features, such as channels, dredged material disposal facilities, turning basins, etc. are transportation cost savings. Transportation cost savings are calculated as reductions in the cost of transporting goods from their ultimate origin to their ultimate destination. Transportation cost savings are calculated at the projected base-year (2015) level of shipping activity at the PONYNJ and Boston Harbor, and do not account for additional potential future growth. Because any deepening increment at Boston Harbor would potentially induce shifting some, but not all, of the number of New England TEUs that would use the PONYNJ under without-project conditions, a port-specific commodity forecast, which would include future growth, was not conducted. The impacts of potential future growth are addressed in a sensitivity analysis.

This analysis has been formulated to respond to concerns identified by the USACE Office of Water Policy Review (OWPR), which were based on a previous Boston Harbor analysis presented at the 2008 Civil Works Review Board meeting. OWPR identified concerns about without-project conditions for container shipping at Boston Harbor and the resulting optimized depth. Three principal comments were put forth by OWPR:

- The study needs to provide more detailed information that will explain why trucking is used under existing conditions;

[1] USACE, National Economic Development Procedures Manual Overview, 2009

- The benefits analysis for each channel depth, including the future without project condition, should use the appropriate fleet mix and distribution of sailing drafts; and
- The study needs to formulate and evaluate other alternatives that may achieve a reduction in transportation cost.

From September 2008 through August 2009, the New England District, North Atlantic Division, OWPR, and the Institute for Water Resources developed a "Framework for Additional Economic Analysis" (revised final 06Aug09) as the consensus approach to answering these questions.

This Boston Harbor Container Benefits Analysis was conducted in accordance with the framework established in August 2009. This data-intensive re-analysis is based on highly detailed information including:

- 2007 PIERS data for individual container movements and cargo characteristics at Boston Harbor and the PONYNJ;
- 2007 Waterborne Commerce Statistics Center data for vessel operations and characteristics at Boston Harbor and the PONYNJ;
- a 2010 survey of shippers identified in the PIERS data as using Boston Harbor and/or the PONYNJ - the main purpose of the survey (as defined in the Framework) was to determine the physical location where containers are transiting to and from; the shipper survey also asked shippers why they used the PONYNJ and/or Boston Harbor; and
- Interviews conducted in 2010 with the two carriers currently using Boston Harbor, with four carriers who call at the PONYNJ but not at Boston Harbor, and with a barge service which recently discontinued coastal container service ("feeder" service) between the PONYNJ and Boston Harbor.

1.1 Boston Harbor Background Information

The Boston Harbor channel has an authorized depth of -40 feet. Shoaling occurs gradually and maintenance dredging occurs at long multi-year intervals. Currently (2012), the controlling depth at Boston Harbor is -38 feet and maintenance operations are currently being performed. In 2007, which is the year represented by much of the detailed vessel operations data in this report, maintenance dredging of the Main Sip Channel had not been conducted for many years and the controlling depth was -37 feet.

At its authorized depth of -40 feet, Boston Harbor has the least depth of all ports that are on the same liner services with Boston Harbor (Table 1-1). Each of the liner services that call at Boston Harbor also call on the Port of New York and New Jersey (PONYNJ), which currently has a controlling depth of -45 feet. In 2014, the PONYNJ controlling depth will be -50 feet. Boston Harbor's authorized depth, which will be achieved in 2012, is similar to the current controlling depth at the Panama Canal (39.6 feet). In 2014, the Panama Canal controlling depth will be increased to -55 feet.

Table 1-1
Future Controlling Depths for Boston Harbor and Related Ports

Port	Controlling Depth	Year Expected
Boston Harbor (w/out-Project)	40 feet	2012
PONYNJ	45 feet	Current
PONYNJ	50 feet	2014
Philadelphia	45 feet	2012**
Baltimore	50 feet	Current
Norfolk	50 feet	Current
Charleston	45 feet	Current
Savannah*	47 feet	2015
Sines, Portugal	52 feet	Current
Valencia, Spain	52 feet	Current
Le Havre, France	55 feet	Current
Panama Canal	55 feet	2014
Qingdao	57 feet	Current
Shanghai	52 feet	Current
Ningbo	49 feet	Current
Yokohama	52 feet	Current
Lazaro Cardenas	52 feet	Current
Cristobal	48 feet	Current
Suez Canal	78 feet	Current

Notes: *Currently -42 feet, increase contingent upon Tier II EIS and GRR, **Currently under construction
Sources: USACE, Containerization International On-line (www.ci-online.co.uk), Panama Canal Commission, and Suez Canal Authority

Boston Harbor is the 12th largest US east coast container-port (Table 1-2). Although similar in Twenty-foot equivalent unit (TEU) volume to the Port of Philadelphia, Boston Harbor is not a niche port, as compared to Philadelphia which relies heavily on refrigerated cargo. Conley Terminal handles a wide variety of containerized cargo, much of which originates in or is destined for the New England region.

Boston Harbor's average annual 7.5% growth in TEUs handled from 2001 – 2007 (prior to the current recession) was similar to growth experienced in Norfolk (7.25%) and the PONYNJ (6.92%), but less than the growth experienced at Savannah (13.44%). Boston Harbor's number

of TEUs handled grew at a greater rate than Baltimore (3.10%), Charleston (1.99%), Miami (-1.09%), Palm Beach (3.42%), Philadelphia (5.11%), and Wilmington (4.30%).

1.1.1 Conley Terminal

Based on the growth in both import and export containerized cargo experienced at Conley Terminal, Massport conducted a $78 million program of efficiency improvements since 2004, which includes realigning the yard to optimize efficiency, the purchase of 12 new rubber tire gantry cranes, repaving to allow for greater container stacking, and repositioning the chassis pool. Major improvements to Conley Terminal infrastructure include:

- installing four Post-Panamax size cranes;
- purchasing an additional 30 acres of adjacent land for terminal operations;
- upgrading crane drive systems;
- installing an automated gate and yard container tracking system; and
- design and build racks for high density refer storage, and

The berths at Conley terminal are currently dredged to -45 feet. Conley Terminal annual throughput capacity is projected to be more than 500,000 TEUs when all improvements have been completed.

1.1.2 Historical Container Services

Boston Harbor has been serviced by a small number of carriers since 2000 including Mediterranean Shipping Company (MSC), China Ocean Shipping Company (COSCO), Maersk, CMA CGM, SPM Container Line, Eimskip, and Columbia Coastal Transport (barge service). Currently only COSCO and MSC make regular weekly calls (liner service) to Boston Harbor. For comparison, consider that more than 40 containership lines make weekly liner service calls to the PONYNJ.

In 2002, COSCO began calling at Boston Harbor on the Asia – US east coast service via the Panama Canal. This COSCO service continues today. COSCO began a new Asia – US east coast service in May 2011, which called at Boston Harbor from Southeast Asia via the Suez Canal. This service introduced the first Post-Panamax[2] vessels to regular service at Boston Harbor. The service was suspended after six months, however; the additional TEUs brought to Boston Harbor by the Suez service increased Boston Harbor's 2011 TEU total to 192,705, which is a 15% increase over the 2010 total (168,285). It is critically important to also note that growth over the same time period at the PONYNJ was 5%. The growth at Boston Harbor, which is triple the growth observed at the PONYNJ during the same time period is due to the initiation of a new service. This rapid growth with the initiation of a new service to Boston Harbor exemplifies a shift in cargo to Boston Harbor. This same phenomenon was observed in 2003 – 2004, when the COSCO Asia service first started calling at Boston Harbor and Boston's Asia TEU volume grew by 57%, but PONYNJ Asia TEU volume grew by only 16%. It was this

[2] Post-Panamax refers to vessel which are larger, typically too wide, than Panama Canal dimensions. Panamax vessels are vessels which are designed to the maximum transit width of the Panama Canal (106 feet).

observation that initiated the entire investigation into cargo shifting from PONYNJ to Boston. The same phenomenon of shifting cargo observed in 2004 has been observed again in 2011 with the initiation of a new Asia service.

Table 1-2
Major US East Coast Container-Port TEU Volumes 2001 – 2010 (TEUs x 1,000)

Port	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
PONYNJ	3,316	3,749	4,068	4,478	4,793	5,093	5,299	5,265	4,562	5,292
Savannah, GA	1,077	1,328	1,521	1,662	1,902	2,160	2,604	2,616	2,357	2,825
Norfolk, VA	1,304	1,438	1,646	1,809	1,982	2,046	2,128	2,083	1,745	1,895
Charleston, SC	1,528	1,593	1,691	1,864	1,985	1,968	1,754	1,636	1,181	1,365
Miami, FL	956	981	1,041	1,010	1,054	977	885	828	807	847
Pt Everglades, FL	621	554	570	654	797	864	948	985	796	793
Jacksonville, FL	699	684	692	728	777	768	710	697	754	857
Baltimore, MD	493	508	536	558	602	628	610	613	525	611
Wilmington, DE	212	245	254	254	251	263	284	268	260	263
Philadelphia, PA	179	215	147	176	205	247	253	256	223	276
Palm Beach, FL	198	221	215	218	248	244	250	245	199	213
Boston, MA	133	142	155	175	189	200	220	209	187	168

PONYNJ: Port of New York and New Jersey.
Source: American Association of Port Authorities (www.aapa-ports.org)

In 2003, MSC split its single Europe/Mediterranean – US east coast service, which called at Boston Harbor, into two services (one from Europe and one from the Mediterranean), which both call at Boston Harbor today. These services use the largest Panamax vessels.

In recent years a number of carriers have attempted to include Boston Harbor in the port-rotation of a weekly liner service. In 2002, Maersk stopped calling at Boston Harbor on its service from Europe to the US east coast because of excessive delays caused by waiting for the tide[3]. In 2004 CMA CGM stopped calling at Boston Harbor on its Europe – US east coast service because it entered into a Europe – US east coast alliance with Maersk, using Maersk vessels, and Maersk had already decided that Boston was not deep enough for their vessels[4]. CMA CGM re-initiated a service with small vessels in 2007, but the service was discontinued during the recent economic downturn.

The Columbia Coastal Transport barge feeder service from the PONYNJ failed at providing a coastal shuttle service because transshipment costs make feeder services uncompetitive with

[3] See Appendix C, 2010 interview with Kenneth Dan Joergensen, Director of Operations, Maersk
[4] See Appendix C, 2010 interview with Kurt Mittenzwei, Director of East Coast Operations, CMA - CGM

direct services to PONYNJ or Boston[5]. In 2006, the SPM Container Line ran a feeder service from Halifax, Nova Scotia to Boston but discontinued the service when the firm ran into financial difficulties.

Eimskip ran a single vessel (700 TEU) bi-weekly service between Iceland and North America, which calls at Everett, MA (up-river from Boston Harbor) and continued down the coast to Richmond, VA. This service was discontinued during the recent economic downturn. Eimskip also attempted a feeder service from Halifax in 2007, but the service was cancelled after only a few months of operation due to the impact of the global recession on Icelandic companies.

1.1.3 Recent Trade and the Economic Downturn

From 2007 to 2009, containerized trade was dramatically reduced due to the economic downturn. Total US containerized trade dropped by 17%, containerized trade at the PONYNJ fell by 14% and by 15% at Boston Harbor. In 2010, containerized trade volumes increased at most US ports but declined by 10% at Boston Harbor. The decline was largely due to a drop in the number of calls by the COSCO Asia service in the summer months. In 2011, although the CMA CGM and Eimskip services have not returned, Boston Harbor TEUs increased by15% over the 2010 level of trade. The large increase in 2011 was due to the COSCO Asia service returning to a regular weekly schedule and to the initiation of a new Asia service via the Suez Canal, which ran for six months of 2011. The Asia service via the Suez Canal, which was operated by Hanjin, has been suspended and does not reflect a change in port rotations which excludes Boston Harbor. Hanjin did not provide an explanation for the suspension of the service.[6]

1.2 Problems and Opportunities

This sub-chapter describes the existing container shipping problems and opportunities at Boston Harbor. The identification of problems and opportunities is the first step in the six-step planning process described in the P&G; however, the analysis in this appendix is limited to containership operations at the Port. Water resource-related problems at Boston Harbor occur under existing conditions and are projected to continue occur in the future under without-project conditions. The problems are related to container ship operations in the Federal navigation channel leading to Conley Terminal. The opportunities described in this chapter include potential improvements to navigation efficiency, which address the federal objective.

1.2.1 Problems

The primary problems identified in this analysis relate to the inefficient operation of containerships in the Federal channel at Boston Harbor, which affect the Nation's international trade transportation costs. The following problem statements describe these inefficiencies:

1. Existing carriers are experiencing increased/ inflated operations costs due to light loading and tidal delays;

[5] See Appendix C, 2010 interview with Bruce Fenimore, President Columbia Coastal Transport

[6] Personal communication with Nick Billows, Massport

2. Channel depth constraints preclude the use of larger, more efficient ships at Boston Harbor which are replacing smaller, less efficient vessels on services to other US east coast ports; and
3. Existing shippers are experiencing increased origin to destination transportation costs for New England containerized cargo because the Port of New York and New Jersey is used as an alternative to Boston Harbor;

1.2.2 Opportunities

The opportunities identified in this appendix are limited to opportunities related to containership operations at Boston Harbor. The opportunity identified in terms of the Federal interest includes:

- Reduce the transportation cost of import and export trade through Boston Harbor and contribute to increases in national net income (NED).

1.3 Report Organization

This study addresses four major questions concerning navigation improvements at Boston Harbor:

- Why doesn't more New England cargo use Boston Harbor under existing conditions?
  - Existing Conditions Analysis (Chapters 2 – 3)
- How will Boston Harbor's cargo and fleet be affected by the Panama Canal Expansion and the 50-foot Deepening Project at the PONYNJ?
  - Without-Project Conditions Analysis (Chapter 4)
- Aren't there a number of non-structural solutions that could meet the planning objectives?
  - Management Measures Evaluation (Chapter 5)
- If the channel at Boston Harbor were deepened would more New England cargo use Boston Harbor and how much cargo might be expected to shift from the PONYNJ?
  - With-Project Conditions Analysis (Chapter 6)
- What would the potential NED benefits be if the channel to Boston Harbor were deepened?
  - Transportation Cost Savings Analysis (Chapter 7).
- How do with-project benefits change if basic assumptions of the analysis are changed?
  - Sensitivity Analyses (Chapter 8)

1.4 Data and Information Resources

Major sources of data used in the analysis include:

- PIERS and Waterborne Commerce Statistics Data (WCSC) for detailed analysis of 2007 cargo and vessel operations.
- Massport and Boston Harbor Pilot Association data for analysis of 2008 - 2010 vessel operations
- Survey of shippers conducted in 2010
- Interviews with carriers conducted in 2004, 2007, 2010, and 2011.

PIERS and WCSC data for cargo and vessel movements through the PONYNJ and through Boston Harbor for 2007 was used in the assessment of current shipping conditions for New England containerized cargo. PIERS data are collected from vessel manifests. WCSC data are provided to the Federal government for every vessel call.

Throughout the analysis of the PIERS/WCSC data, New England cargo is defined as cargo that has any of the following characteristics:

- The company location fields in the PIERS data indicate a New England state, city, or town;
- The notify field (notify that shipment has arrived or departed) in the PIERS data indicates a New England state, city, or town;
- Any cargo moved through Boston Harbor.

This broad definition of New England cargo is intended to include all New England cargo, whether it is moved through the PONYNJ or Boston Harbor.

The PIERS/WCSC data set includes all PONYNJ and Boston Harbor cargo, regardless of its point of U.S. origin (for exports) or destination (for imports). The full data set was initially filtered to identify only containerships and containerized cargo (excluding bulk or break bulk cargo). The PIERS data are based on actual cargo movements and do not include the movement of empty containers. The total New England containerized cargo identified by the PIERS/WCSC 2007 data set is presented in Table 1-3.

Table 1-3
PIERS/WCSC Total and New England TEUs (2007)

	Imports	Exports
Boston Harbor Total TEUs	89,890	63,526
PONYNJ Total TEUs	2,559,993	1,252,139
PONYNJ New England TEUs	202,211	53,045

Detailed analysis of the PIERS and WCSC data are presented in Task R-1: Assessment of Existing Conditions and in the Task R-1: Assessment of Existing Conditions Reference Appendix.

Massport provided Conley Terminal TEU data for 2007 –2010. These data includes the number and size of containers, number of empty containers, and number of TEUs offloaded and loaded for each vessel call. The Boston Harbor Pilot data identify the arrival and departure drafts for all vessels using Boston Harbor from 2008 through July 2010.

A survey of shippers identified in the PIERS data as using Boston Harbor and/or the PONYNJ was conducted in 2010. The main purpose of the survey was to determine the physical location where containers are transiting to and from. The shipper survey also asked shippers why they used the PONYNJ and/or Boston Harbor. The PIERS data identified 19,528 unique import companies and 3,702 unique export companies that moved New England cargo through either

the PONYNJ or Boston Harbor in 2007. These companies are generically referred to as the shippers.

A two-part mailed questionnaire (OMB Control # 0710-001) was developed to gather information from the shippers. The first part of the questionnaire asked the shippers to identify important factors in their choice of carriers and ports. The second part of the questionnaire presented the shipper with a summary of the company's import and export TEUS by country from the 2007 PIERS data. The shipper was asked to provide actual domestic origin and destination information for those TEUs in order to supplement and verify the data contained in PIERS.

The survey questionnaire, sampling method, and survey results are presented in detail in the Task R-1: Assessment of Existing Conditions. An executive summary of the shipper survey is provided as an attachment. Survey results were used for two purposes in the estimation of project benefits. One use was to identify a 95% confidence interval for origin to destination distances by comparing PIERS data to respondent data. The other use of survey results was to identify the number of New England TEUs using the PONYNJ under without-project conditions, which could potentially shift to using Boston Harbor. Survey results indicate a 95% confidence interval of New England TEUs which could shift to Boston Harbor ranging from a lower limit of 131,049 TEUs to an upper limit of 173,148 TEUs, with a mid-point of 152,488 TEUs at the 2007 level of trade.

The use of survey responses, analyzed in conjunction with transportation cost data, can inform the analyst's decision by providing additional information about near term impediments to making a port shift. Survey responses also provide information useful in understanding why a shipper's port usage decision (which may appear economically irrational from a pure transportation cost differential viewpoint), is actually reasonable when considering a particular shipper's decision making limitations. Survey responses concerning why a shipper uses one port or another are not intended to be relied upon as the final determinant of whether a shift will be made.

Carrier interviews were conducted in 2004, 2007, 2010 and 2011 concerning current and projected future vessel operations at Boston Harbor. The 2004 and 2007 interviews include CMA CGM, COSCO, and MSC. The 2010 interviews include CMA CGM, COSCO, MSC, Columbia Coastal Transport, Evergreen, Maersk, and OOCL. The 2011 interviews include MSC, COSCO, and Hanjin. The carriers have been very consistent in their description of current conditions and projection of future conditions. The carriers have stated that vessels using Boston Harbor are operating under a depth constraint that limits vessel loading and causes costly use of the tide. The carriers have also identified a trend, which has been borne out by experience, of increasing size for vessels calling on US east coast ports. The carriers project that this trend will continue due to the "cascade effect[7]" of ever larger vessels entering the world fleet and the

[7] The "cascade effect" refers to the way that the entry of the newest and largest vessels in the world fleet, say a 14,000 TEU vessel entering the intra-Asia trade displaces the existing 10,000 TEU vessel on that trade. The 10,000 TEU vessel then enters the Asia-Europe trade, which displaces the existing 8,000 TEU vessel. The 8,000 TEU vessel cascades into the Asia – US west coast trade, which pushes the existing 6,000 TEU vessel into the Asia –US east coast trade. This cascade effect is made economically feasible because the carriers collaborate by sharing cargo space on each other's vessel and by having vessels belonging to different carriers on the same service.

continued practice of carriers sharing space on each other's vessels. Post-Panamax vessels are increasingly calling at US east coast ports, and the smallest Post-Panamax vessels will call at Boston Harbor under existing conditions. The carrier interviews are included in the Carrier Interview Appendix to this report.

2 Boston Harbor Hinterland

The Boston Harbor hinterland encompasses all of five New England states (Maine, New Hampshire, Vermont, Rhode Island and Massachusetts) and the eastern half of Connecticut. This area includes a population of 12.3 million people (Table 2-1). Boston Harbor is located at the focal point of the Boston Metropolitan Statistical Area (MSA), which has a population of 4.6 million people.

Table 2-1
Boston Harbor Hinterland Population

Location	Population (millions)
Massachusetts	6.5
Maine	1.3
New Hampshire	1.3
Rhode Island	1.1
Vermont	0.6
Hartford, CT MSA	1.2
Norwich – New London, CT MSA	0.3
Total	**12.3**

Sources:

State Populations: Table 1: Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2000 to July 1, 2008 (http://quickfacts.census.gov/qfd/states/25000lk.html)
MSA Populations: Annual Estimates of the Population of Metropolitan and Micropolitan Statistical Areas: April 1, 2000 to July 1, 2009 (CBSA-EST2009-01) (http://www.census.gov/popest/metro/CBSA-est2009-annual.html).

Boston Harbor is located at the intersection of Interstate Highway 93 (North-South) and Interstate Highway 90 (East-West). Both Interstate Highways 93 and 90 connect to Interstate Highway 95 (North-South), which runs in a ring around Boston. Interstate Highway 90 also connects to Interstate Highway 84 (East-West through Connecticut) and interstate Highway 91 (North-South through Connecticut, Massachusetts, and the New Hampshire/Vermont border). Intermodal (rail – truck) service is available from Worcester, MA. There is no on-dock rail service at Conley Terminal, which greatly limits rail as a transportation alternative to trucking. Figure 1 presents the major highway and rail transportation network surrounding Boston Harbor.

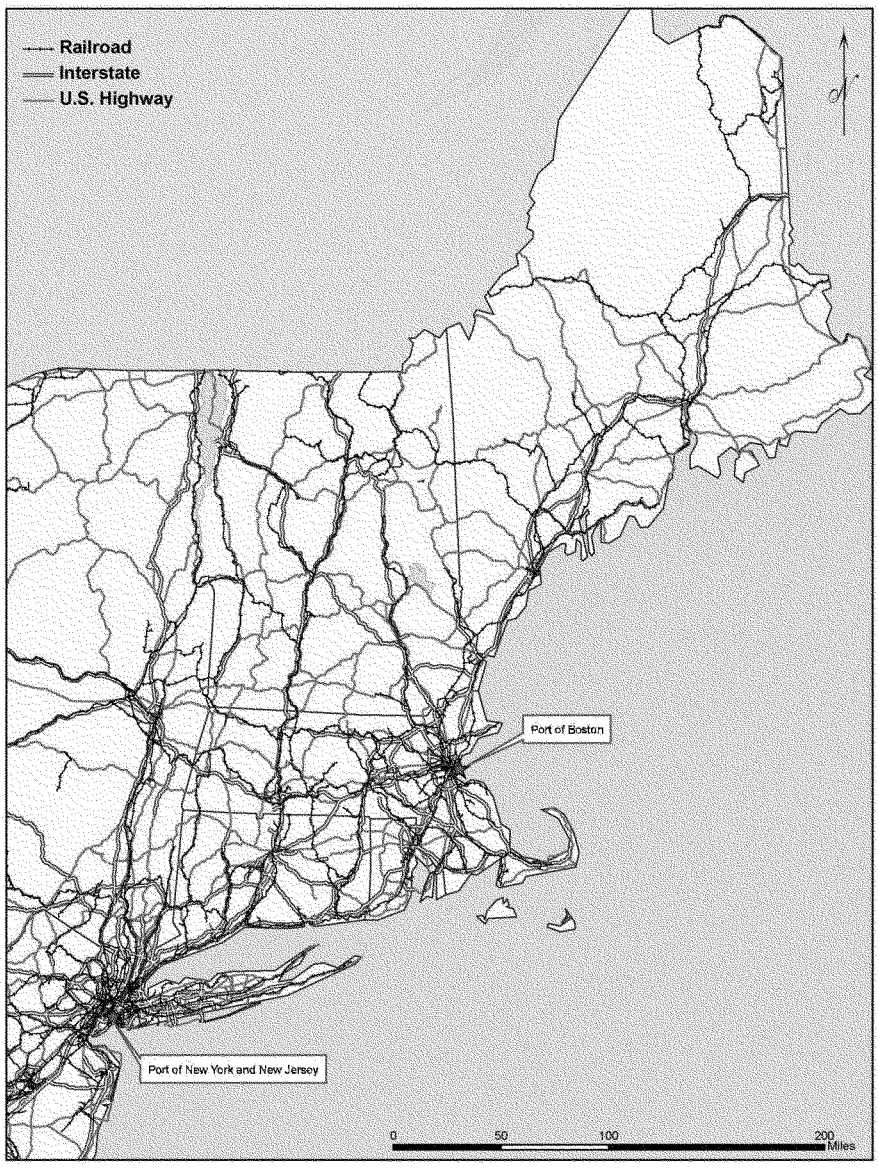

Figure 1: Boston Harbor Major Highways and Railroads

3 Existing Conditions

New England containerized cargo uses both the PONYNJ and Boston Harbor (Table 3-1). Boston Harbor is closer than is the PONYNJ to all points of origin or destination in all New England states, with the exception of Connecticut. Boston Harbor is closer to the point of origin or destination for 29% of Connecticut containerized cargo (71% of Connecticut containerized cargo (73,885 TEUs) is closer to the PONYNJ, based on town of origin and destination data documented in the PIERS 2007 data set.

Table 3-1
PIERS/WCSC Total and New England TEUs (2007)

	Imports	Exports	Total
Boston Harbor Total TEUs	89,890	63,526	153,416
PONYNJ New England TEUs	202,211	53,045	255,256
Total New England TEUs	292,101	116,571	408,672

Boston Harbor handles only 38% of all New England containerized cargo and only 46% of all New England containerized cargo that is closer to Boston Harbor. Overall Boston Harbor is closer to the origin or destination of 334,787 New England TEUs, although only 153,416 use Boston Harbor. Connecticut cargo that is closer to the PONYNJ may however use Boston Harbor as exhibited by the fact that 74% of Connecticut imports and 44% of Connecticut exports using Boston Harbor are closer to the PONYNJ. Figures 2 and 3 display the geographic distribution of New England cargo using Boston Harbor and the PONYNJ, respectively, based on PIERS 2007 data.

3.1 New England Containerized Cargo Characteristics

New England containerized cargo was assessed based on the types of commodities transported, the weight and value of the commodities transported, and the foreign country of origin or destination. A comparison of New England containerized cargo using the PONYNJ and New England containerized cargo using Boston Harbor was conducted to identify any systematic differences in these characteristics between New England containerized cargo using the PONYNJ and New England containerized cargo using Boston Harbor. Task R-1: Assessment of Existing Conditions, Chapter 2.2 Differences Between New England Cargo Moved Through PONYNJ and Boston Harbor contains a more detailed analysis of the information contained in this chapter. This analysis is based on the 2007 PIERS data. The analysis indicates that there are no substantial differences between New England cargo using the PONYNJ and New England cargo using Boston Harbor. Minor differences identified include that Boston Harbor exports are typically slightly heavier than PONYNJ exports and that Boston Harbor has fewer direct service ports and therefore must rely on transshipment more than the PONYNJ for trade with regions not on the direct call services.

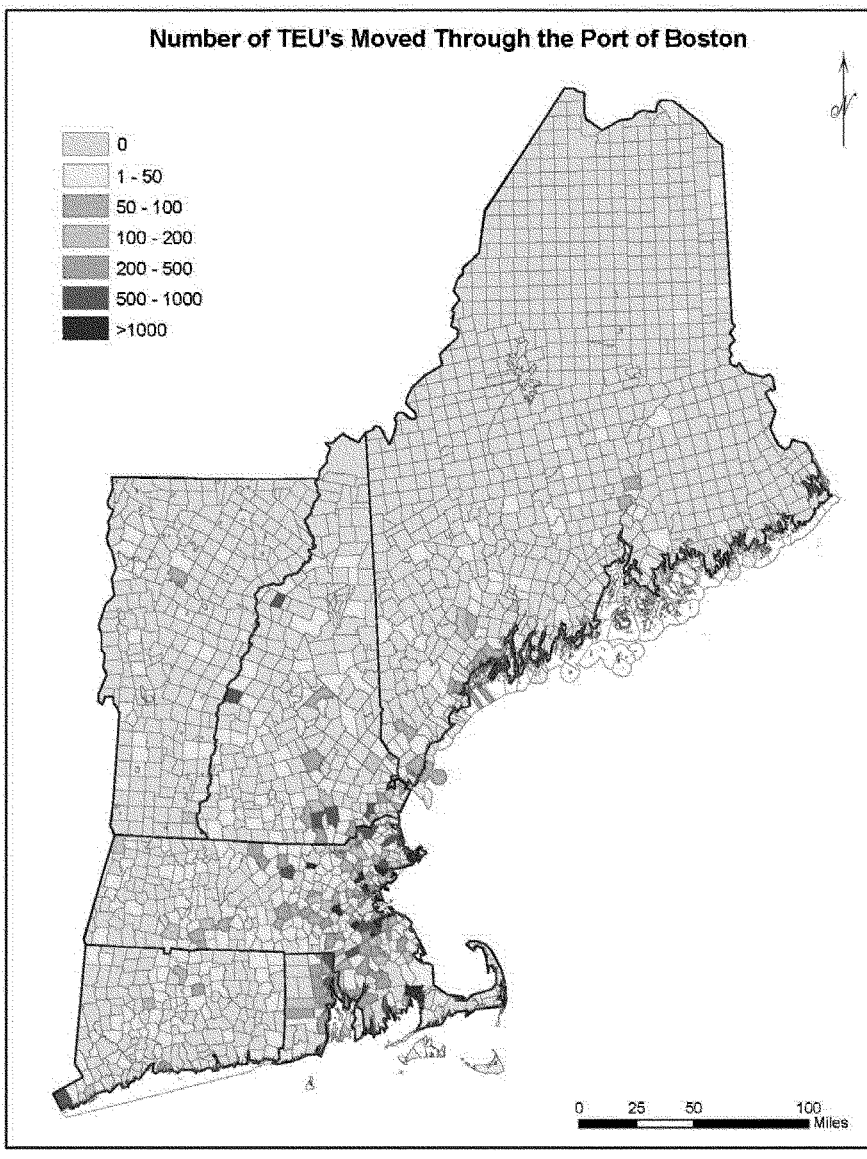

Figure 2: Boston Harbor New England TEU Origins and Destinations

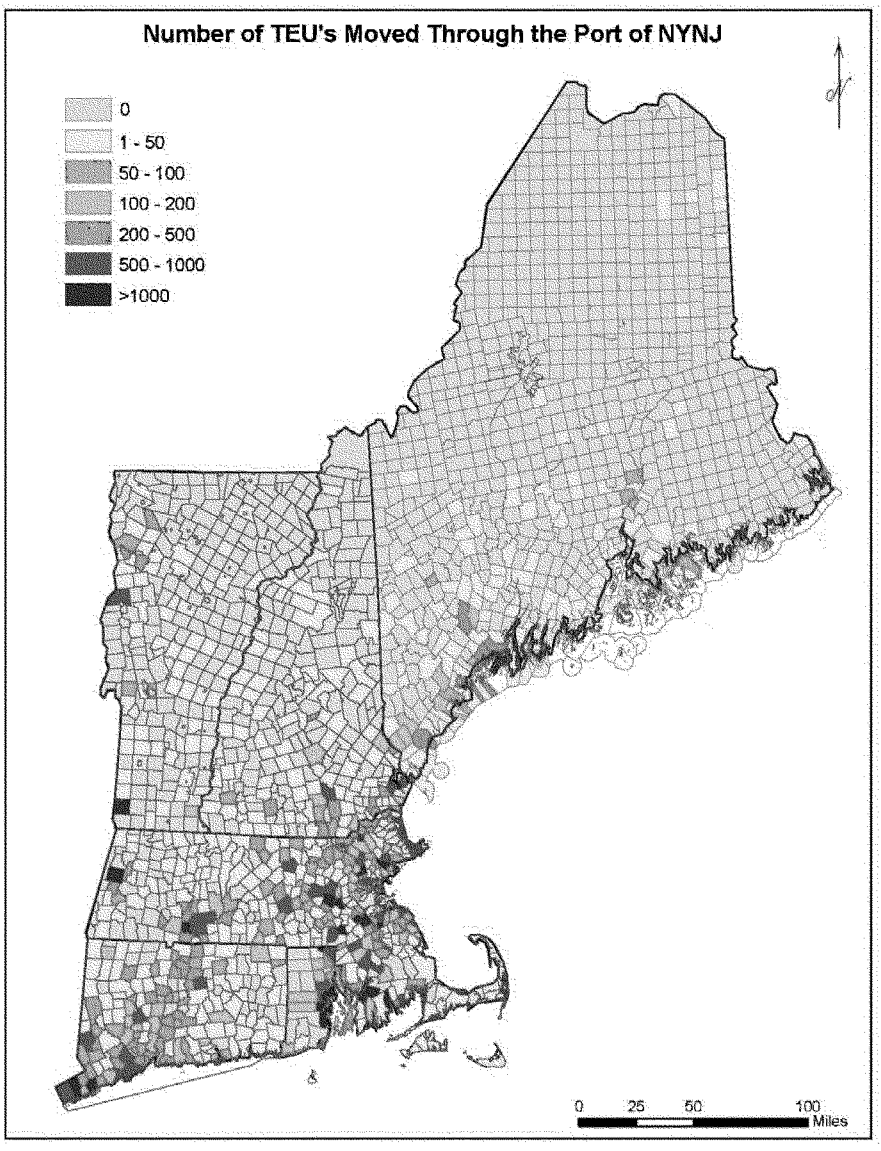

Figure 3: PONYNJ New England TEU Origins and Destinations

3.1.1 Commodity Type

Boston Harbor and the PONYNJ move a broad variety of containerized cargo. The PONYNJ moves many more commodity types than Boston Harbor (Table 3-2). The PIERS data did not identify any commodity type that moves exclusively through Boston Harbor. For both ports, the largest 20 commodity types by volume account for a large portion of total TEUs moved. The two ports share similar commodities in their respective list of top 20 commodity types by volume. Twelve of PONYNJ's top 20 commodities are also in Boston Harbor's top 20 commodity list, and 13 of Boston Harbor's top 20 commodities are on the PONYNJ top 20 list.

Table 3-2
Number of Commodity Types (2007)

	Exports		Imports	
	PONYNJ	POB	PONYNJ	POB
Number of commodity types	744	320	780	502
Total TEUs	1,252,139	63,526	2,559,993	89,890
Top 20 categories number of TEUs	800,214	53,069	1,207,436	51,783
Top 20 categories percent of total	64%	84%	47%	58%

The PIERS data present no indication that commodity type, in and of itself, is a determinant of the port used. Overall, the import commodity types moved through the PONYNJ but not through Boston Harbor account for a minimal 3% of PONYNJ's total 2007 import TEUs. Nearly all of the import commodity types moved through the PONYNJ that were not also moved through Boston Harbor are some type of chemical, compound, or essential oil. There was no consistent difference in types of consumer goods moved through either port. Some South American produce bound for New England was moved exclusively through the PONYNJ, which is attributed to the lack of direct container service between South America and Boston Harbor.

3.1.2 Commodity Weight

An analysis of cargo weights for Boston Harbor cargo and all PONYNJ cargo indicate some minor differences, but not to the extent that cargo weight would be a determining factor for port choice. For example, Northern European imports to PONYNJ are slightly heavier than Northern European imports to Boston Harbor, but Asian imports to Boston Harbor are similarly slightly heavier than Asian imports to PONYNJ (Table 3-3). One consistent aspect of the data are that Boston Harbor exports on all routes are slightly heavier than PONYNJ exports, but to only a small degree.

Table 3-3
PONYNJ and Boston Harbor Tons Per TEU (2007)

	Imports		Exports	
	PONYNJ	POB	PONYNJ	POB
Mediterranean	11.00	10.66	6.56	7.23
North Europe	10.17	8.68	5.48	6.51
Asia	5.03	6.74	8.48	8.92

3.1.3 Commodity Value

Boston Harbor imports have a slightly higher value per ton for Asia and Northern European imports than PONYNJ imports, but the value is lower for Boston Harbor Mediterranean imports (Table 3-4). The differences in import values are consistent with Boston Harbor's import commodity profile, which includes a greater percentage of higher cost/ton primary products such as fish, shellfish, and vegetables than the PONYNJ import profile. PONYNJ exports have consistently higher values than Boston Harbor exports, and there is a major difference in the value of PONYNJ exports and Boston Harbor exports to Asia. Asian exports from the PONYNJ have four times higher value per ton than Boston Harbor exports. This greater value for PONYNJ exports to Asia is explained by Boston Harbor's heavy dependence on paper and metal waste products as primary (61%) export commodities to Asia. This difference in value, while great, is not considered relevant to the question of why vessels call on Boston Harbor today, or whether some may shift from PONYNJ to Boston Harbor in the future.

Table 3-4
PONYNJ and Boston Harbor Dollars per Ton (2007)

	Imports		Exports	
	PONYNJ	POB	PONYNJ	POB
Med	$ 4,038	$ 3,223	$ 6,254	$ 5,597
NEuro	$ 4,202	$ 4,887	$ 8,299	$ 5,521
Asia	$ 4,590	$ 4,710	$ 6,778	$ 1,609

3.1.4 Port of Origin or Destination

In the 2007 data, nearly all of Boston Harbor's containerized cargo was carried on the three major services, which also called at the PONYNJ. These services make direct calls to a limited number of foreign ports (Table 3-5). Each of these ports services its own limited hinterland; however, each service also calls at major transshipment centers which allow cargo from all regions of the world to reach the US east coast and Boston Harbor.

Table 3-5
Boston Harbor Liner Service Direct Call Ports (2007)

Asia	Hong Kong*, China
	Qingdao, China
	Shanghai*, China
	Yantian, China
Mediterranean	La Spezia*, Italy
	Naples, Italy
	Sines, Portugal
	Valencia*, Spain
Northern Europe	Antwerp*, Belgium
	Bremerhaven*, Germany
	Felixstowe, England
	Le Havre, France
	Rotterdam*, Begium

*Indicates major transshipment center; Source: Containerization International 2007 web search

The Boston Harbor liner service direct call ports exclude major trading partners, such as India, and entire world regions, such as Southeast Asia and South America. Therefore, New England containerized cargo destined for or coming from these major trading partners must either transship to a direct call service or use the PONYNJ in order to get direct call container shipping services. Transshipment is a major component of the container shipping industry. The world's largest volume ports such as Shanghai and Singapore transship (move a container from one ship to another) many millions of TEUs each year. Transshipment allows efficient use of large container ships by reducing the number of ports the vessel needs to call on in order to service large regional areas.

3.1.5 Containerized Cargo Characteristics Assessment Conclusion

The purpose of comparing cargo using the PONYNJ with cargo using Boston Harbor is to identify any major differences in cargo using the two ports, which might explain why New England cargo uses the PONYNJ. The comparative assessment of cargo characteristics shows that there are no substantial differences between PONYNJ and Boston Harbor containerized cargo which would be expected to have a substantial systematic impact on port usage.

3.2 Containership Fleet and Operations

Each of the liner services calling at Boston Harbor also call at the PONYNJ. Because of its large population center, port facilities, and intermodal capabilities the PONYNJ is considered an "anchor" port for the US east coast and therefore most major services calling on the US east coast call at the PONYNJ. Currently, on the MSC North Europe service, vessels arrive at the PONYNJ from Le Havre then continue to Boston, Philadelphia, Baltimore and Norfolk before returning to the PONYNJ prior to the trip across the Atlantic. On the MSC Mediterranean service, Boston Harbor is the first US port followed by the PONYNJ. The MSC Mediterranean service continues down the coast to Savannah, but then turns north to Charleston before returning to Valencia, Spain. The Asia Panama service calls on the Pacific side of Mexico

(Lazaro Cardenas) and the Atlantic side of Panama (Cristobal) before working its way up the US east coast. The service calls on Savannah, then PONYNJ, and Boston Harbor before returning to Qingdao via the Panama Canal. Lazaro Cardenas and Cristobal are recent additions to the port rotation. These ports were not included in this service in 2007. The inclusion of these ports opens Boston Harbor to trade with ports on the west and east coasts of South America. South American ports on both coasts run feeder vessels to and from Lazaro Cardenas and Cristobal, which are used as transshipment ports.

The suspended Asia Suez service, which ran from May through December 2011, used vessels ranging from 5,500 TEUs to 6,100 TEUs. The ports-of-call on this service included Boston Harbor (-40 ft.), PONYNJ (-45 feet; -50 feet in 2014), Norfolk (-50 feet), Kaohsiung (-49 feet), Hong Kong (-51 feet), Yantian (-53 feet), Vung Tau (- 48 feet) and Singapore (-53 feet). The port rotation placed Boston between the PONYNJ and Singapore. Singapore, Kaohsiung, and Hong Kong are among the largest transshipment ports in the world.

3.2.1 Vessel Size

An extensive comparative analysis of vessel size was conducted to identify any systematic differences between the fleet calling at the PONYNJ and the fleet calling at Boston Harbor.[8] The analysis was conducted using 2007 data. The comparison was conducted individually for each route with direct service to Boston Harbor. The analysis shows that in 2007 vessels calling at Boston Harbor were consistently smaller in terms of dead weight tonnage (DWT) and maximum sailing draft than vessels calling at the PONYNJ. The use of smaller vessels puts services that call at Boston Harbor at a cost disadvantage. Since 2007, vessel sizes have been upgraded and newer vessels have been added to each service (Table 3-6). COSCO will continue to upgrade the vessels on their service calling at Boston Harbor so that each vessel on the service is the largest possible for Panamax vessels[9]. MSC has also integrated the largest Panamax vessels into services calling at Boston Harbor, which is a substantial change from their 2007 fleet. The Asia Suez service brought Post-Panamax vessels (5,500 TEUs – 6,100 TEUs) to Boston Harbor and the PONYNJ in 2011. This upgrade in vessel size is consistent with a common theme stated by each carrier interviewed, which is that the container shipping business is driven by economies of scale. Smaller, less efficient vessels cannot compete on a service with larger, more efficient vessels. Table 3-7 presents the cost per TEU per 1,000 miles (at service speed) for Panamax and smaller vessels.

[8] Task R-1: Assessment of Existing Conditions and Task R-1: Assessment of Existing Conditions Reference Appendix contain an extensive and detailed analysis of containership operations at the PONYNJ and Boston Harbor in 2007.

[9] COSCO interview 2007; COSCO interview 2010

Table 3-6
Boston Harbor Liner Service Fleets 2007 & 2010

Vessel Name	Total TEU Capacity	DWT	Year Built	Age
Mediterranean Service in 2007				
MSC Bali	2,472	36,314	1980	27
MSC Colombia	4,158	60,348	1996	11
MSC Diego	4,056	56,889	1999	8
MSC Endurance	2,472	36,267	1980	27
MSC Fribourg	*	45,569	1980	27
MSC Greece	2,214	35,551	1995	12
MSC Mediterranean	2,480	41,583	1995	12
MSC Mexico	2,712	40,849	1978	29
MSC Natal	2,638	39,528	1996	11
Average	2,900	43,655	1989	18
Mediterranean Service in 2010				
Cap Victor	4,437	60,639	1989	21
Jennifer Rickmers	5,060	68,189	2004	5
MSC Montreal	4,206	59,283	1989	21
MSC Colombia	4,158	60,348	1996	14
MSC Emma	5,060	68,121	2004	6
MSC Olga	5,060	67,550	2006	4
Average	4,664	64,022	1998	12
Northern Europe Service in 2007				
Hermes	2,490	34,365	2006	1
MSC China	2,808	40,030	1996	11
MSC Christina	3,424	56,902	1998	9
MSC Delhi	3,534	42,183	2004	3
MSC Japan	3,424	43,369	1996	11
MSC Johannesburg	3,467	45,170	1995	12
MSC Prague	3,965	48,930	2003	4
MSC Queensland	3,400	42,183	2004	3
MSC Sardinia	3,074	43,270	1986	21
MSC Sophie	3,500	43,294	1993	14
MSC Ulsan	4,132	52,785	2002	5
MSC Voyager	2,754	36,433	1980	27
MSC Washington	2,824	53,325	1984	23
Average	3,292	44,788	1996	11
Northern Europe Service in 2010				
MSC Eleni	5,060	68,121	2004	6
MSC Ingrid	4,954	66,616	1999	11
MSC Linzie	4,900	67,800	2003	7
MSC Nerissa	5,060	68,121	2004	6
MSC Tanzania	4,545	63,551	1997	13
Average	4,904	66,842	2001	9
Asian Service in 2007				
COSCO Panama	2,702	37,900	2005	2
Da He	4,221	51,946	1994	13
Fei He	4,215	51,280	1994	13
River Wisdom	4,196	49,955	1994	13
Shan He	4,221	51,982	1994	13
Teng He	4,215	51,280	1994	13
Yuan He	4,215	51,280	1994	13
Zhen He	4,221	51,985	1994	13
Zong He	4,221	51,985	1994	13
Average	4,047	49,995	1995	12
Asian Service in 2010				
COSCO Boston	5,089	67,470	2007	3
COSCO New York	5,089	67,470	2007	3
River Elegance	4,196	49,945	1994	16
River Wisdom	4,196	49,995	1994	16
Shan He	4,221	51,982	1994	16
Tian An He	5,100	63,500	2010	0.5
Tian Sheng He	5,106	65,000	2010	0.5
Tian Yun He	5,100	63,500	2009	1
Zhen He	4,221	51,985	1994	16
Average	4,702	58,983	2002	8

*Data not available – vessel decommissioned; Source: Containerization International

Table 3-7: Waterborne Transportation Cost per TEU per 1,000 miles

TEUs	$/TEU
4,800	$33.98
4,000	$36.19
3,500	$38.05
3,000	$40.35
2,800	$41.41
2,500	$43.21

Source: US Army Corps of Engineers Vessel Operating Costs EGM 11-05

3.2.2 Vessel Operations: New England TEUs per Call

New England containerized cargo data for the three liner services calling at both the PONYNJ and Boston Harbor, based on PIERS 2007 data, show that New England cargo on these vessels is predominantly handled at Boston Harbor (Table 3-8). Because these vessels call on Boston Harbor they unload a relatively small amount of New England imports at the PONYNJ. The vessels on these three services account for only 6% of all the New England import TEUs and 4% of New England export TEUs using the PONYNJ. Data for 2010, provided by Massport, indicate small increases in average TEUs per call at Boston Harbor for Asian and European imports from 2007 to 2010 and very small changes for Asian and European exports (Table 3-9). Mediterranean import TEUs per call decreased slightly, but there was a substantial decrease in the number of Mediterranean export TEUs per call.

Table 3-8
Average New England TEUs per Call for Liner Services with Direct Calls at the PONYNJ and Boston Harbor (2007)

	Imports		Exports	
	PONYNJ	POB	PONYNJ	POB
Med	59	261	15	159
NEuro	49	332	32	296
Asia	76	992	16	701

Source: PIERS 2007 data

Table 3-9
Average New England TEUs per Call for Boston Harbor Liner Services (2010)

	Imports	Exports
Mediterranean	252	96
Northern Europe	363	313
Asia	1,090	676

Source: Massport

Although only two carriers handle New England cargo through Boston Harbor, no single carrier dominates the importing of New England TEUs into the PONYNJ. Only two carriers have market share greater than 10% (Maersk and Evergreen), and most carriers have less than 5% market share[10]. Additionally, many carriers call at the PONYNJ with New England cargo more frequently than once a week, indicating that some carriers are active on multiple services.

The average New England TEUs per call for PONYNJ vessel calls are substantially lower than the average New England TEUs per call for vessels on comparable routes calling at Boston Harbor (Appendix A: Table 26). For example, vessels importing New England TEUs through Boston Harbor average 992 New England TEUs on the Asia route versus an average of 97 New England TEUs for vessels importing through the PONYNJ and not calling at Boston Harbor. Similar comparisons can be made for Mediterranean and European cargo.

Overall, the analysis of TEU per call data indicates that New England cargo exhibits a preference for Boston Harbor. When a vessel calls at Boston Harbor, the vast majority of New England cargo on that vessel uses Boston Harbor instead of the PONYNJ. The amount of New England cargo per call at Boston Harbor has remained very stable, with mainly small increases for some services and small decreases for others, despite the impacts of the economic recession. Vessels calling at Boston Harbor carry substantially more New England cargo per call than vessels that call at the PONYNJ and not Boston Harbor.

3.2.3 Vessel Operations: Arrival and Departure Drafts

The controlling depth at Boston Harbor in 2007 was -37 feet. Underkeel clearance is typically three feet or more, which implies that any vessel operating at a draft deeper than -34'0" requires tidal assistance. In 2007, 68% of liner service vessel calls required tidal assistance, which means that these vessels arrived or departed Boston Harbor with operating drafts of 35 feet or more (Appendix A; Table 11). Boston Harbor has a tidal range of approximately 9.4 feet, which carriers often use to gain sufficient underkeel clearance.

In 2007, Asian services calling at the PONYNJ tended to be larger vessels than the Asian service vessels that call at Boston Harbor. Fifty-nine percent of all Asian service calls to PONYNJ were made by vessels larger than the Asian service vessels that call on Boston Harbor (Appendix A:

[10] Task R-1: Assessment of Existing Conditions and Task R-1: Assessment of Existing Conditions Reference Appendix, Chapter 3 Cargo, Vessel, and Vessel operating Characteristics for New England TEUs Using the PONYNJ

Table 19). Similarly 60% of all Asia import cargo was on vessels that are larger than the Asian service vessels calling on Boston Harbor (Appendix A: Table 20). At Boston Harbor with a 37-foot controlling depth, 94% of inbound Asian service vessels arrived with drafts ranging from 34 to a maximum of 37 feet (Appendix A: Table 11). No vessel on the Asia service arrived at Boston Harbor with a draft greater than 37 feet, in 2007. By contrast, Asia service vessels calling at the PONYNJ arrived with drafts greater than 37 feet on 36% of inbound calls (Appendix A: Table 18).

In 2007, MSC rotated 22 vessels on its Europe and Mediterranean services that call at both the PONYNJ and Boston Harbor (Table 3-6). These 22 vessels ranged from 34,000 DWT to 57,000 DWT, although most vessels were in the 36,000 DWT to 45,000 DWT range. Europe and Mediterranean service vessels ealling on the PONYNJ ineluded substantially larger vessels than Europe and Mediterranean service vessels that call on Boston Harbor (Appendix A: Table 21). Forty-one percent of the Europe and Mediterranean service vessel calls to the PONYNJ were by vessels larger than the Europe and Mediterranean service vessels that call on Boston Harbor. Europe and Mediterranean services to the PONYNJ include a number of niche services, such as Turkon Line's service with Turkey, which include vessels smaller than 32,000 DWT. These small vessel services increase the proportion of light draft vessel calls at the PONYNJ.

Vessel arrival and departure draft data for the first half of 2010 indicates that vessels are transiting Boston Harbor with deeper drafts than identified in 2007 (Table 3-10). Unfortunately the 2010 operating draft data includes only January through July 2010 and therefore includes only a limited number of trips and does not reflect the larger number of TEUs per call carried on Asia service vessels in August through October, when ships are more heavily laden than at other times of the year due to inventory stocking in anticipation of the December holidays. The average import TEUs per call for the Asian service during those later months was 1,179 TEUs per call, but is not reflected in Table 3-9. In 2010 the controlling depth at Boston Harbor is -38 feet, which is one foot deeper than the controlling depth in 2007 (-37feet). Also, each of the three liner services calling at Boston Harbor is using newer and larger vessels in 2010 (Table 3-6). On average and in terms of DWT, vessels on the Europe service are 49% larger, vessels on the Mediterranean service are 47% larger, and vessels on the Asian service are 18% larger (Table 3-6) than they were in 2007.

Table 3-10 shows that vessels on each of the three services tended to arrive and depart Boston Harbor with deeper drafts in 2010 than in 2007. This increase in operating drafts at Boston Harbor is attributable to the additional foot of controlling depth at Boston Harbor due to maintenance dredging and the use of larger vessels in 2010 as compared to 2007 for each of the three services.

Table 3-10
Comparative Boston Harbor Arrival and Departure Drafts: 2007 and 2010*

	Asia Service				Europe Service				Mediterranean Service			
	Import		Export		Import		Export		Import		Export	
Draft	2007	2010	2007	2010	2007	2010	2007	2010	2007	2010	2007	2010
>40	0%	0%	0%	0%	2%	34%	3%	24%	4%	15%	0%	11%
40	0%	5%	0%	6%	6%	24%	4%	28%	7%	5%	9%	5%
39	0%	5%	0%	6%	10%	7%	8%	17%	11%	15%	2%	16%
38	0%	21%	0%	17%	7%	10%	10%	7%	20%	15%	20%	16%
37	8%	16%	8%	33%	9%	3%	9%	7%	11%	30%	11%	26%
36	22%	47%	22%	22%	11%	10%	13%	7%	20%	5%	24%	11%
35	33%	5%	39%	17%	16%	3%	13%	0%	13%	0%	18%	11%
34	31%	0%	27%	0%	12%	3%	16%	3%	7%	10%	4%	0%
33	4%	0%	4%	0%	5%	0%	9%	0%	4%	0%	7%	0%
32	0%	0%	0%	0%	7%	0%	5%	3%	2%	5%	2%	0%
31	0%	0%	0%	0%	7%	3%	6%	0%	0%	0%	0%	5%
=<30	2%	0%	0%	0%	7%	0%	6%	3%	2%	0%	2%	0%

Source: WCSC (2007) and Boston Harbor Pilot Association (2010);*January through July data

The 2010 vessel operating draft data exhibits an even greater reliance on the tide for vessels on the Europe and Mediterranean services than the 2007 data. Table 3-11 shows the average wait time and the number of vessels that were affected by tidal delays. The average wait time is the expected value of the wait time accounting for the probabilities of tide height and length of height availability. Actual wait times will vary from the average. Vessels on the Asia service show a similar use of tide and much less tolerance for waiting to obtain tidal advantage, which is consistent with statements by COSCO concerning the need to arrive at the Panama Canal according to a very strict and punitive schedule. In the first half of 2010, 91% of liner service vessel calls (inbound and outbound) used tidal advantage. Thirty-nine percent of vessel calls tolerated an average wait of up to nearly three hours. An additional 26% were willing to wait between 2.9 and 3.7 hours and 27% waited from 3.7 hours to 5.1 hours to obtain suitable tidal advantage.

Table 3-11
Boston Harbor Liner Service Vessels Using the Tide 2010

Vessel Draft*	Tide Height Needed (ft)	Average Wait (hrs)	Asia Service		Europe Service		Med Service		Total
			In	Out	In	Out	In	Out	
44	9.0	5.57	-	-	-	-	-	-	0
43	8.0	5.05	-	-	2	-	-	-	2
42	7.0	4.54	-	-	5	4	2	1	12
41	6.0	4.09	-	-	8	11	2	1	22
40	5.0	3.69	1	2	3	6	3	4	19
39	4.0	3.32	4	2	3	2	3	2	16
38	3.0	2.89	4	6	1	2	6	6	25
37	2.0	2.23	7	5	2	2	-	1	17
36	1.0	1.85	3	2	2	-	1	2	10
35	0	0	-	1	1	-	2	1	5
34			-	-	-	1	1	-	2
33			-	-	-	1	1	-	2
32			-	-	1	-	-	1	2
31			-	-	-	1	-	-	1

Source: USACE New England District; * Note drafts rounded up to nearest foot; **Assumes 3 feet underkeel clearance

3.2.4 Containership Fleet and Operations Assessment Conclusion

The trend towards larger vessels as projected by the carriers during the carrier interviews is visible in the data for Boston Harbor and in the data for vessel operations on the US east coast. Boston Harbor is now served by a newer, larger, and more efficient fleet than in 2007, as shown in Table 3-6. Differences in vessel size between the PONYNJ and Boston Harbor fleet have somewhat diminished now that Boston Harbor receives the largest Panamax vessels in the world fleet; however there are no Post-Panamax vessels calling at Boston Harbor.

US east coast container shipping is currently transitioning to Post-Panamax vessels. Even before the opening of the expanded Panama Canal in 2014, carriers are now shifting to Post-Panamax vessels servicing the US east coast by using the Suez Canal. These vessels are as large as 8,500 TEUs. The same carriers are currently using 14,000 TEU vessels on services between Europe and Asia, via the Suez Canal.

Post-Panamax vessels are currently by-passing Boston Harbor. For example, the 5,600 TEU vessels on the Green Alliance (COSCO, Hanjin, Yang Ming, and K-Line) service from Southeast Asia via the Suez Canal to the east coast of North America call at Halifax from Singapore and then stop at the PONYNJ, by-passing Boston Harbor even though none of the ports on that service have a direct call to Boston Harbor. The Green Alliance is also adding another Asia-US east coast service via the Suez Canal, which began in mid-2011. This service uses 8,000 TEU vessels and by-passes Boston Harbor.

Similarly, the Grand Alliance, which includes Hapag-Lloyd, NYK Line and OOCL, runs a service from Southeast Asia, the Indian sub-continent, and Europe to Halifax and the PONYNJ with Post-Panamax vessels ranging from 5,300 to 5,900 TEUs. MSC's Golden gate service uses 8,000 TEU vessels, which go directly to the PONYNJ after transiting the Suez Canal. The Maersk/CMA CGM TP3 service from Asia to the US east coast via the Suez Canal has recently upgraded to 8,500 TEUs, but also does not call at Boston Harbor.

As explained consistently by the carriers during the interviews, Boston Harbor has an excellent geographic advantage as the closest US port to the Suez Canal but Post-Panamax vessels will not call unless greater depth is available. All of the major Asia – US east coast liner services, whether via the Suez Canal or the Panama Canal, will use Post-Panamax vessels after the Panama Canal expansion is complete.

The vessels currently calling at Boston Harbor are loaded as deeply as existing authorized channel conditions allow. The increase in vessel arrival and departure drafts from 2007 to 2010 (Table 3-10), and the increase in TEUs per call from 2007 to 2010 (Tables 3-8 and 3-9), in response to a single additional foot of depth is a strong indication that carrier operations at Boston Harbor are draft constrained. The carriers have consistently stated that the vessels calling at Boston Harbor are loaded as deeply as they can be, and this statement is supported by the data showing that nearly all vessel calls in 2010 required tidal assistance (Table 3-11).

3.3 Existing Conditions Summary

The existing conditions analysis needs to answer the question: Why doesn't more New England cargo use Boston Harbor under existing conditions? The analysis has identified that although Boston Harbor is closer than the PONYNJ to nearly all New England TEU origins and destinations, only 38% of New England TEUs use Boston Harbor and 62% use the PONYNJ (Table 3-1). Furthermore, the shipper survey analysis[11] indicates that there are a minimum of 131,000 New England TEUs (at the 2007 level of trade) that appear to have the potential to shift from the PONYNJ to Boston Harbor (given the opportunity of adequate service), but these TEUs have not made the shift.

The reasons why so much New England cargo uses the PONYNJ are described in the data and in the interviews with carriers. Shippers cannot use Boston Harbor if the carriers do not offer the opportunity. Carriers do not offer the opportunity because:

- Boston Harbor's depth constraint reduces vessel efficiency and causes delays; and

[11] Appendix A: Chapter 6 Shipper Survey and Chapter 7 Estimation of TEUs Available to Shift from the PONYNJ to Boston Harbor

- All liner services carrying New England cargo call at the PONYNJ which is historically the alternative port for New England cargo.

Under existing conditions Boston Harbor (-38 feet) is 7 feet shallower than the PONYNJ. Vessels calling at Boston Harbor, all of which also call at the PONYNJ as either the previous port or next port, make up for this depth differential by using the tide, enduring delays, and restricting vessel loading[12]. Nearly every liner service vessel transit in the first six months of 2010 (128 out of 135) used the tide at Boston Harbor, with average delays ranging from 1 to 5 hours. None of the vessels required the full 9 feet of tide, which would result in an average delay of almost 6 hours. When vessels do call on Boston Harbor, they offload and load far more New England TEUs per call than any vessel offloads or loads New England TEUs at the PONYNJ.

Carriers face the choice of enduring delays, delay-related costs, and loading restrictions that are associated with adding a call at Boston Harbor or offloading and loading New England cargo at the PONYNJ, which is already in the port-rotation. If there are as many New England TEUs that could potentially shift to Boston Harbor as the analysis suggests, the fact that there are more than 40 carriers currently bringing New England import cargo to the PONYNJ, but there are only two carriers calling at Boston Harbor implies that the industry has very limited tolerance for systematic delays, light-loading, and related inefficiencies.

The suspended Asia Suez service did not have the burden of a Panama Canal schedule and associated late fees, however, these vessels were severely restricted by channel depth at Boston Harbor. Discussions with COSCO[13] and Hanjin[14] personnel in 2011 indicate that it is the carriers' intention to draw additional New England cargo from the PONYNJ. According to the carriers, the vessel size for this new service (5,500 – 6,100 TEUs) was determined by projected cargo volume, vessel availability due to the "cascade effect", and the need to put a competitive size vessel in the Asia – US east coast trade. These vessels brought an additional 30,000 TEUs through Boston Harbor in only a few months, which is an indication of the availability of cargo to shift to Boston Harbor. The carriers have not indicated when this service might be renewed.

[12] MSC interview 21Dec04, MSC interview 18Apr07, Maersk interview 09Aug10

[13] COSCO interview 06Apr11

[14] Hanjin interview 05Apr11

4 Without-Project Condition

The major changes between existing conditions and the without-project condition are driven by the Panama Canal Expansion, which will increase the canal's capacity from the current 5,100 TEU vessel to a 12,000 TEU vessel. The expanded Panama Canal will be able to accommodate vessels with sailing drafts of -50 feet. The Suez Canal is already capable of handling vessels with sailing drafts of -66 feet. The PONYNJ is coordinating completion of its 50-foot deepening project with the opening of the expanded Panama Canal, which is scheduled for 2014. At that time, there will be a 10-foot differential between Boston Harbor's without-project condition controlling depth (-40 feet) and the controlling depth at the PONYNJ (-50 feet). All of the major US east coast ports have been upgrading their infrastructure over the past few years to accommodate the larger vessels that will be using the expanded canal. Boston Harbor has upgraded to four Post-Panamax cranes capable of operating a 16-container wide vessel. Massport has also purchased 30 acres of property adjacent to Conley Terminal that would be used for Post-Panamax vessel berthing and cargo handling. This additional acreage allows Conley terminal to avoid air-draft issues associated with the new Post-Panamax cranes[15].

Tables 4-1 and 4-2 present the without-project controlling depths of the ports currently on a direct call service with Boston Harbor. The controlling depths for the PONYNJ and Savannah Harbor assume completion of their currently authorized deepening projects. Each of the US ports in this table is currently called on by 8,500 TEU Post-Panamax vessels. The foreign ports in this table are currently called on by vessels up to 10,000 TEUs. Boston Harbor, under without-project conditions (-40 feet) would be the draft constraint for each service.

[15] COSCO Interview 31Aug10

Table 4-1
Controlling Depths: Boston Harbor MSC Services

Europe Service		Mediterranean Service	
Bremerhaven	-48.2 ft	Gioia Tauro	-49.2 ft
Felixstowe	-49.2 ft	Naples	-49.2 ft
Antwerp	-51.2 ft	La Spezia	-47.5 ft
Le Havre	-50.8 ft	Valencia	-52.5 ft
PONYNJ*	-50 ft	Sines	-52.5 ft
Boston	-40 ft	Boston	-40 ft
Philadelphia	-45 ft	PONYNJ	-50 ft
Baltimore	-50 ft	Baltimore	-50 ft
Norfolk	-50 ft	Norfolk	-50 ft
		Savannah**	-47 ft
		Charleston	-45 ft

Source: Containerization International
Notes: *projected for 2015; ** projected for 2016

Table 4-2
Controlling Depths: Boston Harbor COSCO Panama Service

Qingdao	-57.4 ft
Shanghai	-52.5 ft
Ningbo	-49.2 ft
Yokohama	-52.5 ft
Lazaro Cardenas	-52.5 ft
Cristobal	-47.9 ft
Savannah*	-47 ft
PONYNJ**	-50 ft
Boston	-40 ft

Source: Containerization International
Notes: * projected for 2016; **projected for 2015

Under existing conditions, the depth constraint at Boston Harbor has already caused some carriers to avoid Boston Harbor, and has also caused much New England cargo to use the PONYNJ rather than Boston Harbor. Under future without-project conditions, the deepening of the PONYNJ to -50 feet, the expansion of the Panama Canal, and the continuing trend towards larger and deeper draft vessels in the world container fleet will all coalesce to further intensify the impacts of the depth constraint at Boston Harbor, making it even less attractive as an option for both carriers and shippers to use in transporting New England cargo.

4.1 US East Coast Containership Fleet

The fleet of containerships calling at US east coast ports in the without-project condition will no longer be constrained by the original dimensions of the Panama Canal. Vessel size will be determined by economic efficiency, which requires that large vessels be operated near capacity. All of the major carriers operate collaboratively either through alliances, partnerships, or slot sharing agreements in order to maximize utilization of their fleet. In alliances, carriers make exclusive agreements among alliance members concerning vessel allocation and slot allocation. An example of an alliance agreement is the way that the Green Alliance allocates vessels and slots to the five services it operates between Asia and the US east coast. The AWE1 service is entirely Hanjin vessels, the AWE2 services is entirely COSCO vessels (this service calls at Boston Harbor), the AWE3 service is entirely Yang Ming vessels, the AWE4 service is entirely K-Line vessels and the AWE5 service is half K-Line vessels and half Hanjin vessels. Each carrier also has slots allocated on each of the five services, but there are no slots allocated to carriers outside of the alliance. In partnerships, carriers often share vessels on the same service, such as the Columbus service shared by CMA CGM (6,500 – 8,500 TEU vessels) and Maersk

(6,000 – 7,400 TEU vessels) which links Asia to the US east coast (PONYNJ, Norfolk, and Savannah). This service also allocates slots to Hyundai Merchant Marine[16]. Slot sharing allows carries to offer their clients direct call services to ports that the carrier's vessels do not call on by using space on other carriers' vessels.

The purpose of all of these arrangements is to allow carriers to use larger, more efficient vessels at a high level of utilization. The transition to larger vessels, especially the transition to Post-Panamax vessels calling on the US east coast, is currently ongoing and will continue with the expansion of the Panama Canal.[17] Vessels as large as 8,465 TEUs (CMA CGM Figaro and CMA CGM La Scala, Columbus service from Asia to North America) currently call at the PONYNJ which indicates that the height of the Bayonne Bridge is not a constraint for vessels of this TEU capacity. Under without-project conditions, it is reasonable to project that carriers will continue the trend of deploying Post-Panamax vessels to the US east coast. These vessels would range in size from 5,600 TEUs to 8,500 TEUs, which is consistent with the current Post-Panamax fleet calling on the US east coast.

4.2 Boston Harbor Containership Fleet

Under without-project conditions, which include a -40-foot controlling depth at Boston Harbor, Post-Panamax vessels larger than the existing fleet (5,500 – 6,100 TEUs) will not call at Boston Harbor.[18] Although Boston Harbor is currently served by the largest Panamax vessels in the world fleet (5,060 - 5,100 TEU vessels) and small Post-Panamax vessels (5,500 – 6,100 TEU vessels), draft constraints preclude use of larger Post-Panamax vessels. Recent history at Savannah Harbor is an indication of carrier's concerns about depth constraints and Post-Panamax vessel deployment. Savannah Harbor is the second largest container port on the US east coast (2.4 million TEUs in 2009) but the controlling depth is only -42 feet. MSC deployed Post-Panamax vessels (6,700 TEUs; maximum draft 47 feet) to Savannah in 2007, but pulled Savannah out of the port rotation because of inability to fully laden the vessel because of depth constraints and frustration over tide delays[19]. In 2009, MSC put Savannah back into the rotation because a sufficient amount of Savannah cargo did not follow MSC's Post-Panamax vessels to neighboring Charleston, which has a controlling depth of -45 feet. Carriers struggle with tide delays at Savannah Harbor, but continue to deploy Post-Panamax vessels because of the large volume of cargo at Savannah[20]. Boston Harbor has neither Savannah's cargo volume, even if all New England cargo were to be included, nor its depth. The absence of these two conditions precludes larger Post-Panamax vessels from calling at Boston Harbor under without-project conditions.

Under future without-project conditions, carriers have stated during the interviews (and transportation cost analysis confirms) that large Post-Panamax vessels will not regularly call at Boston Harbor. Therefore, services projected to shift to large Post-Panamax vessels will not

[16] Containerization International website (www.ci-online.uk.com) accessed 08Dec10
[17] COSCO interview 31Aug 10; CMA CGM interview 10Aug10; Evergreen interview 10Aug10; Maersk interview 09Aug10; MSC interview 10Aug10; OOCL interview 02Sep10
[18] Ibid.
[19] Interview conducted with MSC for Savannah Harbor Expansion Project (Report of Interviews with Carriers JD comments 06Jul09.doc)
[20] Personal communication with Hope Moorer, Georgia Ports Authority

include Boston Harbor as a port of call. Boston Harbor will lose its existing Asia service via the Panama Canal under without-project conditions and will no longer have a direct service call from Asia. Boston Harbor will also likely lose cargo to Halifax or the PONYNJ on the Mediterranean and Europe services, which even though they will continue to use Panamax vessels, the increase in Post-Panamax vessels coming to the US east coast through the Suez Canal (and the Mediterranean and Europe) will draw cargo away from these Panamax vessel services.

Continued use of Panamax vessels on an Asia-US east coast service to Boston Harbor would be unlikely after the Panama Canal expansion is complete, because of the relative inefficiency of Panamax vessels on that long haul trade when compared to Post-Panamax vessels (Table 4-3). Carriers make vessel selection, deployment, and port of call decisions based on minimizing their total system transportation costs for the entire service, not just based on the least cost method of servicing one particular region or one port of call (such as Boston Harbor).

Table 4-3 shows the waterborne transportation cost savings per TEU for Post-Panamax vessels compared to a 5,060 TEU Panamax vessel for a one-way trip from Qingdao, China to the PONYNJ[21]. Carriers that shift from a 5,060 TEU Panamax vessel to an 8,750 TEU Post-Panamax vessel would save 19% of the waterborne transportation cost for each TEU. This cost differential explains why carriers have been shifting to larger vessels whenever feasible and explains why Panamax vessels will not be competitive on Asia – US east coast services after the completion of the Panama Canal.

Table 4-3
One-Way Waterborne Transportation Costs per TEU from Qingdao China to the PONYNJ

Vessel Size (TEUs)	$/1,000 miles	Cost to PONYNJ	Savings	% Savings
9,200	$26.37	$302.66	$78.60	20.6%
8,750	$27.00	$309.87	$71.40	18.7%
8,204	$27.84	$319.51	$61.75	16.2%
7,024	$29.72	$341.06	$40.20	10.5%
5,060	$33.22	$381.26	---	---

Source: USACE Vessel Operating Costs EGM 11-05

Furthermore, the carrier would not actually lose New England cargo by not offering Boston Harbor at a port of call, because New England cargo can use the PONYNJ and the carrier can pass the additional cost of the landside transportation on to the shipper, who does not have a lower cost alternative from which to choose, since the same economies of scale apply to all

[21] Waterborne transportation costs calculated at vessel service speed

carriers servicing the same international markets. As a result, the carrier gains the efficiency of using Post-Panamax vessels to service all its other adequately deep ports of call by not calling on Boston Harbor, and the shipper passes along the additional landside transportation costs to the ultimate consumer (and the nation).

The carrier has indicated during the carrier interviews that vessels on Asian services (via the Suez Canal and via the Panama Canal) will be greater than 7,000 TEU vessels based on the Panama Canal expansion, projected vessel availability, and projected cargo volumes. Other carriers have indicated that vessels in the 8,000 TEU range will be the standard for services to the US east coast. The President of the Panama Canal Commission has stated that vessels in the 8,000 TEU range will be the work-horse of the expanded canal.

The size of the fleet calling at US east coast ports will be determined by the projected cargo volumes and port infrastructure of the major ports (PONYNJ, Savannah, Norfolk and Charleston). These are the "anchor ports" which will drive the carrier's vessel size and deployment decisions. The inclusion of smaller volume ports into the port rotation will depend on whether that port has sufficient cargo and infrastructure to support a call by the vessel selected to service the major ports. Under this decision structure, the controlling depth at Boston Harbor will not influence the size of vessels on the major services calling at US east coast ports, but controlling depth at Boston Harbor will influence whether Boston Harbor is included in a service's port rotation.

The projected future without-project fleet at Boston Harbor includes:

- Mediterranean Service: Panamax vessels (4,900 TEUs) similar in size to vessels in the existing fleet;
- Europe Service: Panamax vessels (5,060 TEUs) similar in size to vessels in the existing fleet;
- Asia Panama Service: No calls at Boston Harbor. Vessels on this service are projected to be 8,500 TEU, which will by-pass Boston Harbor; and
- Asia Suez Service: No calls at Boston Harbor. Vessels on this service are projected to be 8,500 TEU, which will by-pass Boston Harbor.

4.2.1 Hub and Spoke System

An alternative scenario, which could result from the Panama Canal expansion, would be a hub and spoke distribution system in which a very large ship from Asia calls on a single hub port near the US east coast, such as Freeport, Bahamas or Cristobal, Panama. The large vessels would unload cargo at the hub port which is then transshipped to smaller, feeder vessels. The feeder vessels would directly call on a series of US east coast ports.

Hub and spoke distribution systems do not have a successful history on the US east coast, largely due to the expense of double handling cargo (loading and unloading at the transshipment terminal) and the availability of an extensive landside distribution network. Transshipment increases marine related transportation costs, although there may be savings on landside transportation costs if the feeder port is closer to the cargo origin or destination. The use of direct calls by large vessels to a limited number of large ports presents lower marine-related costs to the carrier, but may increase total origin to destination costs due to greater landside distances. Carriers have tended not to use hub and spoke distribution systems when alternative

landside transportation infrastructure is available and land side transportation costs can be borne by other parties.

Table 4-4 presents an example of two potential hub and spoke systems from Asia to the US east coast and their associated waterborne transportation costs. One system uses the Panama Canal and transships cargo at the Port of Cristobal on the Atlantic side of the canal. The other system uses Freeport, Bahamas as the transshipment port. In both examples, the large vessel is a 9,200 TEU Post-Panamax vessel (MSC Chicago) and the feeder vessel is a 4,900 TEU Panamax vessel (NYK Meteor). These vessels were selected to display the cost comparison. In these examples the large vessel brings cargo from Asia to the transshipment terminal and the feeder vessel brings the cargo from the transshipment terminal to Boston. The table also shows the waterborne costs for a direct call to PONYNJ (the without-project condition) by an 8,200 TEU Post-Panamax vessel (MSC Paris). These costs do not include the costs of trans-shipment (moving boxes from one vessel to another, storage, etc.) that are not associated with a direct call of a vessel from one port to another.

Table 4-4
Waterborne Transportation Costs Excluding Transshipment Costs

Route	Total Distance	Vessel Cost per TEU/1,000 miles			Total Cost per TEU*
		MSC Paris	MSC Chicago	NYK Meteor	
Hong Kong - PONYNJ	11,028	$27.84			$307.03
Hong Kong – Freeport	10,246		$26.37		$270.22
Freeport - Boston	1,205			$33.68	$40.58
Hong Kong – Freeport - Boston	11,451		$26.37	$33.68	$310.80
Hong Kong – Manzanillo	9,085		$26.37		$239.60
Manzanillo - Boston	2,217			$33.68	$74.67
Hong Kong – Cristobal - Boston	11,302		$26.37	$33.68	$314.27

Source: USACE Vessel Operating Costs EGM 11-05;*Waterborne transportation costs only exclusive of transshipment costs

Table 4-4 indicates that transshipment costs as little as $10 per TEU, added to waterborne transportation costs, would reduce to zero any savings to the carrier resulting from a hub and spoke distribution system to Boston when the alternative is a direct call to the PONYNJ. Transshipment costs range from $100 to $200 per TEU at non-US ports[22] and can range from $500 to $800 at US ports[23]. The Columbia Transport barge service which has transshipped cargo from the PONYNJ to Boston Harbor via barge has recently dropped the PONYNJ to Boston

[22] Asaf Ashar, "Revolution #4", *Containerization International*, December 2006 (page 46).
[23] Columbia Coastal Transport Interview 02Sep10

service, due largely to the cost of double handling cargo and competition from landside transportation alternatives.

An economic analysis of a potential future hub and spoke system conducted by the National Ports and Waterways Institute, University of New Orleans[24] concluded that "there are dwindling economies of scale once any mothership of a direct service reaches 4,000 TEUs or larger and as a consequence the shift from direct service to a hub and spoke network cannot generate the ship cost savings needed to offset higher transshipment expenses" (page 49). A similar result is expressed in Table 4-4 above. The basis for the confirmatory results of both economic analyses (National Ports and Waterways Institute and Table 4-3) is that a hub and spoke system is more expensive than direct service using a Panamax vessel. A hub and spoke network may be a reasonable alternative for carriers if the spoke ports cannot handle a Panamax vessel or if Panamax vessels are not available, but neither of these conditions applies to the US east coast (or Boston Harbor) in the without-project condition.

Overall, the analysis of without-project conditions indicates that Boston Harbor will continue to be called on by a fleet including the largest Panamax vessels in the world fleet, which is consistent with the existing condition. Post-Panamax vessels will not call at Boston Harbor under without-project conditions due to the inefficiencies caused by the without-project channel depth constraint. A hub and spoke system using smaller feeder vessels would be unlikely to include Boston Harbor, and would unlikely be established for the US east coast, because direct call with Panamax vessels is a less costly alternative for the carriers.

4.3 Boston Harbor Cargo

In the without-project condition, New England containerized cargo will continue to use both the PONYNJ and Boston Harbor. To the extent that the Panamax vessels calling at Boston Harbor cannot compete on a cost basis with the Post-Panamax vessels calling at the PONYNJ, Boston Harbor may lose some New England cargo to the PONYNJ because carriers may look to place cargo on the most efficient vessels. In addition, Post-Panamax vessels need to operate at a high level of utilization to maintain efficiency. However, the occurrence of Post-Panamax vessels and Panamax vessels on the same trade route exists today, although on different services, and the vessels calling at Boston Harbor are as full as channel conditions allow. Therefore, it is assumed that vessels calling at Boston Harbor under without-project conditions will continue to carry an equivalent volume of cargo, adjusted for the fully maintained -40 foot channel, as they carry under existing conditions.

An updated long-term commodity forecast for Boston Harbor containerized cargo or for New England containerized cargo was not conducted for this analysis because it would bring limited added value to the analysis. Any deepening increment at Boston Harbor would potentially induce shifting some but not all of the number of New England TEUs which would use the PONYNJ, as will be presented in Chapter 6: With-Project Conditions. The total potential number of TEUs shifting to Boston Harbor under alternative with-project conditions for each alternative is substantially less than the 367,000 New England TEUs projected to use the PONYNJ in the base-year of the analysis (2015).[25] Recent containerized commodity forecasts of

[24] Asaf Ashar, "Revolution #4", *Containerization International*, December 2006 (pages 46 – 49).

[25] Note that 255,300 New England TEUs were identified as using the PONYNJ in 2007 based on PIERS data.

the US east coast, such as the forecasts used in the Savannah Harbor Expansion Project[26] and the Bayonne Bridge Air Draft Analysis[27], indicate overall 20-year average annual growth ranging from approximately 3.5% to 7%. Whether projected growth of New England containerized cargo is somewhat more or somewhat less than this range would have no impact on this analysis.

4.4 Boston Harbor Vessel Operations

Under without-project conditions, the liner service carriers calling at Boston Harbor are projected to take advantage of the additional two feet of depth afforded by the completion of the current maintenance dredging project (-38 feet existing to -40 feet at completion of the maintenance project in 2012) in a manner similar to the way carriers took advantage of the additional foot afforded by initiation of the maintenance project (-37 feet in 2007 to -38 feet existing). Table 3-10 indicates that vessels transited the channel in 2010 with consistently deeper drafts than in 2007. In addition, there was a shift to larger vessels between 2007 and 2010 and a greater reliance on the tide. Carriers are projected to continue making use of the tide in the without-project condition in the same manner as under existing conditions (Table 3-11). Carriers are not projected to make use of larger vessels, other than minor shifts within the Panamax class of vessels, because the carriers are already using the largest Panamax vessels in the world fleet.

4.5 Without-Project Conditions Summary

Under without-project conditions, the potential for cargo to shift from the PONYNJ to Boston Harbor identified in Chapter 3: Existing Conditions is projected to persist and would be only slightly relieved by the increase in controlling depth at Boston Harbor from -38 feet to -40, after all maintenance dredging has been completed (2012). Three of the four liner services calling at Boston Harbor under existing conditions are projected to continue calling at Boston Harbor under without-project conditions using the current fleet of large Panamax vessels and small Post-Panamax vessels. There will be a substantial shift to large Post-Panamax vessels (8,000+ TEUs) for services calling at US east coast ports from Asia after the Panama Canal Expansion and deepening of the PONYNJ are completed (2014). Large Post-Panamax vessels will not call at Boston Harbor under without-project conditions; therefore Boston Harbor will not have a direct call service with Asia via the Panama Canal under without-project conditions.

[26] USACE, Savannah District, Draft General Re-Evaluation Report for Savannah Harbor Expansion Project, Nov 2010
[27] USACE, New York District Bayonne Bridge Air Draft Analysis, Sep 2009.

5 Management Measures

Management measures are the general categories of actions which are the basis for alternative plan development. The management measures used in this economic analysis were developed through discussions and interviews with Massport, Conley Terminal operations and management personnel, and Boston Harbor Pilots Association members. Management measures identified to address the navigation-related problems at Boston Harbor include operational (i.e., non-structural) measures, locally implemented structural measures, and structural modification of the Federally authorized channel.

The management measures presented below were assessed for their potential as building blocks of the alternative plans for potential navigation improvements at Boston Harbor. Equal consideration must be given to structural and non-structural measures during the planning process. Management measures are listed below according to the problem they are designed to address and according to whether the measure is structural or non-structural.

1. Management Measure Objective: Reduce light loading and tidal delays

   Non-Structural Measures

   - Time arrivals and departures with optimal tide height
   - Reduce underkeel clearance requirement
   - Increase efficiency of landside operations to decrease turn-around time
   - Use feeder vessels in a hub and spoke system
   - Use smaller vessels

   Structural Measures

   - Deeper channel
   - Increased/Improved landside infrastructure

2. Management Measure Objective: Allow use of larger, more efficient vessels

   Non-Structural Measures

   - Reduce underkeel clearance requirement
   - Increase capability of landside operations to accommodate larger vessels
   - Load vessel so that it fits within channel constraints

   Structural Measures

   - Deeper channel
   - Improve landside infrastructure to accommodate larger vessels

3. Management Measure Objective: Reduce origin to destination transportation costs for New England containerized cargo

   Non-Structural Measures

   - Reduce underkeel clearance requirement
   - Increase efficiency of landside operations to decrease turn-around time
   - Use feeder vessels in a hub and spoke system
   - Load more New England cargo on existing vessels that call at Boston Harbor
   - Add more vessel calls to services already calling at Boston Harbor
   - Add Boston Harbor as a port of call

   Structural Measures

   - Deeper channel
   - Increased/Improved landside infrastructure

Three typical ways to increase the TEU throughput at a port would be to increase the number of vessel calls, increase vessel utilization (more TEUs per call), and/or increase vessel size. Each of these measures is evaluated for conditions at Boston Harbor. The evaluation of increasing the number of vessel calls is presented in section 5.1.9 Add More Vessel Calls to Existing Boston Harbor Services and in section 5.1.10 Add Boston Harbor as a Port of Call. The evaluation of increasing vessel utilization is presented in section 5.1.8 Load More New England Cargo on the Vessels that Currently Call at Boston Harbor. The evaluation of increasing vessel size is presented in section 5.1.7 Light Load Larger vessels So They Can Transit the Federal Channel.

5.1 Evaluation of Alternative Non-structural Measures

Each non-structural management measure must be assessed to determine whether it is feasible to recommend the measure for more detailed analysis and potential implementation. If appropriate, non-structural measures are assessed from the perspective of economic rationality.

5.1.1 Reduce Underkeel Clearance Requirement

Reducing the underkeel clearance requirement at Boston Harbor would allow vessels to load more deeply, incur fewer tide delays, and allow some larger vessels to transit the harbor (management measure objectives 1-3). The minimum three feet of underkeel clearance guideline at Boston Harbor is consistent with other deep-water ports in the United States. Specifically, the ports of New York – New Jersey, Delaware River, Norfolk – Hampton Roads, and Los Angeles – Long Beach, which require a minimum of three feet underkeel in their harbors. The recent economic analysis conducted for the Savannah Harbor Expansion Project[28] used a minimum 4-foot underkeel clearance for Panamax vessels. The Federal channel at Boston Harbor has areas of hard substrate and a reduction of the minimum underkeel clearance guideline is not considered consistent with safe vessel operations.

[28] USACE, Savannah District, Draft General Re-Evaluation Report for Savannah Harbor Expansion Project, Nov 2010

It is the pilot's decision whether conditions are adequate for a vessel to transit the river at a given time. The Boston Harbor underkeel guidelines are minimum standards and are not intended to be limiting for pilots, operators, or owners that choose to require a higher degree of safety for their operations. It is also the owners/operators discretion to require that their vessels transit with underkeel clearance in excess of the minimum requirements established by the guidelines. For example, some carriers consider 10% of the vessels' design draft to be a standard rule of thumb for underkeel clearance, which is more than four feet for the largest container ships calling at Boston Harbor.

Vessels that are depth-constrained by the controlling depth of Boston Harbor can achieve the minimum underkeel clearance by timing arrivals and departures with the tide. Boston Harbor has a mean tide range of 9.4 feet. Containerships regularly make some use of the tide when transiting Boston Harbor (Table 3-11). The berths at Conley terminal are dredged to -45 feet to accommodate vessels that use the tide. The pilots operate with real-time channel depth information. There is no additional navigation information or other operational changes that would be sufficient to allow systematic reduction of the underkeel clearance guideline. Therefore, this alternative will not be considered further.

5.1.2 Improve Scheduling of Vessel Arrivals and Departures

If carriers could more effectively schedule vessel arrivals and departures to coincide with favorable tide heights, then vessels could load more deeply while incurring fewer tidal delays (management measure objective 1). Currently vessels either slow steam or wait for tidal advantage. Scheduling arrivals to catch the favorable tide, without incurring costly delays or the costs associated with increased speed, would require the vessels to leave the previous port at the correct time. In order to leave the previous port at the correct time the vessel may either need to leave the port sooner than was planned or sooner than all offloading and loading is completed. It is simply infeasible to regularly schedule vessel calls at Boston Harbor to catch the favorable tide without incurring a cost somewhere else in the schedule, therefore this management measure is not considered further.

5.1.3 Increase Conley Terminal Operations Capacity

As a non-structural measure, modifications to Conley Terminal operations would include improvements to vessel offloading and loading operations. The rationale for this particular nonstructural alternative is that increasing the efficiency of the terminal could potentially decrease the turn-around time for vessels calling at the terminal. Decreased turn-around time could potentially allow vessels to more effectively time their arrivals and departures with the tide thereby allowing vessels to load more deeply while incurring fewer tidal delays (management measure objectives 1 and 2).

Massport has invested $78 million in port efficiency improvements since 2004. These major improvements include upgrade of its container handling equipment, which includes a transition to Rubber Tired Gantry cranes (RTGs), which allows a greater concentration of containers per acre. Conley Terminal currently has added 12 new RTG's and had paved and reorganized the yard for greater efficiency. Conley Terminal has added high density reefer storage racks and has computerized the terminal management system and gate system. In addition, the drive systems on four cranes have been upgraded to improve offloading and loading speed.

Based on the current levels of facility upgrades and expansion and the projected fulfillment of the Master Plan build-out, there are few if any navigation benefits which would result from additional improvements to Conley Terminal. It is unlikely that additional improvements to Conley Terminal would further increase vessel turn-around time to the extent that depth-constrained vessels would have greater opportunities to take advantage of the tides and transit the system more rapidly. Therefore, this non-structural alternative will not receive further consideration.

5.1.4 Use Feeder Vessels in a Hub and Spoke System

A non-structural measure to reduce tide delays and light loading would be for Boston Harbor to become a component of a hub and spoke network that would use small feeder vessels, which would not be subject to channel depth constraints (management measure objective 1). Columbia Coastal Transport ran a feeder service using barges from the PONYNJ to Boston, but business for the feeder service began to diminish once COSCO began direct service with Asia[29], which is consistent with the economic analyses of hub and spoke networks presented in Chapter 4.2: Without Project Conditions Boston Harbor Containership Fleet. The Columbia Coastal feeder service diminished to an unsustainable level before it was abandoned in 2010. Until that time it was surviving on specialty and overweight cargo.[30] A hub and spoke network using containerships as feeder vessels from a large regional port cannot compete economically with Panamax size direct call vessels, as presented in section 4.2. Servicing Boston Harbor with feeder vessels in a hub and spoke network is economically infeasible as long as Panamax vessels are available as a direct call alternative, therefore this measure will not receive further consideration.

5.1.5 Service Boston Harbor with Smaller Vessels

If the fleet calling at Boston Harbor consisted of smaller vessels that were not constrained by the depth of the Federal channel at Boston Harbor, then vessels would not need to light load or experience tide delays (management measure objective 1). In opposition to this non-structural measure the vessels in the fleet calling at Boston Harbor have increased in size since 2007, as presented in Chapter 3.2.1 Existing Condition Vessel Size. This increase in vessel size is concurrent with the industry trend to leverage economies of scale. Smaller, less efficient vessels cannot compete effectively on a service with larger, more efficient vessels. Table 5-1 (repeated from Table 3-12) presents the waterborne transportation costs per TEU per 1,000 miles for Panamax vessels and smaller (operating at service speed), based on the Corps of Engineers vessel operation costs. The table shows the unit cost advantage of Boston Harbor's existing Panamax fleet over smaller vessels.

[29] Columbia Coastal Transport interview 02Sep10
[30] Ibid

Table 5-1
Waterborne Transportation Cost per TEU per 1,000 miles

TEUs	$/TEU
5,060	$33.22
4,800	$33.98
4,000	$36.19
3,500	$38.05
3,000	$40.35
2,800	$41.41
2,500	$43.21

Source: USACE Vessel Operating Costs EGM 11-05

It is unlikely that carriers would scale the size of vessels in their service to the US east coast to avoid light loading and tide delays at Boston Harbor, not only because of the inefficiencies identified in table 5-1, but also because Boston Harbor is the shallowest port on the service. By sizing the fleet to arrive unconstrained at the shallowest port in the service, the carrier would not be able to take advantage of the other deeper ports in the port rotation, such as the PONYNJ (-50 feet), Philadelphia (-45 feet), etc. The inefficiencies associated with using smaller vessels at Boston Harbor would be carried over to each port in the service. These inefficiencies and the fact that carriers are doing the opposite of the action proposed by this measure by deploying larger vessels to Boston Harbor instead of smaller vessels are the reasons why this measure will not receive further consideration.

5.1.6 Coastal Barge Service from PONYNJ to Boston Harbor

One potential non-structural measure would be a coastal barge service, sometimes referred to as Short-Sea Shipping. In this measure, liner service vessels would call at the PONYNJ and load and unload New England cargo as they do under existing and projected without-project conditions. The liner service vessel would not call at Boston Harbor. New England cargo would be shipped from the PONYNJ to Boston Harbor via a barge towed by a tug. After the cargo is barged to Boston Harbor, it would be loaded onto a truck for delivery to its final destination. Columbia Coastal used to run such a service from the PONYNJ to Boston Harbor, but the service was discontinued for lack of cargo. Columbia Coastal does currently run a barge service connecting Norfolk, Baltimore, and Philadelphia, which carries predominantly military cargo.[31]

Although trucking distances are reduced in this measure, the additional costs of loading and unloading cargo and the cost of barge transport makes this alternative economically infeasible. The origin to destination cost using a coastal barge service is greater than the cost of trucking from the PONYNJ and is greater than the cost of sailing directly to Boston Harbor (Table 5-2). The origin to destination cost analysis presented in table 5-2 is based on a one-way liner service voyage from Qingdao, China on a 5,060 TEU capacity vessel. Coastal barge service costs are based on the Container Barge Feeder Service Study, March 2001 prepared by the Connecticut

[31] Personal communication with Jeff Florin, Virginia Port Authority Director of Engineering

Department of Transportation Office of Intermodal Planning. The 2001 costs were escalated to 2011 annual costs using the Bureau of Labor Statistics Producer Price Index.[32]

Table 5-2
Comparative Origin to Destination Costs per TEU: Coastal Barge Service

PONYNJ to RI/Truck		PONYNJ/Barge to Boston Harbor/Truck		Boston Harbor to RI/Truck	
Total Ocean Cost	$1,940,996	Total Ocean Cost	$1,940,996	Total Ocean Cost	$1,981,758
TEUs on board	4,500	TEUs on board	4,500	TEUs on board	4,500
Ocean Cost/TEU	$431	Ocean Cost/TEU	$431	Ocean Cost/TEU	$440
PONYNJ Fees	$115	PONYNJ Fees	$115	Boston Harbor Fees	$21
Trucking Cost	$744	Tug/Barge Costs	$190	Trucking Cost	$363
Total Transport Cost	**$1,291**	Barge Load/unload	$240	**Total Transport Cost**	**$825**
		Port Space	$82		
		Boston Harbor Fees	$21		
		Trucking Cost	$363		
		Total Transport Cost	**$1,442**		

5.1.7 Light Load Larger Vessels So They Can Transit the Federal Channel

As a non-structural measure, carriers could deploy larger, more efficient vessels to Boston Harbor but load them so that are able to transit the channel in the same manner that the existing fleet is light loaded and uses tidal advantage. In some ways, this measure has already been initiated by the carriers because they have recently upgraded the size of their vessels calling at Boston Harbor to include the largest Panamax vessels in the world fleet. An additional upgrade in vessel size, without allowing the vessel to sail at a deeper draft would increase the waterborne transportation cost per box and reduce overall efficiency.

[32] Producer Price Index industry data: Series ID PCU4831134831133; Industry: Coastal and Great Lakes Transport; Product: Coastal and Inter-coastal Towing Transportation

Table 5-3
Comparative Unit Costs at an Operating Draft of 40 feet

Vessel	TEU Capacity	Operating Draft	TEUs at 40 feet	$/TEU/1000 miles @ 40 feet draft
MSC Nerissa	5,060	40	3,980	$42.36
MSC Shanghai	5,900	40	3,776	$48.74
MSC Alessia	6,732	40	4,544	$44.82
COSCO Seattle	7,455	40	5,077	$42.54

Note: Analysis conducted at TEU weight (cargo and box) of 10.35 tons and at service speeds

Table 5-3 presents an analysis of waterborne transportation costs per TEU for vessels sailing at a draft of 40 feet, which would require three feet of tidal advantage and a 2.9 hour delay on average. The MSC Nerissa is in the existing fleet calling at Boston Harbor and is among the largest Panamax vessels in the world. The table displays the inefficiencies of bringing Post-Panamax vessels to Boston Harbor at the without-project controlling depth of -40 feet. Currently there are no large Post-Panamax vessels calling at any US east coast port that has a controlling depth of less than -42 feet.

The inefficiencies associated with light loading Post-Panamax vessels so that they can use the federal channel at Boston Harbor are exacerbated by the impacts to vessel loading in or out of the PONYNJ (-50 feet), which would be either the next or preceding port. Under existing conditions, some of the five-foot depth differential between the two ports is mitigated by using the tide at Boston Harbor. Vessels use as much as four feet of tidal advantage at Boston Harbor. Under without-project conditions the depth differential will be 10 feet, which is far more than can be effectively mitigated by using the tide at Boston Harbor. The large inefficiencies which would result from this non-structural alternative cause the use of larger vessels under without-project channel conditions to be excluded from further consideration.

5.1.8 Load More New England Cargo on the Vessels that Currently Call at Boston Harbor

A potential non-structural solution that would provide for more New England cargo to use Boston Harbor (management measure objective 3) would be for vessels in the existing fleet to simply load more Boston Harbor cargo. The carriers have stated that the cargo is available[33] and the shipper survey indicates that cargo is available.

The data show that vessels calling at Boston Harbor in 2007 and 2010 are loaded as fully as conditions allow. This is evidenced by the frequent and extensive use of tide by nearly all vessels calling at Boston Harbor (Tables 3-10 and 3-11). This interpretation of the data is corroborated by the carrier's statement that the vessels are already full and at operating at the maximum drafts for channel conditions.[34] The current allocation for Boston Harbor has been negotiated with alliance members, service partners, and slot sharing partners. Slot allocations are certainly flexible, but the carriers are not interested in trading-off a slot with PONYNJ cargo for

[33] MSC interview 2010
[34] MSC interview 2007; Maersk interview 2010; CMA CGM interview 2010

a slot with Boston Harbor cargo.[35] This unwillingness to trade off PONYNJ cargo for Boston Harbor cargo was cited as a reason for not calling at Boston Harbor[36]. If the PONYNJ slot were empty, then it would be reasonable to expect that the carrier would look to fill that empty slot with Boston Harbor cargo, but the PONYNJ slot is full. There would be no net increase in cargo to the carrier by displacing PONYNJ cargo with Boston Harbor cargo.

The carriers are operating in a manner that attempts to keeps the vessels as full as conditions allow, which allows the carriers to take advantage of economies of scale. Displacing PONYNJ cargo with Boston Harbor cargo on a vessel that is already full does not increase vessel efficiency. The proportion of Boston Harbor cargo on the vessel has been stable from 2007 to 2010, although each service has seen a small decrease, which is to be expected in a comparison between the port's highest volume year and current recession conditions. The slot allocation for Boston Harbor and the number of TEUs per call have been stables from 2007 to 2010, considering recessionary conditions in 2010. These allocations and TEUs per call are projected to continue into the future and reallocating more slots to Boston Harbor by displacing slots from the PONYNJ is not considered a viable non-structural solution.

5.1.9 Add More Vessel Calls to Existing Boston Harbor Services

Additional New England TEUs could be handled at Boston Harbor (management measure objective 3) if carriers increased the number of vessel calls on existing Boston Harbor services. The services currently calling at Boston Harbor are liner services providing weekly fixed day service. This is the industry standard. Carriers select the number of vessels for a liner service to provide weekly same-day service. Services with longer distances and transit times will have more vessels than services with shorter distances and less transit time. This can be observed by comparing COSCO's Asia service (63 days round trip; 9 vessels; Boston scheduled for Thursday) to MSC's Europe service (35 days round trip; 5 vessels; Boston scheduled for Tuesday). Liner service schedules are not designed to accommodate additional off-day vessel calls because they are purposefully designed to provide regular, predictable, and reliable service. Furthermore, liner services operate with a string of ports in rotation, so adding additional calls to Boston Harbor would require adding additional calls to the other ports on the rotation also. Accelerating the frequency of port calls on a liner service to more than weekly (six-day or five-day for example) is not the standard operating practice for the industry. Typically, carriers increase their service at a port by increasing vessel size and not by adding additional calls on an existing service; therefore this non-structural solution will not be considered further.

5.1.10 Add Boston Harbor As a Port of Call

One non-structural solution that would bring additional New England TEUs to Boston Harbor (management measure objective 3) would be for services that currently call at the PONYNJ, but not Boston Harbor, to include Boston Harbor in the port rotation. In order to add a port to the rotation another port must be dropped so that the weekly schedule can be maintained at the other ports on the service or the service must be reconfigured. For example, COSCO's Asia service was reconfigured in 2010 to include a vessel call in Mexico (Lazaro Cardenas) and a vessel call in Panama (Cristobal). Adding these ports increased the transit time for the service from 56 days

[35] MSC interview 2010; Evergreen interview 2010
[36] Maersk interview 2010

to 63 days, so the number of vessels was increased from 8 to 9 to maintain weekly same-day service.

The carrier interviews conducted for this analysis include four carriers[37] that do not currently call at Boston Harbor (two of the four have called at Boston Harbor in the past). Each carrier representative stated that there was sufficient cargo to justify calling at Boston Harbor, but each carrier representative also mentioned that a -40 foot channel was a substantial constraint and disincentive. The influence of the PONYNJ was also consistently mentioned. One carrier representative put it clearly:

> *Boston cargo is already established. Boston Harbor has the population density to establish a cargo base. Boston could also potentially develop some distribution centers that would pull cargo from PONYNJ. Boston already has major importers and a strong population base. Boston also has the benefit of proximity to Canada. However, at existing channel depth Boston is mostly a "substitute service port" meaning that even though the Bill of Lading says Boston, the marine carrier will drop the box off in PONYNJ and let it get trucked or barged the rest of the way.*[38]

The great amount of cargo that goes through the PONYNJ (4 to 5 million TEUs each year since 2003) is what brings liner services to the northern US east coast. It would be inconceivable for a carrier to drop the PONYNJ so that Boston Harbor could be added to the port rotation. For an existing service to be reconfigured to include Boston Harbor, that service would also necessarily include the PONYNJ because the PONYNJ has the demand for service and the depth to allow efficient vessel utilization. The carrier that considers New England to be within the PONYNJ hinterland and that is already servicing New England through the PONYNJ, and that has an unfavorable view of Boston Harbor's depth constraint would be an unlikely candidate for adding Boston Harbor as a port of call.

For each of the four carrier representatives interviewed, acknowledgement of sufficient cargo to justify a call at Boston Harbor is not enough incentive to overcome the disincentive of Boston Harbor's depth constraint and the "substitute service" availability of the PONYNJ. These conditions are projected to persist into the future and to become more intractable as the Panama Canal expansion and deepening of the PONYNJ induces larger vessels and existing vessels more deeply loaded to use the PONYNJ. This non-structural solution is unlikely to be effective and is not given further consideration.

5.2 Evaluation of Alternative Structural Measures

Structural measures would include engineered solutions that achieve the management measure objectives. Structural measures include improvements to Conley Terminal infrastructure and improvements to the Federal channel at Boston Harbor.

5.2.1 Conley Terminal Infrastructure Improvements

Improvements to Conley Terminal infrastructure would increase productivity and throughput capacity. Increases in productivity and throughput capacity could conceivably reduce tide delay

[37] Evergreen, OOCL (Grand Alliance), CMA CGM, and Maersk
[38] Evergreen Interview 10Aug10

if vessels could be turned around more quickly, allow larger more efficient vessels to use the terminal, and reduce origin to destination transportation costs by allowing larger vessels to use the terminal (management measure objectives 1-3).

Like many other container ship terminals on the US east coast, Conley Terminal has been engaged in a long-term capital improvement program for the purpose of maintaining competitive productivity levels and to keep pace with the trend of increased vessel size. Since 2004, Massport has spent $78 million on capital improvements at Conley Terminal[39]. The terminal has increased capacity and productivity with the purchase of two additional Post-Panamax cranes to make a total of four Post-Panamax cranes with a reach of 16 containers across. The terminal's two Panamax cranes and existing Post-Panamax cranes have had drive-system upgrades to increase operating speed and productivity.

Terminal operations have switched to rubber tire gantries, which allow for higher density yard use and faster operations. A new rack system has been constructed for higher density reefer storage. Berths have been dredged to -45 feet to accommodate vessels using the tide. Most importantly, 30 acres of adjacent land has been added to the terminal. This acreage is accessible by Post-Panamax vessels. Servicing Post-Panamax vessels in this location avoids the air-draft constraints posed by proximity to Logan Airport, which would restrict crane operation and vessel loading. This constraint on Post-Panamax vessel operations had been identified by the carriers,[40] but is now resolved.

Overall, Conley Terminal's annual throughput capacity will be approximately 500,000 TEUs, which is more than double the terminal's busiest year (220,000 TEUs in 2007; Table 1-2). The recent improvements made to the terminal have increased productivity and capacity. Foreseeable future infrastructure improvements may result in marginal increases in productivity and capacity, but any opportunities for substantial improvements that would affect vessel operations and further support management measure objectives 1 – 3 have already been realized. It is unlikely that additional infrastructure improvements at Conley Terminal would effectively enhance project objectives; therefore, this structural measure will not receive further consideration.

5.2.2 Federal Channel Deepening

The without-project condition controlling depth (-40 feet) will be a constraint to efficient navigation of the without-project fleet projected to call at Boston Harbor as presented in Chapter 4: Without-Project Conditions. The without-project condition controlling depth constraint also precludes Post-Panamax vessels from using Conley Terminal. Increasing the Federal channel controlling depth by deepening the channel would reduce tide delay for vessels constrained by the without-project condition controlling depth, allow vessels to load more deeply, and reduce origin to destination transportation costs by having larger, more efficient vessels use Boston Harbor (management measure objectives 1-3). Channel deepening will be considered for detailed incremental analysis.

[39] Source: personal communication with Nick Billows, Massport Deputy Director Port Sales and Marketing
[40] COSCO Interview 31Aug10

5.3 Description of Alternative Plans

5.3.1 No Action

In this plan, no improvements would be made to the existing Boston Harbor Federal Navigation Project. This is equivalent to the without-project condition. The navigation channel would remain at its presently authorized 40-foot depth. This plan will serve as the basis for comparison of the expected project benefits. It will comprise the economic conditions that are projected to occur over the 50-year period of analysis. The analysis will include an assessment of the origin to destination transportation costs for New England containerized cargo using Boston Harbor if no harbor improvements are implemented. The size and number of vessels that will transport those commodities through the harbor will be identified.

5.3.2 Channel Deepening Alternatives

This plan will include several levels of harbor deepening so that an incremental analysis of economic benefits can be performed. The plan will include several scales, with the benefits of channel deepening evaluated at one-foot depth increments ranging from -42 feet to -50 feet.

6 With-Project Conditions

Under with-project conditions (alternative channel depths) carriers are projected to take advantage of the additional depth afforded by the deepened channel by operating at deeper drafts and by bringing larger vessels to Boston Harbor. By operating at deeper drafts and with larger vessels at Boston Harbor the carriers will be able to present shippers with more opportunities to ship New England cargo through Boston Harbor instead of shipping through the PONYNJ. Shippers are projected to take advantage of the opportunity to ship more New England cargo through Boston Harbor, thereby shifting some New England TEUs from using the PONYNJ in the without-project condition to using Boston Harbor in the with-project condition. The projection that shippers will take advantage of additional opportunities to ship through Boston Harbor is supported by the shipper survey, which was conducted as a component of the "Framework for Additional Economic Analysis" (revised final 06Aug09), which was developed by the New England District, North Atlantic Division, OWPR, and the Institute for Water Resources to support the analysis of containerized cargo benefits..

Only TEUs with sufficient supporting information were considered as potentially able to shift from the PONYNJ to Boston Harbor under with-project conditions. That supporting information includes information from the PIERS data and the survey responses. In 2007, there were 255,256 New England TEUs moved through the PONYNJ, of which 73,885 TEUs were from areas of Connecticut, which are closer to the PONYNJ than to Boston Harbor and 181,371 TEUs which were closer to Boston Harbor (255,256 – 73,885 = 181,371). Therefore the ultimate upper limit of TEUs in 2007, which could potentially shift from the PONYNJ to Boston Harbor, is 181,371. The shipper survey created 95% confidence intervals around the lower limit and upper limit of TEUs which could potentially shift to Boston Harbor, based on responses to eight sets of questions. Survey results indicate that the lower limit of TEUs, which could potentially shift from the PONYNJ to Boston Harbor, is 131,049 and the corresponding upper limit is 173,148. The survey-based upper limit (173,148) is less than the ultimate upper limit of New England TEUs, which are loser to Boston Harbor (181,371).

The mid-range value between the lower and upper limits of the survey results, based on 2007 conditions, is 152,488 New England TEUs which may be available to shift to Boston Harbor. This mid-range value increases to 219,356 TEUs by the base year (2015) assuming the 20-year (1999 – 2009) historical annual growth rate (4.65%) for TEUs at US container ports continues into the future. The mid-range value is the preferred benchmark for the analysis. These survey results only inform the analysis and are not sufficient to suggest a decision to switch from the PONYNJ to Boston Harbor. The decision to switch is based on an economically rational response to reduced origin to destination transportation costs.

6.1 With-Project New England Cargo

The amount of New England containerized cargo is not affected by without-project or with-project conditions. Similarly, the characteristics of New England cargo are not affected by without-project or with-project conditions. This analysis assumes that the amount and characteristics of New England containerized cargo under with-project conditions will be consistent with observations made in 2007. Under this assumption there are no substantial differences between New England containerized cargo domestic origins and destinations observed in the 2007 PIERS data and projected future New England containerized cargo

domestic origins and destinations. Cargo volumes observed in 2007 are projected out to the base-year (2015) using the historical 20-year (1989 – 2009) growth rate (4.65%) of container traffic at US ports.

The analysis conducted on the Shipper Survey responses estimated the mid-point of the range of New England TEUs that could potentially shift from the PONYNJ to Boston Harbor to be 152,488 TEUs at 2007 trade levels (Appendix A: Assessment of Existing Conditions). By the base-year (2015), this estimate increases to 219,356 TEUs, using the historical 20-year (1989 – 2009) growth rate (4.65%) of container traffic at US ports. The base-year "mid-range available to shift" estimate should also include the 87,333 Asia Panama service TEUs that are projected to shift back to the PONYNJ under without-project conditions, which increases the "mid-range available to shift" estimate to 306,689 TEUs by 2015 (Table 6-1).

Table 6-1
Range of New England TEUs Potentially Available to Shift from the PONYNJ to Boston Harbor

	Lower Limit	Mid-Point	Upper Limit
Survey Results (2007)*	131,049	152,488	173,148
Survey Results with growth to 2015 (4.65% annual growth rate)	188,516	219,356	249,076
Return of Asia Service via Panama in 2015	87,333	87,333	87,333
Total Available to Shift in 2015	275,849	306,689	336,409

*See Boston Harbor Container Benefits Appendix A 20April12, section 7: Estimation of TEUs Available to Shift From the PONYNJ to Boston Harbor

It is also important to consider that distribution centers located near the PONYNJ under without-project conditions may shift to locations nearer to Boston Harbor under with-project conditions, or new distribution centers may locate closer to Boston Harbor under with-project conditions. Distribution centers are neither prohibitively expensive, nor difficult to construct. As an example, in 2009 and 2010, at least four new distribution centers have been developed near Savannah Harbor ranging from 192,000 square feet (Dayton Superior) to 800,000 square feet (Gildan Activewear). Distribution center development costs ranged from $12.5 million (Le Creuset) to $20 million (Gildan Activewear). A $20 million investment with repayment over ten years at 6% interest would cost approximately $2.7 million per year, which is the equivalent of the landside transportation cost savings for fewer than 7,000 TEUs or 10 forty-foot trailers per day. This simple example indicates that landside transportation cost savings generate a substantial incentive for the placement of distribution centers at the port nearest to the hinterland.

6.2 With-Project Boston Harbor Fleet

The size of containerships in the fleet calling at Boston Harbor under with-project conditions are projected to be consistent with vessel sizes in the overall fleet calling at other major US east coast ports. These vessels will be Panamax and Post-Panamax vessels. Channel deepening at

Boston Harbor will not affect the size of vessels calling at the US east coast, but channel deepening will affect the size of vessels calling at Boston Harbor.

The base case with–project condition scenario includes Panamax and Post-Panamax vessels calling at Boston Harbor. The design vessels used to determine with-project channel dimensions and to estimate incremental project costs include the COSCO Hamburg (5,600 TEUs, maximum draft 45.9 feet, LOA 918 feet), the MSC Alessia (6,700 TEUs, maximum draft 47.6 feet, LOA 984 feet), and the COSCO Yokohama (7,500 TEUs, maximum draft 46.0 feet, LOA 1,050 feet).

The projected future with-project fleet at Boston Harbor includes:

- Mediterranean Service: Panamax vessels (4,900 - 5,060 TEUs; maximum draft 44 feet) similar in size to vessels in the existing condition fleet, with a transition to 6,700 TEU vessels (maximum draft 48 feet) at depths of -42 feet and deeper;
- Europe Service: Panamax vessels (5,060 TEUs; maximum draft 44 feet) similar in size to vessels in the existing condition fleet; and
- Asia Panama Service: No calls at Boston Harbor at depths less than -45 feet. At controlling depths of -45 feet and deeper, Boston will be added as a port-of-call for 8,500 TEU vessels; and
- Asia Suez Service: No calls at Boston Harbor at depths less than -45 feet. Boston may be added as a port-of-call for 8,500 TEU vessels at controlling depths of -45 feet and deeper, but because this service had been suspended under existing conditions it is included in with-project conditions as an alternative to the base-case, which excludes the Asia Suez service.

Large Post-Panamax vessels, which will not call at Boston Harbor under without-project conditions, are projected to call at Boston Harbor at controlling depths of -45 feet and deeper[41]. A controlling depth of -45 feet at Boston Harbor creates a five-foot depth differential with the PONYNJ that is equivalent to existing conditions. At this depth differential, vessel loading at the PONYNJ would not be severely impacted provided vessels continue to use tidal advantage at Boston Harbor in a manner similar to existing conditions.

The relatively small number of TEUs handled annually at Conley Terminal (187,000 in 2009)[42] is not projected to impact a carrier's decision to deploy Post-Panamax vessels to Boston Harbor. Indeed, the COSCO Asia Suez service called at Boston Harbor from May through December 2011 using vessels ranging from 5,500 TEUs to 6,100 TEUs. Currently two other services deploy Post-Panamax vessels - the Green Alliance's AWE4 (5,600 TEU vessels) and the Grand Alliance's AEX (5,300 – 5,900 TEUs) - through the Suez Canal to the east coast of North America, calling at Halifax, Nova Scotia and the PONYNJ. Halifax (347,000 TEUs in 2009[43]) is a considerably smaller volume port than the PONYNJ. The relatively small volume at Halifax has not stopped Post-Panamax vessels from being successfully deployed there. In the interviews with the carriers, each of the seven liner service carrier representatives indicated that Boston Harbor, with adequate channel depth (depths cited ranged from 45 to 50 feet), would be serviced by Post-Panamax vessels. Not one of the carrier representatives indicated that the total volume of TEUs handled at a port was a consideration in the deployment of Post-Panamax vessels.

[41] Sensitivity analyses were conducted using different size Post-Panamax vessels and without Post-Panamax vessels
[42] Table 1-2
[43] Containerization International website accessed 09Dec10 (www.ci-online.uk.com)

6.3 With-Project Vessel Operations

Under with-project conditions, the Europe and Mediterranean service vessels are projected to operate at Boston Harbor with the same distribution of tidal advantage and willingness to wait for the tide observed in 2010 (Table 3-11). For example, in 2010 two MSC vessels on the Europe route (Table 3-11) were observed arriving at Boston Harbor with an operating draft of 43 feet (rounded upwards). These vessels waited slightly more than 5 hours to use 8 feet of tide to gain 5 feet of additional operating draft while maintaining 3 feet of underkeel clearance. The few vessel calls in 2010 (9%) that did not take advantage of the tide are not projected to take advantage of a deeper channel in the with-project condition – they are removed from any benefits calculations. Incremental increases in Boston Harbor TEUs under with-project conditions are based only on vessel calls that used the tide in 2010.

As the channel is deepened, vessels are projected to load more deeply to take advantage of the additional depth while maintaining or reducing the observed use of tide. Again as an example, the two MSC vessels that were willing to wait 5 hours to arrive with a draft of 43 could, if the channel were deepened one foot, be able to arrive with a draft of 44 feet and incur the same wait time of 5 hours. With-project vessel operations are based on the assumption that carriers will respond to incremental channel deepening by loading vessels more deeply, thereby moving more cargo while incurring an equal or less wait time for tidal advantage. Table 6-2 provides a detailed example.

Table 6-2
Channel Depth and Tidal Advantage Example

Observed 2010 (Table 3-11)			One Foot of Additional Channel Depth		
Sail Draft	**Wait Time (hrs)**	**# of Calls**	**Sail Draft**	**Wait Time (hrs)**	**# of Calls**
40	3.69	19	41	3.69	19
41	4.09	22	42	4.09	22
42	4.54	12	43	4.54	12
43	5.05	2	44	5.05	2

In 2010, 55 vessel calls were observed as willing to wait 3.69 hours or more for tidal advantage at Boston Harbor (Table 6-2 and Table 3-11). Those 55 vessel calls were distributed among sailing drafts ranging from 40 feet to 43 feet as presented in the left-hand side of Table 6-2 and in Table 3-11. With an additional one foot of channel depth, those 55 vessels calls could maintain the same tide delay tolerance and load one foot deeper (right hand side of Table 6-2). If, for example, the maximum sailing draft of these vessels was 43 feet, then with an additional foot of channel depth there could be 14 vessels sailing with a draft of 43 feet and two of those vessels would have a tide delay reduction (from 5.05 hours to 4.54 hours). In order for vessels to take advantage of a deeper channel two conditions must be met: there must be cargo available to load the vessel more deeply and the vessel must have available sailing draft – no vessel is projected to load deeper than its design draft.

Large Post-Panamax vessels (8,500 TEU) projected for the COSCO Asia Panama and COSCO Asia Suez services do not have a history of deployment to Boston Harbor and therefore observed

behavior at Boston Harbor by Panamax vessels was used to estimate future vessel operating drafts. In a sensitivity analysis (Sensitivity Analysis 9) projected with-project vessel operations for large Post-Panamax vessels at Boston Harbor are based on observed 2010 operating drafts for similar size vessels arriving at the Port of Oakland on the China Shipping Container line (CSCL) AAC service which calls at Hong Kong, Guangzhou, Yantian, Shanghai, Ningbo, Busan, Los Angeles, and Oakland. The controlling depths at the ports on this service are similar to the Asia Panama and Asia Suez services. Also, Oakland is in a position in the port rotation similar to Boston Harbor's prospective position. The vessels on this service are 8,500 TEU vessels (maximum draft 48 feet), similar to the vessels projected to call at Boston Harbor. In 2010, the Port of Oakland had a controlling depth of 50 feet, so the observed Oakland draft distribution requires vessels to wait for the tide at shallower with-project Boston Harbor depths.

Vessels are projected to carry the same proportion of Boston Harbor TEUs relative to the vessel's capacity as observed in 2010[44]. The analysis assumes that carriers will use the reduced draft constraint at Boston Harbor as an opportunity to also load additional cargo for ports other than Boston Harbor. This cargo transits the Federal channel at Boston Harbor but is not handled at Conley Terminal. There are no benefits calculated for these TEUs.

6.4 With-Project Boston Harbor TEU Projections

Table 6-1 presented the number of New England TEUs, which may potentially shift from the PONYNJ to Boston Harbor under with-project conditions. The number of TEUs projected to shift under with-project conditions is based on the additional Boston Harbor cargo loaded on to vessels at each increment of additional channel depth at Boston Harbor. Additional channel depth increments allow vessels to load more deeply, with some proportion of that cargo (based on the TEUs per call identified in Table 3-9) allocated to Boston Harbor. The additional cargo that would be loaded onto vessels for channel depth increments from the existing condition (-38 feet) to the without-project condition (-40 feet) were calculated in the same manner as with-project condition cargo and has been included in the without-project condition. The base case with-project condition Boston Harbor TEU projections at incremental depths are presented in Table 6-3. Note that the total number of TEUs presented below excludes TEUs on four Europe service vessel calls (two in-bound and two out-bound) and eight Mediterranean service vessel calls (four in-bound and four out-bound), which did not use the full controlling depth available in 2010 and therefore are excluded from the benefits analysis. The average number of export empty TEUs are included in the vessel operating draft calculations (historically there are no import empty containers) at a weight of 2.2 tons per empty container.

[44] Sensitivity analyses were conducted using 2007 observed TEUs per call.

Table 6-3
Base Case: With-Project Condition TEU Volumes

Depth	Europe	Mediterranean	Asia	Total	Increment
40*	42,526	20,072	-	62,598	
41	46,837	21,127	-	67,965	5,367
42	49,967	26,608	-	76,574	8,610
43	52,825	27,853	-	80,678	4,104
44	54,636	28,962	-	83,598	2,920
45	56,112	29,907	170,927	256,946	173,348
46	57,321	30,647	179,525	267,492	10,546
47	58,097	31,102	186,062	275,261	7,769
48	58,509	31,307	190,034	279,850	4,589
49	58,725	31,485	191,074	281,284	1,435
50	58,784	31,568	191,074	281,427	143
51	58,784	31,568	191,074	281,427	-
*Without Project Condition			**Total Additional With-Project TEUs**		**218,829**
			Total Additional With-Project TEUs less 87,333 returning on Panama Canal service		**131,496**

The number of New England TEUs projected to shift from the PONYNJ (Table 6-3: 218,829 TEUs at a channel depth of -50 feet), which includes 87,333 TEUs projected to return to Boston Harbor, is far less than the mid-point range estimate of 306,689 TEUs and less even than the lower limit estimate of 275,849 TEUs available to shift in 2015 (Table 6-1). Base-case projections of shifting TEUs due to channel deepening (Table 6-3) are substantially less than the number of TEUs which are estimated to be available to shift in 2015 (Table 6-1). Table 6-3 and all subsequent presentation of Total and Incremental TEUs are loaded TEUs only. The total number of TEUs, which is in part based on 2010 observations, reflects some diminishment of export TEUs during the 2010 economic recession.

A sensitivity analysis was performed to identify the importance using large Post-Panamax vessels on the Asian services in the with-project condition. Under base case with-project conditions, large Post-Panamax vessels are projected to call at Boston Harbor at controlling

depths of -45 feet and deeper. In the analysis without large Post-Panamax vessels on the Asian service, the vessels on these services are the same as existing 2011 conditions: Panamax vessel on the Asia Panama service. In this sensitivity analysis large Post-Panamax vessels do not enter the Asian services at any channel depth. Table 6-4 presents the "No Large Post-Panamax" sensitivity analysis. The sensitivity analysis indicates that at depths through -45 feet Panamax vessels provide the equivalent of 75% of the TEUs provided by Post-Panamax vessels. At depths deeper than -45 feet Panamax vessels are achieving their draft limitations at a faster rate than Post-Panamax vessels and contribute considerably fewer TEUs.

Table 6-4
No Post-Panamax on Asia Panama Service Sensitivity Analysis TEU Volumes

Depth	Europe	Mediterranean	Asia Panama	Total	Increment
40*	42,526	20,072	87,333	149,931	
41	46,837	21,127	94,371	162,336	12,405
42	49,967	26,608	101,185	177,759	15,423
43	52,825	27,853	106,955	187,633	9,874
44	54,636	28,962	111,244	194,841	7,208
45	56,112	29,907	113,378	199,396	4,555
46	57,321	30,647	113,816	201,783	2,387
47	58,097	31,102	113,816	203,014	1,231
48	58,509	31,307	113,816	203,631	617
49	58,725	31,485	113,816	204,026	395
50	58,784	31,568	113,816	204,169	143
51	58,784	31,568	113,816	204,169	-
*Without Project Condition			**Total Additional With-Project TEUs**		**54,238**

An analysis was also conducted that included an Asia Suez service, which would call at Boston Harbor at channel depth of -45 feet and deeper. This service is projected to bring an additional 152,533 TEUs through Boston Harbor at a channel depth of -49 feet. However, in the base year (2015) the total number of shifted TEUs (Table 6-5; 371,362), would be greater than than the mid-range number of TEUs estimated to be available to shift (306,689) to Boston Harbor in 2015

(Table 6-1). This analysis uses the mid-range number of TEUs as the constraint on the number of TEUs that would shift to Boston Harbor; therefore only a portion of the full potential of Asia Suez service TEUs (152,533 TEUs) would be available to shift in 2015.

Table 6-5
With-Project Condition TEU Volumes including an Asia Suez Service

Depth	Europe	Mediterranean	Asia via Panama Canal	Asia via Suez Canal	Total	Increment
40*	42,526	20,072	-		62,598	
41	46,837	21,127	-		67,965	5,367
42	49,967	26,608	-		76,574	8,610
43	52,825	27,853	-		80,678	4,104
44	54,636	28,962	-		83,598	2,920
45	56,112	29,907	170,927	136,450	393,395	309,798
46	57,321	30,647	179,525	143,313	410,805	17,410
47	58,097	31,102	186,062	148,532	423,793	12,987
48	58,509	31,307	190,034	151,703	431,552	7,760
49	58,725	31,485	191,074	152,533	433,817	2,265
50	58,784	31,568	191,074	152,533	433,960	143
51	58,784	31,568	191,074	152,533	433,960	-
*Without Project Condition				**Total Additional With-Project TEUs**		**371,362**

Although growth in the number of shifting TEUs after 2015 is not used in the base-case scenario, or in any of the other sensitivity analyses, projected growth in the mid-range number of TEUs available to shift to Boston Harbor would allow the Asia Suez service to increase the number of Boston Harbor TEUs in future years. The mid-range number of TEUs available to shift from the PONYNJ to Boston Harbor is assumed to grow at a rate of 4.65%, which indicates that the full amount of shifted TEUs for the Asia Suez service identified in Table 6-5 (152, 533) would not be achieved until 2026. Table 6-6 shows the projected growth of Asia Suez service cargo from 2015 through 2026.

Table 6-6
Asia Suez Service by Year 2015 - 2026

Year	Mid-Range Available TEUs	Asia Suez Service TEUs
2015	306,356	24,929
2016	316,556	35,129
2017	327,230	45,803
2018	338,401	56,974
2019	350,091	68,664
2020	362,325	80,898
2021	375,128	93,701
2022	388,526	107,099
2023	402,547	121,119
2024	417,219	135,792
2025	432,575	151,148
2026	448,644	152,533*

*Full Asia Suez service Boston Harbor projection

7 Transportation Cost Savings

Transportation costs include all origin to destination costs. Transportation cost savings are defined as the difference in total origin to destination costs between the without-project and with-project conditions. There are three categories of transportation costs that may be affected by alternative channel depths at Boston Harbor: landside transportation costs; waterborne vessel operating costs, and in-port vessel operating costs.

Landside transportation costs, which are affected by the switch of some cargo from the PONYNJ to Boston Harbor, are calculated as trucking costs per TEU in Chapter 7.1 Trucking Costs. Rail transport costs are not included in the calculation of landside transportation costs because the distances New England cargo travels between either the PONYNJ or Boston Harbor are typically far shorter than the distances where rail transport is the lower cost alternative to truck transport.

Waterborne transportation costs are only marginally affected by alternative depths at Boston Harbor. New England cargo that switches from the PONYNJ to Boston Harbor travels an additional 386 nautical miles between the PONYNJ and Boston Harbor[45], which takes approximately an additional 15.5 hours[46]. This additional waterborne transportation cost is included in the transportation cost savings calculations as a minor offset to overall transportation cost savings. Waterborne transportation costs are also marginally affected by differences in the time the Boston Harbor fleet must wait for appropriate tide heights at alternative channel depths. The costs of waiting for the tide are also included as a minor offset to overall transportation cost savings.

In-port vessel operating costs are based on the time the vessel spends in port, which is determined by the number of TEUs offloaded and loaded onto the vessel. The total number of import and export New England TEUs in not affected by alternative channel depths at Boston Harbor. Only the port where the TEUs are handled is changing; therefore there is no difference in the time the vessel spends in port and no change in in-port vessel operating costs. This analysis assumes that each port (PONYNJ and Boston Harbor) offloads and loads TEUs at the same rate.

7.1 Summary of Assumptions

The major underlying assumption supporting with-project transportation costs savings is that carriers would call at Boston Harbor and load vessels more deeply if additional channel depth were available. Under with-project conditions, some of the additional cargo on the more deeply loaded vessels at Boston Harbor would be New England cargo, which would use the PONYNJ under without-project conditions. The availability of cargo to shift from the PONYNJ to Boston Harbor is a critical assumption for with-project transportation cost savings. The assumption that cargo would shift if vessels could load more deeply at Boston Harbor is supported by three major observations:

1. Vessels calling at Boston Harbor are currently loaded to take full advantage of existing channel depth and are using extensive tidal advantage (Table 3-11);

[45] US Department of Commerce, NOAA, Distances Between US Ports 2009 edition
[46] Based on the average service speed of vessels ranging from 4,800 to 8,000 as identified in the USACE Vessel Operating Costs spreadsheet

2. The few vessel calls (12), which did not take advantage of the tide in 2010 (Table 3-11) have been removed from the analysis and are not included in future projections or transportation cost savings calculations;
3. The shipper survey indicates that there is a substantial amount of New England cargo available to shift from the PONYNJ to Boston Harbor (Table 6-1); and
4. There are substantial transportation cost savings available to the shipper, due to reduced landside trucking costs, if New England cargo were to use Boston Harbor instead of the PONYNJ (Table 7-4).

Carriers are assumed to have the same tolerance for tide delays under without-project conditions and with-project conditions as observed in 2010. This assumption means that carriers will load more deeply under with-project conditions as long as they have the same or less need for tidal advantage that was observed in 2010. As channel depth increases under with-project conditions, larger vessels enter the fleet calling at Boston Harbor. At a channel depth of -42 feet, 6,700 TEU vessels enter the European and Mediterranean services. Vessels of this size periodically call at Boston Harbor on these services in 2012 and regularly call at Savannah, which currently has a controlling depth of -42 feet. At a channel depth of -45 feet, the COSCO Asia service via the Panama Canal is projected to return to Boston Harbor with a fleet consisting of 8,500 TEU vessels.

Operating drafts at Boston Harbor are based on observed import and export cargo weight, the number of loaded and empty boxes per call, channel depth, tide delay tolerance, and the vessel design draft. In order to avoid projecting that vessels will operate fully loaded at their design draft, the transportation cost savings model constrains all vessels to sail at no more than 98% of their design draft. For example, the COSCO Japan, which has a design draft of 47.6 feet (rounded to 48 feet), is constrained to a maximum operating draft of 46.7 feet (rounded to 47 feet). Based on these vessel operating assumptions, the transportation cost savings model identifies vessels as fully loaded, including empty containers, ranging from 85% to 95% of their TEU capacity.

Table 7-1 presents a snapshot of projected vessel operations under with-project conditions (-47-foot channel). The design draft for vessels on each of the services is 48 feet. The maximum operating draft for each service, with a -47-foot channel, is 47 feet. Assuming four feet of underkeel clearance for post-Panamax vessels, all vessels operating with drafts greater than 43 feet (80% of calls) are using tidal advantage. Table 7-2 presents the operating draft distributions for the Asia service under with-project conditions channel increments from -45 feet to -48 feet. As the channel becomes incrementally deeper, vessels can load more deeply without requiring additional tidal advantage. It is important to note that there are 14 vessel calls not included in Tables 7-1 or 7-2 because these calls did not use the tide in 2010, therefore they were not included in future projections or transportation cost savings calculations.

Table 7-1
Operating Draft Distributions, Vessel Capacity Utilization, and Number of Shifted TEUs at -47-foot Channel Depth

	Europe Service		**Mediterranean Service**		**Asia Service**	
Design Draft	48 Feet		48 Feet		48 Feet	
Operating draft	# of calls	%	# of calls	%	# of calls	%
47 feet	41	39%	40	39%	25	24%
46 feet	45	43%	0	0%	19	18%
45 feet	7	7%	42	41%	8	8%
44 feet	6	5%	5	5%	0	0%
43 feet	2	2%	7	7%	25	24%
42 feet	0	0%	0	0%	19	18%
41 feet	0	0%	0	0%	8	8%
Non-benefitting calls	4	4%	8	8%	0	0%
Total Calls	104		102		104	
Avg TEU Capacity Utilization*	94%		93%		88%	
Total Shifted TEUs	15,571		11,030		99,062	
Incremental Shifted TEUs from -46-foot	776		455		6,537	

* TEU capacity utilization includes empty containers and only includes benefitting vessel calls

Table 7-2
With-Project Conditions: Asia Operating Draft Distributions (-45-foot to -48-foot Channel)

	Channel Depth			
Operating Draft	**-45 Feet**	**-46 Feet**	**-47 Feet**	**-48 Feet**
48	0	0	0	0
47	3	14	25	44
46	11	11	19	8
45	11	19	8	0
44	19	8	0	0
43	11	14	25	44
42	11	11	19	8
41	11	19	8	0
40	19	8	0	0
<40	8	0	0	0

7.2 Trucking Costs

Seven trucking firms that provide New England container transportation service to and from the PONYNJ and Boston Harbor were interviewed for this analysis in order to develop an estimate of landside trucking costs. Each firm provided quotes for 14 locations to and from Boston Harbor and the PONYNJ, ranging in distance from 24 miles to 405 miles. The locations were selected because they were identified as either origins or destinations in the PIERS data and they provide a broad distribution of distances. The trucking firms noted that round trip is the standard rate charged. One-way rates are not as common and are negotiated individually with the carrier. The trucking firms were each unwilling to provide carrier specific one-way rates. The quotes provided do not include fuel surcharges, which the trucking firms indicated is a percentage of the quote and not calculated by the mileage. There are also additional fees for extended wait times, which are not included in the quotes or in this analysis. The trucking firms indicated that there was no difference in the rates charged for empty or loaded containers. Tables 7-3 and 7-4 present the raw data received from the trucking firms in 2010.

Table 7-3
Round Trip Trucking Cost Raw Data for PONYNJ

City	State	Costs to/from PONYNJ						
		Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7
Waterville	ME	$1,600	$1,495	$1,566	$1,260	$1,500	$1,777	$1,220
Middlebury	VT	$975	$1,456	$867	$1,225	$1,800	$1,240	$928
Bennington	VT	$875	$1,211	$867	$1,045	$1,200	$935	$680
Manchester	NH	$975	$1,040	$1,026	$840	$1,000	$1,318	$928
Pittsfield	MA	$825	$1,071	$852	$750	$1,000	$799	$655
Springfield	MA	$850	$1,060	$852	$1,025	$800	$775	$638
Natick	MA	$875	$944	$934	$850	$800	$1,021	$750
Fall River	MA	$875	$944	$934	$850	$800	$1,003	$730
Woonsocket	RI	$875	$932	$852	$800	$750	$968	$730
North Kingston	RI	$775	$900	$852	$800	$700	$905	$700
Torrington	CT	$725	$1,060	$768	---	$700	$637	$502
Hartford	CT	$750	$800	---	$650	$700	$614	$479
Bridgeport	CT	$700	$1,125	$852	---	$700	$564	$374
Norwich	CT	$750	$998	$852	---	$700	$755	$374
Fuel Surcharge		20%	20%	20%	17%	21%	27%	19%

Table 7-4
Round Trip Trucking Cost Raw Data for Boston Harbor

City	State	Costs to/from Boston Harbor						
		Firm 1	Firm 2	Firm 3	Firm 4	Firm 5	Firm 6	Firm 7
Waterville	ME	$750	$763	$752	$710	$700	$827	$650
Middlebury	VT	$775	$828	$584	$725	$800	$869	$650
Bennington	VT	$575	$630	$584	$545	$700	$698	$720
Manchester	NH	$375	$345	$385	$335	$325	$360	$308
Pittsfield	MA	$500	$565	$602	$555	$550	$642	$484
Springfield	MA	$475	$520	$469	$425	$425	$399	$422
Natick	MA	$275	$273	$271	$250	$250	$265	$226
Fall River	MA	$350	$323	$373	$350	$300	$360	$293
Woonsocket	RI	$350	$333	$343	$300	$275	$290	$293
North Kingston	RI	$375	$323	$368	$300	$300	$360	$308
Torrington	CT	$550	$540	$605	---	$550	$604	$529
Hartford	CT	$450	$447	---	$475	$425	$600	$500
Bridgeport	CT	$650	$651	$692	---	$550	$717	$545
Norwich	CT	$475	$436	$692	---	$425	$399	$415
Fuel Surcharge		20%	20%	20%	17%	21%	27%	19%

The raw data provided by the trucking firms in 2010 was used to develop a mathematical relationship between distance and trucking costs. A regression analysis was conducted to fit the trucking cost data to the distance data. Multiple types of equations (linear, exponential, etc.) were tried to see which equation provided the best fit. The models provided R^2 values ranging from .653 for the linear model to .733 for the exponential model. Although the exponential model provided the best fit it greatly exaggerated costs when extrapolating beyond the reference data values. The polynomial model and the simple power model also extrapolated poorly or interpolated poorly throughout some range of the reference data. The linear model provided the most reasonable estimates through the reference data range and for extrapolations, and was therefore used to estimate trucking costs. Figure 4 below presents the data plot and regression results.

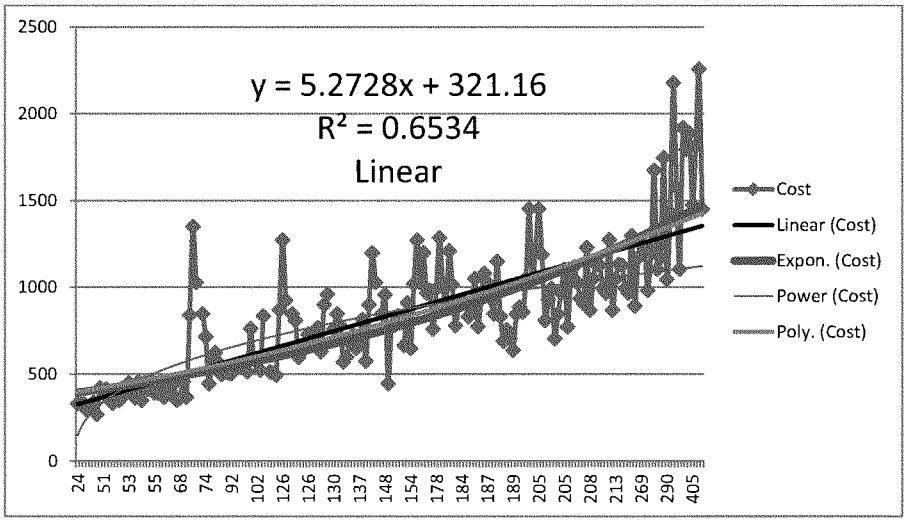

Figure 4: Trucking Distances and Costs

Fixed costs are approximated by the y-intercept ($321.16) in the linear equation. Trucking costs display diminishing costs per mile as portrayed in Figure 5.

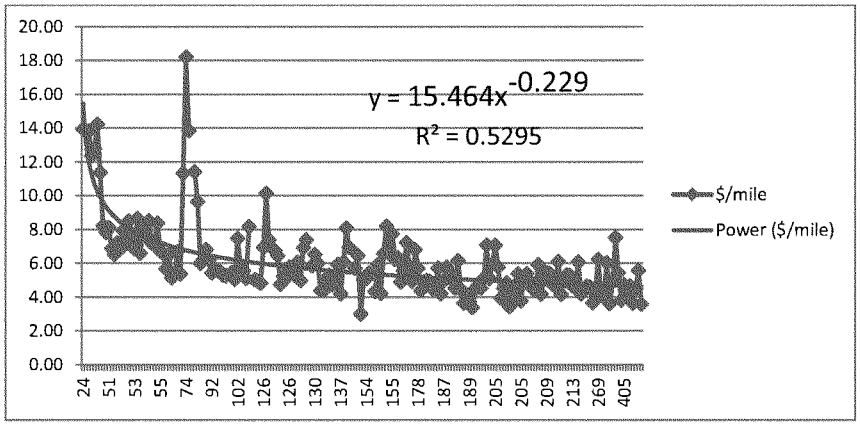

Figure 5: Trucking Costs per Mile

The linear regression model developed from the data provided through the trucking firm interviews was be used to compute the landside transportation costs for each New England TEU identified in the PIERS data. Table 7-5 presents the weighted average trucking cost for all New England TEUs using the PONYNJ in 2007 and the alternative trucking cost through Boston

Harbor. The weighted averages are based on distance and cost calculations conducted for every New England TEU in the PIERS data set that had sufficient origin or destination information (i.e., city, town or zip code).

Table 7-5
Weighted Average Trucking Costs for All New England TEUs Using the PONYNJ in 2007 with Comparative Boston Harbor Cost ($/TEU)

	Imports		Exports	
	Boston	**PONYNJ**	**Boston**	**PONYNJ**
CT	$558.61	$409.82	$568.32	$448.77
MA	$255.32	$713.01	$263.62	$721.01
ME	$621.41	$1,211.64	$548.91	$1,124.65
NH	$373.31	$961.64	$368.45	$916.71
RI	$344.59	$706.16	$355.74	$626.65
VT	$729.29	$932.27	$735.02	$935.81

Note: $/TEU calculations based on 1.85 TEUs per haul as calculated from the PIERS data; costs are presented in FY10 dollars

7.2.1 Landside Transportation Cost Savings

Land side transportation cost savings (Table 7-6) are calculated by multiplying the incremental increases in Boston Harbor TEUs (Table 6-1) by the weighted average distance calculated from the 2007 PIERS data. These landside transportation cost savings include the net difference in ILA Assessment fees for the PONYNJ and Boston Harbor as described in section 7.4 Impact of the International Longshoreman's Association Fees. Trucking costs are updated to February 2012 dollars using the Bureau of Labor Statistics Producer Price Index.[47]

[47] Producer Price Index Industry Data: Series ID PCU484121484121SM; Industry: General freight trucking, long-distance, trailer load, Product: Other receipts.

Table 7-6
Base Case: With-Project Condition Annual Trucking Cost Savings (000's)

Depth	Europe	Mediterranean	Asia	Total	Increment
41	$2,072	$500	$-	$2,572	$2,572
42	$3,575	$3,096	$-	$6,671	$4,100
43	$4,949	$3,686	$-	$8,635	$1,963
44	$5,819	$4,211	$-	$10,030	$1,395
45	$6,528	$4,659	$81,634	$92,821	$82,791
46	$7,109	$5,010	$85,740	$97,858	$5,038
47	$7,482	$5,225	$88,862	$101,569	$3,711
48	$7,679	$5,322	$90,759	$103,761	$2,192
49	$7,783	$5,407	$91,256	$104,446	$685
50	$7,812	$5,446	$91,256	$104,514	$68
51	$7,812	$5,446	$91,256	$104,514	$-

7.3 Additional Waterborne Transportation Costs

New England containerized cargo that shifts from the PONYNJ to Boston Harbor incurs additional waterborne costs consisting of the cost of transporting the additional 386 nautical miles from the PONYNJ to Boston and the cost of waiting for the tide at Boston Harbor. Waterborne transportation costs are calculated using USACE Vessel Operation Costs (EGM 11-05). Table 7-7 presents the additional waterborne transportation costs for each increment of depth.

Table 7-7
Base Case: Additional Waterborne Transportation Costs

Depth	Europe	Mediterranean	Asia Panama	Total	Increment
41	$(5,791)	$12,621		$6,830	$6,830
42	$2,002	$(46,950)		$(44,948)	$(51,778)
43	$15,407	$(39,063)		$(23,656)	$21,292
44	$40,768	$(22,138)		$18,630	$42,286
45	$70,910	$(5,238)	$(1,663,932)	$(1,598,260)	$(1,616,890)
46	$107,165	$24,244	$(1,683,991)	$(1,552,582)	$45,678
47	$162,162	$56,136	$(1,610,773)	(1,392,475)	$160,107
48	$215,575	$173,756	$(1,595,552)	$(1,206,222)	$186,254
49	$341,326	$192,233	$(1,553,496)	$(1,019,938)	$186,283
50	$446,385	$283,903	$(1,524,471)	$(794,183)	$225,755
51	$446,385	$283,903	$(1,385,441)	$(655,153)	$139,030

7.4 Base Case With-Project Total Transportation Cost Savings

The base case with-project total transportation cost savings are calculated as the trucking cost savings less any additional waterborne transportation costs, which would be incurred during the voyage from the PONYNJ to Boston Harbor (Table 7-8). Chapter 1.1.6 Survey and PIERS-Based Landside Distances: Origins and Destinations of the Shipper Survey Attachment identifies the 95% confidence interval for origin to destination distances from the PONYNJ calculated

from the PIERS data (-13.7% to +9.9%)[48]. A 95% confidence interval has been constructed around total and incremental cost savings to illustrate a range of base case benefits for each with-project depth (Table 7-9).

Table 7-8
Base Case Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	256,946	173,348	$91,222,428	$81,173,612
46	267,492	10,546	$96,305,684	$5,083,256
47	275,261	7,769	$100,176,470	$3,870,786
48	279,850	4,589	$102,554,678	$2,378,208
49	281,284	1,435	$103,426,171	$871,493
50	281,427	143	$103,719,909	$293,738
51	281,427	-	$103,858,939	$139,030

[48] Domestic origins and destinations identified by respondents for 2007 cargo movements were compared to the PIERS-based domestic origins and destinations for the same cargo to see how well the information in the PIERS data represents actual origin/destination location as provided by the survey responses. In the survey questionnaire, the respondent was presented with the number of import and export TEUs from each trading partner country as identified in the PIERS data. The respondent was asked to identify the domestic origins and destinations for these TEUs. The respondent was asked to provide domestic origin and destination information at the city and town level. A statistical analysis of the city and town information provided by the respondent and of the city, town and zip code information provided by PIERS was conducted to assess whether the information likely comes from the same population (it does) and to develop confidence intervals around the distance estimates.

Table 7-9
Base Case Average Annual Transportation Cost Savings ($000) with 95% Confidence Intervals

Channel Depth	Total Cost Savings			Incremental Cost Savings		
	Low	Expected	High	Low	Expected	High
41	$2,225	$2,578	$2,834	$2,225	$2,578	$2,834
42	$5,719	$6,627	$7,283	$3,494	$4,048	$4,449
43	$7,431	$8,611	$9,464	$1,713	$1,985	$2,181
44	$8,672	$10,049	$11,044	$1,241	$1,438	$1,580
45	$78,725	$91,222	$100,253	$70,053	$81,174	$89,210
46	$83,112	$96,306	$105,840	$4,387	$5,083	$5,586
47	$86,452	$100,176	$110,094	$3,340	$3,871	$4,254
48	$88,505	$102,555	$112,708	$2,052	$2,378	$2,614
49	$89,257	$103,426	$113,665	$752	$871	$958
50	$89,510	$103,720	$113,988	$253	$294	$323
51	$89,630	$103,859	$114,141	$120	$139	$153

A No Post-Panamax sensitivity analysis was performed to identify the impact that the projection of Post-Panamax vessels using Boston Harbor has on annual total transportation cost savings (Table 7-10). The sensitivity analysis indicates that at depths deeper than -45 feet Panamax vessels are achieving their draft limitations at a faster rate than Post-Panamax vessels and contribute considerably fewer transportation cost savings at these depths than provided by Post-Panamax vessels.

Table 7-10
Annual Transportation Cost Savings with No Post-Panamax Vessels on the Asia Panama Service in the With-Project Condition

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	149,931		--	--
41	162,336	12,405	$5,914,014	$5,914,014
42	177,759	15,423	$13,194,319	$7,280,305
43	187,633	9,874	$17,919,614	$4,725,295
44	194,841	7,208	$21,410,553	$3,490,939
45	199,396	4,555	$23,792,704	$2,382,151
46	201,783	2,387	$25,045,825	$1,253,121
47	203,014	1,231	$25,767,239	$721,413
48	203,631	617	$26,406,863	$639,624
49	204,026	395	$26,783,377	$376,514
50	204,169	143	$27,077,115	$293,738
51	204,169	-	$27,216,145	$139,030

The base case scenario was also assessed with the inclusion of an Asia Suez service, which would call at Boston Harbor at channels depths of -45 feet and greater (Table 7-11). The Asia Suez service is assumed to use 8,400 TEU vessels. The addition of the Asia Suez service is projected to bring an additional 152,533 TEUs through Boston Harbor by the year 2026 as indicated in table 6-6, which increases transportation cost savings (at -51 feet) by $62,056,158 ($165,915,097 - $103,858,939 = $62,056,158).

Table 7-11
Average Annual Transportation Cost Savings with Asia Suez Service

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	393,395	309,798	$146,449,815	$136,401,000
46	410,805	17,410	$154,337,325	$7,887,509
47	423,793	12,987	$160,348,989	$6,011,664
48	431,552	7,760	$164,086,799	$3,737,810
49	433,817	2,265	$165,336,138	$1,249,340
50	433,960	143	$165,659,462	$323,324
51	433,960	-	$165,915,097	$255,634

7.5 Impact of International Longshoreman's Association Assessment Fees

The New York Shipping Association (NYSA) represents the interests of the carriers, terminal operators, stevedores, and other marine-related businesses using the PONYNJ. The NYSA negotiates collective bargaining agreements with the International Longshoreman's Association (ILA) on behalf of its membership. One aspect of the negotiated collective bargaining is the NYSA-ILA Assessment Agreement, which is filed with the Federal Maritime Commission Bureau of Trade Analysis, Office of Agreements.[49] The assessment program established under the agreement funds obligations resulting from NYSA-ILA collective bargaining agreements, which include pension, health, and other benefits which are components of the ILA negotiated compensation package.

[49] Federal Maritime Commission Agreement no. 201162

Assessment rates are established for various types of cargo. Container Unit Assessment rates are based on the landside distance from origin or destination to the Center of the Port, which is defined as Columbus Circle in the City, County, and State of New York (57th Street and Broadway). Containers originating from or destined for domestic locations that are more than 260 highway miles from the Center of the Port are assessed at a rate of $21 per container. Containers originating from or destined for domestic locations that are less than 260 highway miles from the Center of the Port are assessed at a rate of $115 per container. Assessment fees are added to the cargo and vessel handling fees charged to the carrier (or agent) by the terminal operator. Boston Harbor also charges a fixed per container assessment fee that does not vary with distance. The Boston Harbor fee is $1.00 per ton of cargo.

Cargo and vessel handling fees are negotiated between carriers and terminal operators an on individual and confidential basis. The Container Unit Assessment rates are negotiated collectively by the representatives of the carriers and terminal operators (NYSA) and organized labor (ILA). This distance based assessment fee takes advantage of the relatively inelastic demand for PONYNJ services for importers and exporters working within the PONYNJ's primary hinterland. This 260 mile threshold includes 89% of New England import and 95% of New England export cargo using the PONYNJ in 2007. The Container Unit Assessment for containerized cargo using Boston Harbor is substantially lower than the PONYNJ fees; therefore New England containerized cargo that switches from the PONYNJ to Boston Harbor would incur a cost savings by avoiding the higher cost of the PONYNJ Container Unit Assessment. The weighted average cost of this assessment per New England TEU is $48.77 per import TEU and $51.46 per export TEU, accounting for the mix of New England containers within and outside of the 260 mile threshold, accounting for 1.85 TEUs per container in 2007, and accounting for the net impact of incurring Boston Harbor assessment fees[50].

The Container Unit Assessment fee is a component of the total cost of handling cargo at the PONYNJ. It is not associated with any government program to redistribute income, fund the provision of public goods, or subsidize government sanctioned behavior. In other words, the Container Unit Assessment fee is not a transfer payment, which is a payment made without the expectation of a good or service being offered in return. The Container Unit Assessment fee is part of the negotiated compensation paid to labor for the provision of container handling services and is therefore included in the base case transportation cost savings estimates.

Table 7-12 presents the base case transportation cost savings with the Container Unit Assessment fee excluded. The exclusion of the Container Unit Assessment fee as a component of transportation costs reduces the transportation cost savings afforded by shifting from the PONYNJ to Boston Harbor.

[50] 1.85 TEUs per container figure is based on calculations conducted with the PIERS data.

Table 7-12
Base Case Average Annual Transportation Cost Savings without Container Unit Assessment Fee Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,353,523	$2,353,523
42	76,574	8,610	$6,042,793	$3,689,269
43	80,678	4,104	$7,855,737	$1,812,945
44	83,598	2,920	$9,171,319	$1,315,582
45	256,946	173,348	$83,101,887	$73,930,568
46	267,492	10,546	$87,744,431	$4,642,544
47	275,261	7,769	$91,290,590	$3,546,158
48	279,850	4,589	$93,477,037	$2,186,447
49	281,284	1,435	$94,288,582	$811,545
50	281,427	143	$94,576,370	$287,788
51	281,427	-	$94,715,400	$139,030

8 Sensitivity Analyses

Analyses identifying the impact of the Container Unit Assessment fee and on restricting Post-Panamax vessels from the Asia Panama service under with-project conditions are presented in Chapter 7: Transportation Cost Savings. Sensitivity analyses are performed to address the uncertainty in projected future conditions and to see how changes in influential factors may impact project benefits. Factors assessed in sensitivity analyses include: timing of carrier response to the deeper channel, vessel size, and potential additional services.

8.1 Uncertainty Discussion

The service with Asia is projected to continue being the largest service, in terms of TEUs, at Boston Harbor, as it has been historically. The Asia service accounted for the majority of loaded TEUs in 2007 as compared to the Europe and Mediterranean services (Appendix A: Table 5). The Asia service moved 86,534 (58%) loaded TEUs through Boston Harbor, while the Mediterranean service moved 19,407 (13%) and the Europe service moved 43,215 (29%).

Projected future benefits are weighted more heavily (79%) towards the Asia service (Table 7-1) because this service has a larger slot allocation and uses larger vessels than the other services, therefore more New England TEUs are handled on this service. The higher risk associated with vessel size on the Asia service is addressed in Sensitivity Analyses 6 and 7, which assess transportation cost savings with smaller vessels on this service.

Under with-project conditions, a channel depth at Boston Harbor of -45 feet is considered a tipping point for the Asia service. At channel depths less than -45 feet, the Asia service is projected to not call at Boston Harbor and all Asian trade New England TEUs would use the PONYNJ. The selection of -45 feet as a tipping point was based on discussions with the carrier (COSCO) and on the relation between a -45-foot channel at Boston Harbor and a -50-foot channel at the PONYNJ. Due to the extensive tidal range at Boston Harbor and the heavy use of tidal advantage exhibited by carriers, it is projected that carriers will continue to rely heavily on tidal advantage at Boston Harbor under without and with-project conditions. The analysis projects that a -45-foot channel depth at Boston Harbor would not constrain vessel operations (vessel departure or arrival drafts) at the PONYNJ for vessels which also call at Boston Harbor as a next or prior port of call. If the tipping point is less than -45 feet, there would be no substantial change to benefits other than a shift of the first increment of Asia service related benefits to a shallower depth. Incremental benefits at depths greater than -45 feet would not be affected.

Project benefits are not dependent on projected future growth of New England cargo using the PONYNJ or Boston Harbor and there is no uncertainty or risk associated with a projected rate of growth. Under the base case scenario and a with-project condition -51-foot channel, the analysis projects that 218,829 TEUs would shift from the PONYNJ to Boston Harbor. Of those 218,829 TEUs are included 87,333 Asia service TEUs which use Boston Harbor under existing conditions, but are projected to shift to the PONYNJ under without-project conditions. These 87,333 TEUs would be considered returning to Boston Harbor under with-project conditions. Therefore, under a with-project condition -51-foot channel, 131,496 TEUs (218,829 – 87,333 = 131,496) would be considered shifting TEUs which historically used the PONYNJ.

This shift of 131,496 New England TEUs, which historically used the PONYNJ, is less than the mid-point of the range of TEUs (152,488) identified as available to shift in the shipper survey at the 2007 level of trade (Table 6-1). The shift of 131,496 TEUs is only slightly more than the lower limit (131,049) also identified in the shipper survey (Table 6-1). The low, middle, and high range estimates of the number of New England TEUs available to shift from the PONYNJ to Boston Harbor are escalated to the base-year (2015) using the 20-year (1989 – 2009) US containerized trade growth rate (4.65%) in Table 6-1. But, growth in New England TEUs is not included in the transportation cost savings calculations. The growth rate is used in Table 6-1 to indicate that there will be more than sufficient cargo available to shift from the PONYNJ to Boston Harbor in 2015 and subsequent years. The middle range estimate of cargo available to shift in 2015 (using the 4.65% growth rate and including the 87,333 returning TEUs) is 306,689 TEUs, which is more than the total 218,829 TEUs (including returning TEUs) projected to shift under with-project conditions and a -51-foot channel at Boston Harbor.

8.2 Sensitivity Analysis Descriptions

The following sensitivity analyses were conducted:

- Sensitivity Analysis 1: Same with and without-project conditions as the base case with the exceptions that the Asia Panama service waits for five years after the base-year before calling at Boston Harbor.
- Sensitivity Analysis 2: Same with and without-project conditions as the base case with the exception that the Post-Panamax vessel entering the Mediterranean service is an 8,400 TEU vessel.
- Sensitivity Analysis 3: Same with and without-project conditions as the base case with the exception that no Post-Panamax vessels enter the Mediterranean service.
- Sensitivity Analysis 4: Same with and without-project conditions as the base case with the exception that a new fifth service (Mediterranean) calls at Boston Harbor using 8,400 TEU vessels beginning at a controlling depth of 42 feet.
- Sensitivity Analysis 5: Same with and without-project conditions as the base case with the exception that a new fifth service (Mediterranean) calls at Boston Harbor using 8,400 TEU vessels beginning at a controlling depth of 45 feet.
- Sensitivity Analysis 6: Same with and without-project conditions as the base case with the exception that the Asia Panama service is constrained to a 5,800 TEU vessel.
- Sensitivity Analysis 7: Same with and without-project conditions as the base case with the exception that there are no Post-Panamax vessels on the Asia Panama service.
- Sensitivity Analysis 8: Same with and without-project conditions as the base case with the exception that the largest vessel to call at Boston Harbor is a 7,500 TEU vessel
- Sensitivity Analysis 9: Same with and without-project conditions as the base case with the exception that the largest Post-Panamax vessels on the two Asia services arrive and depart at drafts similar to operating drafts observed at Oakland Harbor in 2010 for services with similar vessel size, ports of call, and placement in the port rotation.
- Sensitivity Analysis 10: This sensitivity analysis only calculates waterborne transportation cost savings. In the without project condition, existing Panamax containerships in the 4700 TEU range would service Boston Harbor in their current rotation. As Boston channels are deepened under with-project conditions these ships are loaded more fully and ultimately shift to fewer, bigger ships with same cargo volume, achieving economies of scale with larger vessels. Cargo volumes increase due to global growth in trade, and as channel depth increases allow, ship sizes increase and larger ships are used to carry the additional cargo. New England cargo loaded and landed at the PONYNJ under without-project conditions would shift to Boston Harbor, as vessels load to deeper depths and vessel size increases to handle the additional cargo. Use of larger vessels decreases shipping costs for all cargo onboard the vessel irrespective of whether those boxes were loaded or landed at Boston Harbor or at some other port on the service's rotation; therefore, the benefits calculated in this sensitivity analysis are based on all TEUs on the vessel.
- Sensitivity Analysis 11: This sensitivity analysis is exactly the same as Sensitivity Analysis 10 with the exception that benefits are calculated based on the share of Boston Harbor cargo onboard the vessel. The proportion of Boston Harbor cargo on the vessel is the proportion of vessel cost used in the calculation of with-project benefits.
- Sensitivity Analysis 12: This sensitivity analysis calculates the number of additional trips by the existing fleet calling at Boston Harbor required to haul the base case number of shifted TEUs. The waterborne transportation cost of these additional trips is calculated based on the proportion of Boston harbor TEUs historically loaded on these vessels. This

sensitivity analysis excludes the 87,333 Asia service TEUs, which return to Boston Harbor under with-project conditions.

- Sensitivity Analysis 13: This sensitivity analysis assesses the effects of alternative operating draft distributions for the fleet projected to call at Boston Harbor under with-project conditions. Alternative operating draft distributions used in this sensitivity analysis include:
    - Strict adherence to observed operating draft distributions, such that vessels do not load more deeply if any vessel is project to achieve its maximum load at that channel depth.

8.3 Sensitivity Analysis Results

The sensitivity analysis resulting in the largest reduction in benefits is Sensitivity Analysis 7, which constrains the total number of shifted TEUs by 70%. Alternatively, both of the new fifth service sensitivity analyses (Sensitivity Analysis 4 and Sensitivity Analysis 5) increase the number of shifted TEU to 13% more than estimated in the base case.

Sensitivity Analysis 1: Same with and without-project conditions as the base case with the exceptions that the Asia Panama service waits for five years after the base-year before calling at Boston Harbor.

Sensitivity Analysis 1: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,629,454	$2,629,454
42	76,574	8,610	$6,757,732	$4,128,278
43	80,678	4,104	$8,781,705	$2,023,973
44	83,598	2,920	$10,247,821	$1,466,116
45	256,946	173,348	$76,128,401	$65,880,580
46	267,492	10,546	$80,448,769	$4,320,368
47	275,261	7,769	$83,720,894	$3,272,124
48	279,850	4,589	$85,742,075	$2,021,181
49	281,284	1,435	$86,516,962	$774,887
50	281,427	143	$86,810,382	$293,421
51	281,427	-	$86,922,784	$112,401

Sensitivity Analysis 2: Same with and without-project conditions as the base case with the exception that the Post-Panamax vessel entering the Mediterranean service is an 8,400 TEU vessel.

Sensitivity Analysis 2: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	83,461	15,496	$9,855,293	$7,276,901
43	87,814	4,353	$11,964,446	$2,109,153
44	90,956	3,142	$13,502,838	$1,538,392
45	264,493	173,537	$94,768,590	$81,265,751
46	275,188	10,695	$99,927,621	$5,159,032
47	283,048	7,860	$103,848,014	$3,920,393
48	287,677	4,630	$106,271,141	$2,423,127
49	289,148	1,471	$107,163,417	$892,276
50	289,307	159	$107,484,989	$321,572
51	289,307	-	$107,624,019	$139,030

Sensitivity Analysis 3: Same with and without-project conditions as the base case with the exception that no Post-Panamax vessels enter the Mediterranean service.

Sensitivity Analysis 3: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	72,185	4,221	$4,618,300	$2,039,908
43	75,637	3,452	$6,309,423	$1,691,123
44	77,817	2,180	$7,404,265	$1,094,842
45	250,504	172,688	$88,337,700	$80,933,435
46	260,454	9,950	$93,122,837	$4,785,137
47	267,817	7,363	$96,838,561	$3,715,725
48	272,200	4,384	$99,001,997	$2,163,435
49	273,457	1,257	$99,770,528	$768,532
50	273,516	59	$99,933,165	$162,636
51	273,516	-	$100,072,195	$139,030

Sensitivity Analysis 4: Same with and without-project conditions as the base case with the exception that a new fifth service (Mediterranean) calls at Boston Harbor using 8,400 TEU vessels beginning at a controlling depth of 42 feet.

Sensitivity Analysis 4: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	110,068	42,104	$22,300,720	$19,722,328
43	115,667	5,599	$25,002,922	$2,702,202
44	119,917	4,250	$27,079,493	$2,076,571
45	294,400	174,483	$108,806,806	$81,727,313
46	305,835	11,435	$114,343,684	$5,536,878
47	314,149	8,314	$118,510,120	$4,166,436
48	318,984	4,835	$121,147,470	$2,637,349
49	320,633	1,649	$122,142,265	$994,795
50	320,876	243	$122,594,745	$452,480
51	320,876	-	$122,733,775	$139,030

Sensitivity Analysis 5: Same with and without-project conditions as the base case with the exception that a new fifth service (Mediterranean) calls at Boston Harbor using 8,400 TEU vessels beginning at a controlling depth of 45 feet.

Sensitivity Analysis 5: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	294,400	210,802	$108,806,806	$98,757,991
46	305,835	11,435	$114,343,684	$5,536,878
47	314,149	8,314	$118,510,120	$4,166,436
48	318,984	4,835	$121,147,470	$2,637,349
49	320,633	1,649	$122,142,265	$994,795
50	320,876	243	$122,594,745	$452,480
51	320,876	-	$122,733,775	$139,030

Sensitivity Analysis 6: Same with and without-project conditions as the base case with the exception that the Asia Panama service is constrained to a 5,800 TEU vessel.

Sensitivity Analysis 6: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598		--	--
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	210,777	127,179	$69,555,909	$59,507,094
46	216,811	6,034	$72,552,023	$2,996,114
47	219,271	2,460	$73,824,452	$1,272,429
48	219,890	619	$74,318,891	$494,439
49	220,285	395	$74,670,599	$351,708
50	220,427	143	$75,026,302	$355,703
51	220,427	-	$75,026,302	$0

Sensitivity Analysis 7: Same with and without-project conditions as the base case with the exception that there are no Post-Panamax vessels on the Asia Panama service.

Sensitivity Analysis 7: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	149,931		--	--
41	162,336	12,405	$5,864,228	$5,864,228
42	177,759	15,423	$13,103,393	$7,239,165
43	187,633	9,874	$17,799,261	$4,695,868
44	194,841	7,208	$21,263,033	$3,463,772
45	199,396	4,555	$23,521,680	$2,258,647
46	201,783	2,387	$24,751,246	$1,229,566
47	203,014	1,231	$25,444,372	$693,125
48	203,631	617	$25,995,584	$551,212
49	204,026	395	$26,328,295	$332,711
50	204,169	143	$26,593,007	$264,712
51	204,169	-	$26,593,007	$0

Sensitivity Analysis 8: Same with and without-project conditions as the base case with the exception that the largest vessel to call at Boston Harbor is a 7,500 TEU vessel

Sensitivity Analysis 8: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598			
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	235,996	152,399	$81,349,431	$71,300,616
46	245,538	9,541	$85,954,866	$4,605,435
47	252,513	6,976	$89,438,952	$3,484,086
48	256,485	3,971	$91,520,628	$2,081,676
49	257,723	1,239	$92,293,711	$773,083
50	257,866	143	$92,584,239	$290,528
51	257,866	-	$92,707,894	$123,655

Sensitivity Analysis 9: Same with and without-project conditions as the base case with the exception that the largest Post-Panamax vessels on the Asia service arrives and departs at drafts similar to operating drafts observed at Oakland Harbor in 2010 for services with similar vessel size, ports of call, and placement in the port rotation.

Sensitivity Analysis 9: Average Annual Transportation Cost Savings

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598			
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	80,678	4,104	$8,611,171	$1,984,669
44	83,598	2,920	$10,048,815	$1,437,645
45	171,467	87,869	$50,793,847	$40,745,031
46	182,332	10,865	$56,049,373	$5,255,526
47	192,480	10,147	$60,983,126	$4,933,753
48	193,097	617	$61,455,285	$472,158
49	193,491	395	$61,787,996	$332,711
50	193,634	143	$62,052,708	$264,712
51	193,634	-	$62,052,708	$0

Sensitivity Analyses 10 & 11: Average Annual Transportation Cost Savings

	Base Case		Sensitivity Analysis 10		Sensitivity Analysis 11	
Channel Depth	Total Cost Savings	Incremental Cost Savings	Total Cost Savings	Incremental Cost Savings	Total Cost Savings	Incremental Cost Savings
42	$2,578,392	$2,578,392	$65,562,901	$65,562,901	$15,726,712	$15,726,712
43	$6,626,502	$4,048,110	$90,526,903	$24,964,002	$21,266,408	$5,539,696
44	$8,611,171	$1,984,669	$107,469,424	$16,942,521	$25,007,182	$3,740,773
45	$10,048,815	$1,437,645	$141,804,175	$34,334,752	$33,836,365	$8,829,184
46	$91,222,428	$81,173,612	$157,484,609	$15,680,433	$37,632,457	$3,796,092
47	$96,305,684	$5,083,256	$168,151,273	$10,666,664	$40,260,047	$2,627,590
48	$100,176,470	$3,870,786	$174,099,048	$5,947,775	$41,754,019	$1,493,972
49	$102,554,678	$2,378,208	$175,992,504	$1,893,456	$42,166,023	$412,004
50	$103,426,171	$871,493	$176,225,350	$232,846	$42,184,990	$18,967
51	$103,719,909	$293,738	$176,225,350	$0	$42,184,990	$0

Sensitivity Analysis 12: This sensitivity analysis calculates the number of additional trips by the existing fleet calling at Boston Harbor which would be required to haul the base case number of shifted TEUs if the channel were not deepened. The waterborne transportation cost of these additional trips is calculated based on the proportion of Boston harbor TEUs historically loaded on these vessels. This sensitivity analysis excludes the 87,333 Asia service TEUs, which return to Boston Harbor under with-project conditions.

Sensitivity Analyses 12-1: Background Data

	Europe	Mediterranean	Asia
One-way Voyage Cost	$501,307	$440,317	$1,981,758
TEUs per Call	676	348	1,766
% of Vessel TEUs	7.4%	5.4%	23.2%
Boston Cost per Voyage	$37,005	$23,696	$459,371

The transportation cost savings of Sensitivity Analysis #12 are calculated by subtracting the voyage costs of the additional vessel calls from the total landside transportation savings

computed for the Base Case. The resulting analysis is shown in the final table for this sensitivity below.

Sensitivity Analyses 12-2: Base Case Shifted TEUs

Channel Depth	Europe	Mediterranean	Asia*	Total
42	7,441	6,536		13,977
43	10,299	7,781		18,080
44	12,110	8,890		21,000
45	13,586	9,835	83,927	107,348
46	14,795	10,575	92,525	117,894
47	15,571	11,030	99,062	125,663
48	15,983	11,235	103,034	130,252

Note: *Excludes 87,333 Asia service TEUs currently using Boston Harbor

Sensitivity Analyses 12-3: Additional Calls

Channel Depth	Europe	Mediterranean	Asia	Total
42	11	19	0	30
43	15	22	0	38
44	18	26	0	43
45	20	28	48	96
46	22	30	52	105
47	23	32	56	111
48	24	32	58	114

Sensitivity Analyses 12-3: Voyage Costs of Additional Calls

Channel Depth	Europe	Mediterranean	Asia	Total	Incremental
42	$407,325	$445,030		$852,356	
43	$563,798	$529,828		$1,093,626	$241,270
44	$662,936	$605,317		$1,268,252	$174,626
45	$743,719	$669,674	$21,831,107	$23,244,500	$21,976,248
46	$809,885	$720,068	$24,067,541	$25,597,495	$2,352,994
47	$852,380	$751,035	$25,768,057	$27,371,473	$1,773,979
48	$874,915	$764,999	$26,801,257	$28,441,171	$1,069,698

Sensitivity Analyses 12-4: Transportation Cost Savings

Channel Depth	Base Case Landside Savings (Table 7-6)	Additional Call Voyage Costs (Table Sensitivity Analysis 12-3)	Total Transportation Cost Savings	Incremental Transportation Cost Savings
42	6,671,450	$852,356	$5,819,094	$5,819,094
43	8,634,826	$1,093,626	$7,541,200	$1,722,106
44	10,030,185	$1,268,252	$8,761,933	$1,220,733
45	92,820,688	$23,244,500	$69,576,188	$60,814,255
46	97,858,266	$25,597,495	$72,260,771	$2,684,583
47	101,568,945	$27,371,473	$74,197,472	$1,936,701
48	103,760,900	$28,441,171	$75,319,729	$1,122,257

Sensitivity Analysis 13: This sensitivity analysis assesses the effects of alternative operating draft distributions for the fleet projected to call at Boston Harbor under with-project conditions. The first operating draft distribution tested under this sensitivity analysis (13A) is a strict adherence to observed operating draft distributions, such that vessels do not load more deeply if any vessel is project to achieve its maximum load at that channel depth.

Sensitivity Analyses 13A: Strict Observed Distribution with No Advancement

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598			
41	67,965	5,367	$2,578,392	$2,578,392
42	76,574	8,610	$6,626,502	$4,048,110
43	76,574	-	$6,626,502	$0
44	76,574	-	$6,626,502	$0
45	247,502	170,927	$86,596,250	$79,969,748
46	256,099	8,598	$90,682,401	$4,086,151
47	256,099	-	$90,682,401	$0

The second alternative operating draft scenario assessed in this sensitivity analysis (13B) forces each vessel to load as fully as possible at each depth increment. Under this scenario vessels are using tidal advantage much more aggressively than observed at Boston Harbor. Because the maximum vessel operating draft is 47 feet the Europe and Mediterranean services are all fully loaded at a channel depth of -42 feet and the Asia service is fully loaded at a channel depth of -45 feet. Some tide delay benefits continue to accrue at deeper channel depths. This is considered an unrealistic scenario.

Sensitivity Analyses 13B: All Vessels Fully Loaded

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	62,598			
41	74,507	11,909	$5,575,229	$5,575,229
42	90,353	15,846	$12,915,853	$7,340,625
43	90,353	-	$13,023,032	$107,178
44	90,353	-	$13,119,048	$96,016
45	281,427	191,074	$102,604,335	$89,485,287
46	281,427	-	$102,767,594	$163,259
47	281,427	-	$103,043,867	$276,272
48	281,427	-	$103,276,792	$232,926
49	281,427	-	$103,479,744	$202,952
50	281,427	-	$103,719,909	$240,164
51	281,427	-	$103,858,939	$139,030

The third operating draft distribution sensitivity analysis (13C) uses the Post-Panamax Generation 2 Vessel Class distribution, which was used in the Savannah Harbor Expansion Project (Savannah Harbor Economics Appendix; page 144; Table 108). The operating draft distribution presented in the Savannah Economics Appendix was extrapolated to depths shallower than -44 feet. This operating draft distribution is the same at channel depths of -47 and -48 feet, indicating that vessels will not load more deeply at channel depths greater than 47 feet.

Sensitivity Analyses 13C: Savannah Harbor Deepening Distribution

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	65,821			
41	66,195	374	$286,878	$286,878
42	69,908	3,713	$2,074,258	$1,787,380
43	70,084	176	$2,459,874	$385,616
44	70,631	548	$2,776,213	$316,340
45	214,150	143,519	$69,865,162	$67,088,949
46	219,413	5,263	$72,414,269	$2,549,107
47	228,305	8,892	$76,709,624	$4,295,355
48	228,305	-	$76,767,989	$58,365
49	228,305	-	$76,799,292	$31,303
50	228,305	-	$76,820,966	$21,674
51	228,305	-	$76,834,335	$13,368

The fourth operating draft distribution sensitivity analysis (13D) constrains the maximum operating draft of vessels to be 2.5 feet less than their design draft. Under this constraint a vessel with a 47.56 design draft operates at drafts no deeper than 44.99 feet. This constraint is applied to all vessels in this sensitivity analysis.

Sensitivity Analyses 13D: Maximum Operating Draft Constrained by 2.5 Feet

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	64,910			
41	65,240	329	$224,555	$224,555
42	76,524	11,284	$5,542,412	$5,317,857
43	79,084	2,560	$6,820,733	$1,278,322
44	81,172	2,088	$7,894,514	$1,073,781
45	250,715	169,543	$87,391,328	$79,496,814
46	256,668	5,953	$90,396,645	$3,005,317
47	258,903	2,235	$91,519,230	$1,122,584
48	259,219	316	$91,908,830	$389,601
49	259,219	-	$91,937,856	$29,026
50	259,219	-	$92,076,886	$139,030
51	259,219	-	$92,076,886	$0

The fifth operating draft distribution sensitivity analysis (13E) reduces the amount of tidal advantage used at Boston Harbor to one-half of the observed use of tidal advantage. This spreads the operating draft distribution among a broader and shallower range of operating drafts (Sensitivity Analysis 13: Comparison of Operating Drafts With a -47-Foot Channel). The effect of reducing tidal advantage is to reduce overall project benefits and to distribute benefits more evenly among various with-project conditions channel depths (Sensitivity Analysis 13E: Reduced Tidal Advantage).

Sensitivity Analyses 13: Comparison of Operating Drafts with a -47-Foot Channel

Base Case			**Reduced Tidal Advantage**		
Operating Draft	Number of Calls	% of Total Calls	Operating Draft	Number of Calls	% of Total Calls
47	25	24%	45	3	3%
46	19	18%	44	11	11%
45	8	8%	43	11	11%
44	0	0%	42	19	18%
43	25	24%	41	8	8%
42	19	18%	40	3	3%
41	8	8%	39	11	11%
Total Calls	104		38	11	11%
			37	19	18%
			36	0	0%
			35	8	8%
			Total Calls	104	

Sensitivity Analyses 13E: Reduced Tidal Advantage

Channel Depth	Total TEUs	Incremental TEU Increase	Total Cost Savings	Incremental Cost Savings
40	59,061			
41	60,934	1,873	$925,843	$925,843
42	68,367	7,433	$4,481,475	$3,555,631
43	70,256	1,890	$5,449,796	$968,321
44	72,833	2,576	$6,787,099	$1,337,303
45	213,520	140,687	$72,531,037	$65,743,938
46	218,998	5,477	$75,306,949	$2,775,913
47	225,721	6,724	$78,571,287	$3,264,338
48	232,430	6,708	$81,883,477	$3,312,189
49	238,848	6,418	$85,024,046	$3,140,569
50	245,365	6,517	$88,234,722	$3,210,677
51	251,337	5,972	$91,090,706	$2,855,983

9 Conclusion

Post-Panamax vessels were deployed to Boston Harbor (Asia Suez service) for the first time in May 2011; however, this service was discontinued after six months. The large surge in Boston Harbor throughput which accompanied the new, but short lived, service to Boston Harbor supports the fundamental finding of this analysis, which is that the potential for substantial landside transportation cost savings is an economic incentive for shippers to shift some New England containerized cargo from using the PONYNJ to using Boston Harbor. This economic incentive is identified and quantified by the trueking cost analysis (Chapter 7.1). The shipper survey conducted in 2010 indicates that a substantial number of New England TEUs currently using the PONYNJ appear to have the potential to shift to Boston Harbor (Appendix A: Revised R-1 Report). Carriers are currently providing limited opportunities for shippers to shift to Boston Harbor because of channel constraints at Boston Harbor. Some carriers are reluctant to call at Boston Harbor because of the light loading and tide delays that are a regular component of Panamax vessel operations at Boston Harbor (Chapter 3.2). Interviews with the carriers indicate that channel depth constraints are the reason for historically pulling Boston Harbor out of the liner service rotation and for not including Boston Harbor in the rotation today and under without-project conditions (Appendix C: Carrier Interviews).

Under with-project conditions the existing fleet of Panamax vessels calling at Boston Harbor would be able to load more deeply (Chapter 6.3). Large Post-Panamax vessels are projected to use Boston Harbor at controlling depths of -45 feet and deeper, because at this controlling depth Boston Harbor would not be a constraint on the operating drafts of vessels coming from or going to the PONYNJ. Base case Boston Harbor TEU amounts (Table 6-3) and transportation cost savings (Table 7-8) are alternatively calculated assuming no Post-Panamax vessels call at Boston Harbor on the Asia Panama service under with-project conditions. Vessels are projected to use tidal advantage under both without-project conditions and with-project conditions in the same way that vessels were observed using tidal advantage in 2010.

Some of the additional cargo carried on vessels using the federal channel at Boston Harbor under with-project conditions is projected to be New England containerized cargo, which switched from using the PONYNJ to using Boston Harbor (Chapter 6.4). Under with-project conditions, the total amount of Boston Harbor cargo carried on the vessel is calculated based on the 2010 observed proportion of Boston Harbor cargo. The total amount of cargo projected to shift under the base case with-project condition is 218,829 New England TEUs[51] (Table 6-2). The total amount of New England TEUs projected to shift from the PONYNJ to Boston Harbor includes 87,333 TEUs that are handled at Boston Harbor under existing conditions, so the total number of newly shifting cargo exclusive of returning cargo is 131,496 TEUs.

The PIERS data identifies 255,000 New England TEUs as having used the PONYNJ in 2007 (Table 3-1). By 2015, there will be 367,000 New England TEUs using the PONYNJ under without-project conditions based on the average annual TEU volume growth rate for all US container ports from 1999 – 2009 (4.65%[52]). The 367,000 TEU estimate is based on 2007 data for the PONYNJ and excludes the 87,333 Asian service New England TEUs, which are projected

[51] Calculated at a with-project channel depth of -48 feet

[52] AAPA data accessed at www.aapa-ports.org

to shift from Boston Harbor to the PONYNJ under future without-project conditions. Including the Asian service cargo increases the total number of New England TEUs projected to use the PONYNJ in 2015 to 454,000.

The analysis of shipper survey data[53] estimates that the mid-range number of New England TEUs available to shift from the PONYNJ to Boston Harbor in 2007 was 152,488 TEUs and the low estimate was 131,049 TEUs (Table 6-2). This mid-range estimate of "shiftable" TEUs is projected to increase to 219,356 TEUs by 2015 using the same historical growth rate (4.65%). The "shiftable" TEU estimate is based on 2007 data and excludes the 87,333 Asian service New England TEUs, which currently use Boston Harbor but are projected to shift from Boston Harbor to the PONYNJ under future without-project conditions. Including the Asian service cargo increases the mid-range number of "shiftable" TEUs projected to use the PONYNJ in 2015 to 306,689, which is substantially greater than the 218,829 projected to shift under with-project conditions of a -48-foot channel.

The 218,829 New England TEUs projected to shift from the PONYNJ to Boston Harbor, which includes the 87,333 Asian service TEUs returning to Boston Harbor, are 48% of the of the total New England TEUs projected to use the PONYNJ under without project conditions (218,829/454,000 = 48%). The 218,829 New England TEUs projected to shift to Boston Harbor are only 71% of the mid-range estimate of New England TEUs available to shift to Boston Harbor in 2015 (218,829/306,689 = 71%).

Total transportation cost savings are calculated as the reduction in trucking costs resulting from the switch from using the PONYNJ to using Boston Harbor and the net difference in waterborne transportation costs (including tide delays) for containers that don't get offloaded or loaded at the PONYNJ, but instead make the additional ocean voyage to Boston Harbor. Base case transportation cost saving are alternatively calculated with the PONYNJ Container Unit Assessment fee excluded as a component of origin to destination costs for New England cargo using the PONYNJ (Chapter 7.4). Sensitivity analyses (Chapter 8) are performed to assess the influence of important factors on benefit estimates, including: timing of carrier response to the deeper channel, vessel size, and potential additional services.

[53] Appendix A: Estimation of TEUs Available to Shift from the PONYNJ to Boston Harbor

APPENDIX C-2

Economic Analysis of Additional Channel Segments

Channel Deepening to Bulk Cargo Terminals

Main Ship Channel Extension to Marine Terminal

Mystic River Deepening at Medford Street Terminal

Chelsea River Channel Deepening

Updated November 2012

Attachment C-2
Economic Analysis of Additional Channel Segments

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Appendix C-2
Economic Analysis of Additional Channel Segments

1. Introduction

The purpose of this economic analysis is to estimate the economic benefits of deepening three small additional channel segments in Boston Harbor. The first segment is an extension of the Main Ship channel north of the Reserved Channel to provide deeper access to a new terminal being developed, the Massport Marine Terminal. The second segment is located in the Mystic River, and would extend the existing 40-foot channel to the Medford Street Terminal. The third segment would consist of deepening the Federal channel in the Chelsea River from 38 feet to 40 feet. The Chelsea River is used primarily by oil tankers, and is the main distribution point for gasoline, aviation fuel and heating oil in eastern Massachusetts. Since these additional channel segments are separable elements from the Main Channel deepening to Conley terminal, they are analyzed separately in this analysis.

The base year of the analysis is 2016, and the period of analysis is 2016-2066. Details regarding the channel design and construction are contained in the main report and engineering appendices. All benefits are presented in annual terms, at the 2011 price level. Benefits are converted to average annual equivalents where necessary using the FY13 Federal interest rate for water resources projects of 3.75 percent.

2. Additional Channel Segment to Massport Marine Terminal

The Massport Marine Terminal is located just north of the Reserved Channel on the west side of the harbor in South Boston, on a site known as the North Jetty (Massport Marine Terminal). The 30-acre site was used during the 1990's and early 2000's for storing excavated material from Boston's Big Dig construction project. With the completion of that project, the land is now available for other use and development. The site is owned by the City of Boston but has been leased to Massport through 2070, and includes a berth that is 900 feet long which was dredged to 40 feet with the last channel dredging improvement project. Some repairs would be required to the dock for full usage of the site, as well as construction of some landside support facilities. In 2007, Massport was in final negotiations with a tenant who planned to use the site as a regional import center for cement, but the tenant withdrew due to the economic downturn. The severe recession of 2007 – 2009 has hampered the leasing of the site, but Massport expects it will be used for the import of cement, salt, or construction materials once the local economy recovers.

For the without project condition, it is assumed that the Massport Marine Terminal will be leased and in use for cement or other dry bulk cargo imports by 2016, the base year of the analysis. However, prior to channel dredging, this assumption should be verified, the vessel usage documented, and the economic benefits re-evaluated at that time.

2.1 Benefit Methodology

Benefits for dredging a deeper channel to the Massport Marine Terminal are estimated based on information provided by Massport, and based on information about vessels currently bringing bulk commodities to Boston Harbor obtained from terminal operators and detailed Waterborne Commerce Statistics Center data. Benefits to channel dredging are derived from reduced waterborne transportation costs expected with the project, since a deeper channel would allow larger vessels to be used. Expected waterborne transportation costs were estimated for the without and with project conditions using FY2010 Deep Draft Vessel Operating Costs developed by the Corps of Engineers Institute for Water Resources. The economic benefits to channel dredging equal the difference in expected waterborne transportation costs between the without and with project conditions.

2.2 Economic Study Area and Hinterlands for Bulk Commodities

For the economic analysis of dredging to the Massport Marine Terminal, the economic study area and the hinterlands of the port are defined as the six New England states. It is expected that cement, salt, or other bulk cargo landed at the site would serve the greater Boston area as well as the wider New England-region market.

2.3 Cement and Dry-Bulk Imports to Boston Harbor

There are currently three cement terminals located in Boston Harbor. Coastal Cement operates a terminal in South Boston just above the Reserved Channel. LaFarge Cement has a terminal on the Mystic River near the Autoport facility. St. Lawrence Cement has a terminal off the Mystic River, on Island End River. According to data from the Waterborne Commerce Statistics Center (www.ndc.iwr.usace.army.mil/wcsc), 549,000 tons of cement were brought into Boston Harbor in 2009. Road salt is brought into Boston primarily to the Eastern Minerals terminal at the entrance to the Chelsea River. Total salt volumes vary by year depending on weather conditions, but typically average more than 1 million tons. Recent historical cement, road salt, and other dry bulk volumes for Boston Harbor are shown in Table C2-1, below.

Table C2-1
Recent Historical Imports, Dry Bulk Cargo
Boston Harbor

Commodity Classification	all data in thousand short tons					
	2009	**2008**	**2007**	**2006**	**2005**	**Avg.**
Soil, Sand, Gravel, Rock and Stone	11	57	189	188	231	135
Iron Ore and Scrap	941	706	608	691	382	666
Other Non-Metal Minerals (road salt)	1,260	1,293	797	595	1,531	1,095
Cement, Glass and Lime	549	665	796	907	1,051	794
Primary Iron and Steel	10	126	21	11	64	46
Primary Non-ferrous Metals	90	237	320	242	284	235
Total	2,861	3,084	2,731	2,634	3,543	2,971

Source: Waterborne Commerce of the United States, 2005 - 2009

2.4 World Bulk Carrier Fleet

In 2007, the world bulk carrier fleet consisted of 6,200 vessels greater than 5,000 deadweight tons (*Propulsion Trends in Bulk Carriers,* MAN Diesel A/S, Copenhagen, Denmark, 2007). The size distribution of the bulk carrier fleet of vessels greater than 5,000 DWT is shown in Table C2-2 below. Generally, 35,000 DWT bulk carriers have loaded drafts up to 35 feet, and the larger Handymax bulk carriers of 50,000 to 55,000 DWT have loaded drafts up to 41 feet.

Table C2-2
World Bulk Carrier Fleet, 2007

Vessel Size Class	Deadweight Tonnage (DWT)	Proportion of World Fleet
Small	< 10,000	4.3%
Handysize	10,000-35,000	33.4%
Handymax	35,000-55,000	28.6%
Panamax	60,000-80,000	20.5%
Capesize and larger	80,000-200,000	13.2%

Source: *Propulsion Trends in Bulk Carriers,* MAN Diesel A/S, Copenhagen, Denmark, 2007, www.manbw.com/technical papers

2.5 Without Project Condition

In the Without Project Condition for the Massport Marine Terminal, the channel north of the Reserved Channel remains at the authorized depth of 40 feet, and the berth at the Massport Marine Terminal also remains at a depth of 40 feet. It is assumed that the future tenant develops a bulk terminal at the site with or without a channel deepening project, and that the terminal is fully operational by 2016, the base year of the analysis. Massport expects that the terminal will be used for the receipt of bulk shipments, such as cement, road salt, construction materials, or wind farm components.

2.6 Commerce Forecast and Projected Future Operations

It is expected that shipments to the new Massport Marine Terminal will be brought on large, foreign flag vessels from overseas ports, based on information provided by the previous expected tenant. Based on information provided by Massport and by the tenant expected to use the site before the recession, the commerce forecast for the Massport Marine Terminal is projected to be 300,000 tons of cement, salt, or other bulk cargo by 2016, the base year of the analysis, growing to 600,000 tons by 2020, as the terminal becomes established and assuming moderate economic growth has resumed. These assumptions should be examined prior to construction of the channel deepening project, when actual cargo volumes and the specific characteristics of vessels using the terminal are known.

2.7 Fleet Forecast

A fleet forecast was developed for the Massport Marine Terminal based on information provided to Massport by potential tenants. Without the project, the channel to the Massport Marine Terminal will remain at 40 feet, and vessels calling the new terminal would be limited to 35,000 to 40,000 DWT with drafts of 36 to 37 feet. With underkeel clearance equal to ten percent of loaded draft, these vessels would use the existing 40-foot channel to capacity. In the with project condition, the channel and berth would be deepened to between 42 and 45 feet. With a deeper channel, it is expected that carriers would use larger vessels in order to achieve the economies of scale and lower cost per ton of larger vessels. In interviews with past potential tenants, tenants have indicated that they would prefer to use larger vessels if sufficient depth is available. With channel deepening, shippers could use vessels up to 55,000 DWT with drafts of 40 to 41 feet. These vessels would require 45 feet in the channel with required underkeel clearance. Tenants at the Massport Marine Terminal would be unlikely to use vessels greater than 55,000 DWT due to berth constraints. The fleet forecast for the Massport Marine Terminal is shown below in Table C2-3. Loaded drafts are taken from the Corps Deep Draft Vessel Operating Cost tables (FY2010).

Table C2-3
Fleet Forecast, Massport Marine Terminal
Boston Harbor

Condition	Average Vessel Size (DWT)	Loaded Draft (feet)	Analysis Years
Without Project (40')	40,000	36.6	2016-2066
With Deepening to 42'	45,000	37.9	2016-2066
With Deepening to 43'	50,000	39.3	2016-2066
With Deepening to 44'	55,000	40.4	2016-2066
With Deepening to 45'	55,000	40.4	2016-2066

2.8 Estimated Benefits

The benefits to channel deepening are estimated by calculating the difference between projected without and with project transportation costs. For the without project condition, transportation costs for transporting bulk cargo on 40,000 DWT vessels requiring 40 feet of channel depths are calculated. For the with project condition, it is projected that shippers will move to larger ships due to the economic efficiencies to be gained. With channel deepening, vessels up to 55,000 DWT could be used, depending on the channel depth available. Transportation costs were estimated using the hourly operating costs developed by the Corps of Engineers Institute for Water Resources, Deep Draft Vessel Operating Costs for Fiscal Year 2010, for the appropriate vessel type, size, and flag. Transportation costs were estimated assuming an average one-way travel time of 20 days for bulk carriers on foreign flag ships from international ports, and 3 days in-port for offloading, based on information provided by the previous expected tenant and by a local shipping agent. Since the vessels would most likely proceed to other US ports to pick up other cargo, only one-way travel time was used. Total transportation costs were calculated as assuming projected volumes of 300,000 tons of cement or other bulk cargo per year in 2016, growing to 600,000 tons per year by 2020, and remaining at 600,000 tons for the following years. The annual benefit figure reflects the average annual equivalent value of the resulting stream of benefits over the 50 year period of analysis. The annual transportation costs and annual benefits using these assumptions are shown below in Table C2-4. No benefits are estimated for channel depths beyond 45 feet since any tenant would be unlikely to use vessels greater than 55,000 DWT due to berth constraints.

Table C2-4
Annual Transportation Cost and Annual Benefits
Channel to Massport Marine Terminal

Condition	Annual Transportation Cost, Initial Volume (300K tons in 2016)	Annual Transportation Cost, Future Volume (600K tons by 2020)	Average Annual Benefits
Without Project (40')	$3,372,000	$6,744,000	-
42' Channel	$3,142,756	$6,285,511	$444,047
43' Channel	$2,958,880	$5,917,760	$800,215
44' Channel	$2,872,830	$5,745,659	$966,894
45' Channel	$2,771,636	$5,543,273	$1,162,906

Two sensitivity analyses were performed to determine how changes in key assumptions affect the estimated benefits. In the first sensitivity analysis, projected commodity volumes were increased to 500,000 tons in year 2016, increasing to 1,000,000 tons by year 2020. These are the volumes that were projected by the past expected tenant, who had intended to import cement to serve markets in the entire northeastern region of the US. The resulting transportation costs and annual benefits are shown in Table C2-5, and represent the potential upper bound of benefits. A second sensitivity analysis was performed in which the assumption that the terminal will be called primarily by foreign flag vessels from international ports was changed. Instead it was assumed that the terminal will be called by US flag vessels from east coast US ports, similar to existing cement traffic into Boston Harbor. These results are shown in Table C2-6, and represent the potential lower bound of benefits. Since the terminal is not in use at this time, it is difficult to project specific usage characteristics of the terminal. Prior to project construction, specific details regarding vessel flags and origin locations can be determined, and the benefits to channel dredging should be re-evaluated.

Table C2-5
Sensitivity Analysis, Massport Marine Terminal
Higher Cargo Volumes

Condition	Annual Transportation Cost, Initial Volume (500K tons in 2016)	Annual Transportation Cost, Future Volume (1M tons by 2020)	Average Annual Benefits
Without Project (40')	$5,620,000	$11,240,000	-
42' Channel	$5,237,926	$10,475,852	$740,078
43' Channel	$4,931,467	$9,862,933	$1,333,691
44' Channel	$4,788,049	$9,576,099	$1,611,491
45' Channel	$4,619,394	$9,238,788	$1,938,177

Table C2-6
Sensitivity Analysis, Massport Marine Terminal
Domestic Traffic Only

Condition	Annual Transportation Cost, Initial Volume (300K tons in 2016)	Annual Transportation Cost, Future Volume (600K tons by 2020)	Average Annual Benefits
Without Project (40')	$1,205,800	$2,411,600	-
42' Channel	$1,135,644	$2,271,289	$135,891
43' Channel	$1,079,200	$2,158,400	$245,225
44' Channel	$1,046,612	$2,093,223	$308,348
45' Channel	$1,009,745	$2,019,941	$379,758

3. Additional Channel Segment – Medford Street Terminal

The Medford Street Terminal is located on the south side of the Mystic River in the Charlestown neighborhood of Boston. The terminal is located next to the Moran Autoport, and was purchased by Massport in the 1980's. Since then, the terminal was leased by the Massachusetts Water Resources Authority to transport construction workers and material to the Deer Island sewage treatment plant, and by others for the waterborne transport of construction materials and equipment. When the existing Federal Navigation Project in the harbor was deepened to 40 feet in the 1990's, the portion of the channel accessing the Medford Street Terminal was not included since the terminal was not in use. As a result, the portion of the channel accessing the terminal has a depth of only 35 feet.

The Medford Street Terminal is still not in use, but was recently leased to the Autoport for long-term development. The Autoport is a private company which imports and exports vehicles, located adjacent to the Medford Street Terminal to the east. The terminal is located in a Designated Port Area, a state zoning designation which requires that the land be used for water-dependent industrial or related uses. Massport expects that the Autoport will find a tenant in the near future when the local economy recovers. The berth at the terminal is 453 feet long and has been dredged by Massport to a depth of 40 feet. The future use of the terminal is unknown at this time, but Massport expects that it will most likely be used to import cement for expanded operations of the LaFarge cement terminal located next to the site.

3.1 Commerce Forecast and Future Operations

The commerce forecast for the Medford Street Terminal is based on information provided by Massport. Massport expects that by 2016, the base year of the analysis, the economy will have recovered and the terminal will be in use. In the without project condition, it is projected that US flag bulk carriers will use the terminal, bringing cement from US east coast ports such as Portland (Maine), Newark, or Baltimore. Based on

information provided by Massport, and based on Massport's discussions with a past potential tenant, it is estimated that 300,000 tons of cement will be landed at the terminal per year. This level of cargo is projected for each year of the 50 year period of analysis, 2016 – 2066.

3.2 Fleet Forecast

A fleet forecast was developed for the future Medford Street Terminal based on information provided by Massport and based on information provided by past potential tenants. Without the project, the channel to the Medford Street Terminal will remain at 35 feet, and the average vessel size will be limited to 25,000 DWT vessels with 32-foot operating drafts assuming 3 feet of underkeel clearance. With the project, the channel would be deepened to a depth between 37 and 40 feet, and larger, more cost-effective vessels could be used. The fleet forecast for the Medford Street Terminal is shown below in Table C2-7.

Table C2-7
Fleet Forecast, Medford Street Terminal
Boston Harbor

Condition	Average Vessel Size	Loaded Draft	Analysis Years
	(DWT)		
Without Project (35')	25,000	31.9	2016-2066
With Deepening to 37'	30,000	33.5	2016-2066
With Deepening to 38'	35,000	35.2	2016-2066
With Deepening to 39'	35,000	35.2	2016-2066
With Deepening to 40'	40,000	36.6	2016-2066

3.3 Estimated Benefits

The benefits to channel deepening are estimated by calculating the difference between the projected without and with project transportation costs. Without channel deepening, it is projected that 300,000 tons of cement will be shipped to the terminal on 25,000 DWT bulk carriers with typical drafts of 32 feet, for which the existing 35-foot channel would be adequate. With channel deepening to 40 feet, the same cargo volume could be carried on 35,000 and 40,000 DWT bulk carriers, depending on the channel depth, vessels with drafts of 35 to 37 feet. Use of larger vessels with channel deepening will allow fewer total trips, thereby reducing total transportation costs. Hourly operating costs as developed by the Corps of Engineers, Deep Draft Vessel Operating Costs for Fiscal Year 2010 were used for the appropriate vessel type, size, and flag to determine total transportation costs under the without and with project conditions. Since the shipments would most likely be between US ports, it is assumed that US flag vessels are used. Total trip costs were estimated assuming 36 hours round-trip travel time for domestic cargo such as cement, and assuming 24 hours in-port. Prior to project

construction, these assumptions should be verified or revised based on the actual usage of the terminal, and the economic benefits reevaluated. The projected transportation costs and estimated annual benefits using these assumptions are shown in Table C2-8.

Table C2-8
Annual Transportation Cost and Annual Benefits
Channel to Medford Street Terminal

Condition	Annual Transportation Cost	Annual Benefits
Without Project (35')	$873,792	-
37' Channel	$775,920	$97,872
38' Channel	$733,710	$140,082
39' Channel	$706,114	$167,678
40' Channel	$652,410	$221,382

As a sensitivity analysis, the commerce forecast for the 40' channel condition was revised to reflect only 150,000 tons of cargo shipped to the terminal each year on vessels large enough to require greater than the existing 35 feet of channel depth. It was assumed that any additional cargo received at the terminal would be on smaller vessels not requiring depth greater than the current 35 feet. This reduces annual benefits with a 40' channel to $110,700, and represents the potential lower bound of benefits.

For a second sensitivity analysis, it was assumed that future cargo at the terminal would be shipped from international ports, with significantly longer travel time on foreign flag ships, similar to existing salt traffic. This increases annual benefits with a 40' channel depth to $563,400, and represents the potential upper bound of benefits.

4. Additional Channel Segment – Chelsea River

The purpose of the analysis contained in this section is to determine the economic justification of deepening the Federal channel in the Chelsea River, Boston Harbor, from 38 feet to 40 feet. The Chelsea River is used primarily by oil tankers, and is one of the main distribution points for gasoline and heating oil in Massachusetts. In addition, most of the airline fuel used at Logan Airport is delivered to a terminal on the river. Until only recently, the use of the river was constrained by the old Chelsea Street Bridge, an old highway drawbridge which connected East Boston and Chelsea. The opening of the old bridge was only 96 feet, which limited the size of vessels using the river. However, that bridge was recently replaced, with the new bridge completed in June 2012. The US Coast Guard, in conjunction with the City of Boston and the Massachusetts Department of Public Works, constructed the new Chelsea Street Bridge to improve navigation safety in the river, reduce the risk and frequency of vessel-bridge collisions, and reduce bridge

repair and vehicle detour costs. The new bridge is a drawbridge with a lift span of 400 feet, allowing for a potential navigation channel of 225 feet between the bridge towers. With construction of the new bridge, the existing navigation channel in the river has been widened to a minimum width of 175 feet.

4.1 Area Description

The Chelsea River, also known as Chelsea Creek, is located in the inner harbor area of Boston Harbor. It is bordered on the west by the city of Chelsea and on the east by East Boston and Revere. Currently, the main channels in the rest of the harbor have authorized depths of 40 feet, while the channel in the Chelsea River has an authorized depth of only 38 feet. Deepening the channel to 40 feet would improve the navigability of the river and increase the safety and efficiency of shipments.

Two bridges cross the Chelsea River, the McArdle Bridge near the inner confluence, and the Chelsea Street Bridge farther upstream. Both are vehicular bridges with heavy urban traffic. The McArdle Bridge has a width clearance of 175 feet, while the original Chelsea Street Bridge had a clearance of only 96 feet. In the past, safety requirements limited the beam of vessels transiting through the old Chelsea Street Bridge to 90.5 feet. However, with the new bridge recently completed, and the channel widened to 175 feet, these restrictions will likely be lifted. From the McArdle Bridge upstream, the authorized depth of the Federal channel in the Chelsea River is 38 feet. The area has a tidal range of 9 feet.

4.2 Chelsea River Terminals

The Chelsea River is one of the primary distribution points for gasoline and oil in Massachusetts and New England. Four oil terminals and one bulk terminal are located along the river. The bulk terminal receives primarily road salt, and is located just upstream of the McArdle Bridge in Chelsea. One of the four oil terminals, Sunoco International, is located on the opposite side of the river in East Boston, between the McArdle and Chelsea Street Bridges. This terminal receives all of the jet fuel for Logan Airport. The remaining three oil terminals are located upstream of the Chelsea Street Bridge, and include Irving Oil and Global Oil on the east side in Revere, and Gulf Oil on the west side in Chelsea. Special oil tankers have been constructed to navigate the narrow Chelsea River, "Chelsea Class" vessels, with beams of only 90.5 feet. These vessels are also used in other restricted ports. The terminals on the Chelsea River with their storage capacities in short tons are: Sunoco - 164,847; Global Oil - 240,691; Irving Oil - 182,981; and Gulf - 236,130.

4.3 Waterborne Commerce on the Chelsea River

In 2009, a total of 5,468,000 tons of petroleum and petroleum products were brought to terminals on the Chelsea River, including gasoline, heating oil, and jet fuel. In addition, 1,004,000 tons of road salt were imported into the Chelsea River in 2009. Recent historical waterborne commerce for the Chelsea River, for petroleum products and road salt, is shown in Table C2-9. The petroleum and petroleum products brought

into Chelsea River terminals consist primarily of gasoline and heating oil. In 2009, 68 percent of the total tonnage was gasoline, 28 percent heating oil, and 3 percent other petroleum products. The significant variation in road salt volumes is due to weather-related demand fluctuation. In years with heavy snowfall and frequent icing conditions there is high demand for road salt, and deliveries to the terminal increase significantly.

Table C2-9
Recent Historical Waterborne Commerce, Chelsea River (only)

Year	Petroleum and Petroleum Products (thousand tons)			Total Petroleum Products	Road Salt (thousand tons)
	Foreign	Canadian	Domestic		
2009	383	3,279	1,806	5,468	1,004
2008	138	2,781	1,979	4,898	1,024
2007	157	3,730	1,947	5,834	526
2006	478	2,593	1,877	4,948	492
2005	403	2,580	2,013	4,996	1,164
2004	533	2,877	1,700	5,110	624
2003	461	3,516	1,801	5,778	959
2002	608	2,672	1,715	4,995	456
2001	1,813	2,184	1,669	5,666	817
2000	1,962	1,373	2,820	6,155	632
1999	1,291	2,216	3,562	7,069	215
1998	1,974	1,714	3,544	7,232	258

Source: Waterborne Commerce of the United States, 1998 – 2009

4.4 Existing Fleet, Chelsea River

The number of inbound vessel trips and vessel drafts for vessels transiting the Chelsea River are shown in Table C2-10. In 2009, the Chelsea River had 599 inbound vessel trips, which included 153 foreign-flag vessels and 446 US-flag vessels. Of the 446 US flag inbound vessel trips, 335 were barges or vessels with shallow drafts less than 19 feet.

Table C2-10
Vessel Draft Distribution, Inbound Trips
Chelsea River, 2009

Draft, in Feet	# of vessels Foreign	# of vessels Domestic	Total # of Vessels
42	0	1	1
41	0	0	0
40	0	0	0
39	11	0	11
38	8	0	8
37	7	0	7
36	17	0	17
35	58	1	59
34	13	0	13
33	5	0	5
32	5	0	5
31	6	1	7
30	6	3	9
29	2	12	14
28	2	11	13
27	3	4	7
26	5	5	10
25	3	9	12
24	1	7	8
23	0	11	11
22	0	7	7
below 22'	1	374	375
Total	153	446	599

Source: Waterborne Commerce of the United States, 2009

Petroleum shipments are brought into the Chelsea River on tankers and barges, with the drafts of the tankers ranging from 22 to 37 feet, and include a mix of US flag and foreign flag vessels. The largest tankers which currently transit to the terminals above the Chelsea Street Bridge are typically 35,000 to 37,000 deadweight tons with 90.5-foot beams. Shipment origins are wide-ranging, with the largest volumes in recent years originating in Canada. Other shipments commonly originate in Europe, Venezuela, and the Caribbean, as well as from domestic ports. The tankers calling on the Chelsea River are sometimes referred to as "Chelsea Class" with beams of 90.5 feet to allow passage through the Chelsea Street Bridge. For domestic shipments, vessels are constructed and placed in dedicated service between U.S. refineries and the Chelsea River terminals. For foreign shipments, vessels are loaded usually in the Caribbean or Europe and their loads

purchased on the spot market by local oil companies. These are small tankers that able to transit the channel without lightering. Road salt is brought into the Chelsea River on foreign flag bulk carriers with drafts ranging from 21 to 42 feet. The salt is imported from a variety of countries, including Mexico, Chile, and Egypt. The US Coast Guard requires that all vessels transiting the river have an underkeel clearance of 2 feet while underway.

Based on detailed Waterborne Commerce Statistics data for the Chelsea River, 71 percent of the vessels calling Chelsea terminals were 20,000 to 25,000 dead-weight tons (DWT), 13 percent were less than 20,000 DWT, 12 percent were 25,000 to 30,000 DWT, and the remaining 4 percent were greater than 30,000 DWT. No vessels transiting the river exceeded 40,000 DWT.

4.5 World Tanker Fleet

In 2007, the world tanker fleet consisted of 5,300 vessels greater than 5,000 DWT (*Propulsion Trends in Tankers,* MAN Diesel A/S, Copenhagen, Denmark, 2007). The current size distribution of the tanker fleet of vessels greater than 5,000 DWT is shown in Table C2-11 below.

Table C2-11
World Tanker Fleet, 2007

Vessel Size Class	Deadweight Tonnage (DWT)	Proportion of World Fleet
Small	< 10,000	21.1%
Handysize	10,000-35,000	19.8%
Handymax	35,000-55,000	24.4%
Panamax	60,000-80,000	5.8%
Aframax	80,000-120,000	13.4%
Suezmax	125,000 - 170,000	6.7%
> Suezmax	200,000 +	8.8%

Source: *Propulsion Trends in Tankers,* MAN Diesel A/S, Copenhagen, Denmark, 2007, www.manbw.com/technical papers

The tankers which call the Chelsea River oil terminals are all in size classes smaller than Panamax. The majority of the world tanker fleet is made up of vessels in the size classes smaller than Panamax, with 65 percent of tankers in the small Handysize and Handymax classes, as shown in Table C2-12. The tankers which call at Boston are primarily Handysize and Handymax vessels, which are also used at other New England petroleum ports.

4.6 Economic Study Area and Chelsea River Hinterlands

For the economic analysis of the Chelsea River deepening, the study area and the hinterlands of the port are defined as the greater Boston area and, secondarily, Massachusetts. Nearly all of the gasoline and heating oil volumes shipped into the Chelsea River are distributed to the greater Boston area of eastern Massachusetts. Other ports in Massachusetts which receive petroleum shipments include Braintree, Weymouth, Quincy, New Bedford, and Fall River, although these ports receive much smaller total volumes than the Chelsea River. Other New England states have their own ports for receipt of petroleum products, including Searsport and Portland harbors in Maine, Portsmouth in New Hampshire, Providence Harbor in Rhode Island, and New Haven, New London, and Bridgeport harbors in Connecticut.

4.7 Chelsea River Without Project Condition

The constraints of the old Chelsea Street Bridge caused many navigation inefficiencies in the Chelsea River. These inefficiencies included requirements of daylight-only transit for large vessels, rules limiting passage upriver while a vessel is at one of the down-river terminals, requirements for extra tugs to navigate safely through the old bridge opening, and limits on the size of vessels which can transit the river which greatly limited vessel capacity. However, with the new, wider Chelsea Street Bridge completed and the channel recently widened to 175 feet, these inefficiencies will likely be eliminated. In terms of channel depth, the existing Federal channel in the river was last dredged in 2008 to the authorized depth of 38 feet.

In the benefit analysis for the deepening the channel in the Chelsea River, it was assumed in the without project condition that construction of the new Chelsea Street Bridge was completed and recent operating restrictions lifted. The new, wider bridge will allow wider vessels to be used. The economic benefits from eliminating the delays and operating inefficiencies caused by the narrowness of the old bridge are allocated to bridge replacement and are not benefits to channel deepening. However, the authorized 38-foot channel depth will continue to constrain navigation in the river to some degree.

4.8 Chelsea River With Project Condition

In the with project condition, the channel in the Chelsea River will be deepened beyond the current authorized depth of 38 feet. Depths of 39 and 40 feet are examined. The deepening will allow oil and bulk shipments to be brought into the river on deeper ships, achieving cost efficiencies and economies of scale. Benefits to channel deepening are calculated by comparing the operating costs of the expected fleet after bridge replacement with the current 38-foot channel, to the operating costs of the expected fleet after bridge replacement with deeper channel depths (39 and 40 feet).

4.9 Chelsea River Commerce Forecast

The primary commodities brought into the Chelsea River are petroleum and petroleum products. As can be seen in Table 9, the total volume of petroleum products brought into the Chelsea River has generally fluctuated between 5 million and 6 million tons per year since 2000. This is a decrease in total volumes from the 1990s, when shipments to terminals in the Chelsea River fluctuated between 6 million and 8 million tons per year. Total volumes have decreased partly because there has been a decrease in terminal capacity over the period, due partly to the institution of just-in-time inventory procedures, and partly to increasing use of natural gas. There have been significant investments in the natural gas pipeline infrastructure in New England, increasing the use of natural gas for heating fuel and electricity generation.

According to the US Census Bureau, the population of Massachusetts is projected to grow by a total of 10 percent between 2000 and 2030, increasing from 6,349,097 to 7,012,009 (US Census, State Interim Population Projections by State to 2030, www.census.gov). This increase reflects projected population growth of approximately 0.35 percent per year, putting Massachusetts in the low to moderate range of expected population growth over the period relative to other states, as southern and western states are expected to grow more quickly. Moderate population growth would generally support moderately increasing demand for both gasoline and heating oil in the study area, the two fuels which are imported into the Chelsea River.

Nationally, the Energy Information Agency (EIA) forecasts steady growth in liquid petroleum consumption in the US through 2030, with total consumption in 2005 of 40.4 quadrillion Btu growing to 52.2 quadrillion Btu's by 2030 (Energy Information Agency, Annual Energy Outlook 2007 with Projections to 2030), an annual increase of 1.2 percent per year. However, the EIA forecasts a slight decrease in heating oil consumption in the northeast over the period 2005 to 2030, from approximately 60 million barrels in 2005 to approximately 55 million barrels by 2030, due largely to the a forecasted increase in natural gas supply into the northeast over the same period, primarily from Canadian sources, and due to the relatively low population growth projected for the northeast over the period (EIA, Future Supply and Demand of Natural Gas, Heating Oil and Propane, Projections for the Northeast from the Annual Energy Outlook 2006). The EIA projects that population in the northeast will increase from 14.3 million in 2005 to 15.3 million by 2020, an increase of 9 percent over the period, or approximately 0.5 percent per year. EIA projects that the ratio of natural gas use over heating oil us will increase from a roughly 1 to 1 ratio in 2005 to 1.3 to 1 by 2030. However, the EIA does projects an increase in gasoline consumption in the northeast, the largest import in the Chelsea River, increasing from approximately 33 million barrels in 2005 to 38 million barrels by 2030, an overall increase of 15 percent, or 0.6 percent per year (EIA, Future Supply and Demand of Natural Gas, Heating Oil and Propane, Projections for the Northeast from the Annual Energy Outlook 2006).

The total commerce forecast for Chelsea River terminals in 2016, the base year of the analysis, is estimated at 6.4 million tons. This includes 5.4 million tons of petroleum products and 1 million tons road salt, equal to the existing 2009 levels. This commerce volume is used for each year of the 50 year period of analysis. While demand for gasoline in the economic study area is project to increase moderately over the planning horizon, corresponding to a moderate increase in population, both factors which would support increased demand for petroleum products brought into the Chelsea River over the planning horizon, these factors were judged to be offset by the increasing use of natural gas for heating fuel in Massachusetts and the lack of recent historic growth in petroleum imports at Chelsea terminals. As a result, a flat forecast of a continuance of existing volumes was judged to be a reasonable commodity forecast over the 50 year period of analysis.

4.10 Benefits to Chelsea River Channel Deepening

The National Economic Development (NED) benefits to deepening the channel in the Chelsea River are determined by estimating the cost of transporting goods into and out of the Chelsea River for the most likely without and with project conditions. The difference in transportation costs between with the without (38-foot channel) and with project (40-foot channel) conditions are the benefits to channel deepening. The deeper channel will permit the use of larger vessels in comparison to the without project condition, beyond that allowed by the bridge replacement alone, as well as reduce tidal delays and lightloading. The difference between the existing condition transportation costs and the without project transportation costs are benefits which accrue to bridge replacement and maintenance dredging. This analysis does not address inefficiencies due to channel width, as there was no indication from channel users that channel width is a problem other than at the Chelsea Street Bridge restriction.

Transportation costs were developed for each terminal for the without project condition, and for the expected likely conditions once the bridge is replaced. Costs were developed on a per-ton basis. Future tonnages were held constant at existing levels as a conservative assumption. For both the without and with project conditions, a future commodity forecast for petroleum and petroleum products delivered to Chelsea River terminals of 6,405,300 tons was used. For each cost calculation, it is assumed that the destination and origin of traffic remains the same over the 50-year period of analysis. The Army Corps of Engineers Institute for Water Resources (IWR) vessel operating costs for FY2010 were used to estimate transportation costs. Each year, IWR publishes vessel operating costs by flag, cargo type, and size of vessel. Cost data for coastal barges was obtained from a report, Coastal Tank Barge Market, authored by the Office of Statistical and Economic Analysis, Maritime Administration, U.S. Department of Transportation, April 23, 2004. This information was updated to reflect the 2011 price level.

Shippers were surveyed about their operating practices, future activity in the Chelsea River, navigational problems currently being experienced, and their views on optimum channel dimensions. Terminals were queried concerning continued operations, desired channel dimensions, tonnages received and shipped, size distribution of fleet

under existing conditions, expected size distribution of fleet after bridge replacement, and the extent of lightering, lightloading and tidal delays. These responses were then combined with detailed vessel movement data from the Corps of Engineers Waterborne Commerce Statistics Center to estimate total transportation costs under the different conditions analyzed.

While transportation cost savings are the benefits analyzed in this analysis, those savings represent only a portion of the advantages of dredging. Improved safety, reduced risk of environmental damage, and a more reliable oil delivery system are important additional benefits of channel dredging.

4.11 Chelsea River Waterborne Transportation Costs

Waterborne transportation costs for goods brought into terminals on the Chelsea River were determined for the expected without project condition and the expected with project condition. Total transportation costs were developed based on detailed movement data for Boston Harbor provided by the Waterborne Commerce Statistics Center (WCSC). The detailed movement data includes information on port destination/origin, trip miles, volume of product carried, type of product carried, vessel identification, operating draft and other data. This file was then matched with a WCSC vessel file to determine ship characteristics, such as design draft, beam, length, deadweight tonnage and other data. Data on both foreign flag and domestic vessel movements were obtained from the WCSC.

The augmented vessel movement data and vessel characteristic data were compiled for each terminal in a spreadsheet. Transportation cost for each vessel movement was calculated for each terminal, and aggregated over all movements for that terminal. Hourly vessel operating costs by vessel size, or deadweight ton (DWT), as developed by the Institute for Water Resources (IWR) were used to calculate transportation costs. The IWR data also includes vessel operating speeds, immersion rates, and vessel dimensions. The types of costs developed in the spreadsheet for this analysis include trip cost and tidal delay cost. Trip hours are determined using the time/distance/velocity relationship. Trip hours are multiplied by the IWR hourly vessel operating cost to determine trip cost. Tidal delay cost is associated with vessels waiting for higher tidal stages in order to safely navigate up the river. Terminal costs include all of the oil terminals in the Chelsea River and the bulk terminal.

Shipper behavioral assumptions were built into the spreadsheet based on information provided by the terminals. Shippers may have different operating preferences with respect to lightloading vessels, lightering vessels, utilizing the tide, underkeel clearance, and channel depth required to shift tonnage to larger vessels. Each vessel movement into (and out of) the harbor is looked at with respect to depth required, depth available and shipper operating procedures. Only those vessels movements that are using the channel to its full capacity are subject to the operating inefficiencies discussed above. The spreadsheet was evaluated at the existing controlling depth for each vessel movement at each terminal. Separate calculations were made for domestic and foreign

flag vessels. If depth required is less than the tidal range, tidal delay is calculated by the spreadsheet. Tidal delay is calculated using a tidal chart relating channel depth to time, depth required, and channel transit time. The average delay is then multiplied by the hourly vessel operating cost to determine tidal delay cost. Lightloading is evaluated using dispersion rates in tons per inch and based on the relationship between maximum vessel draft and available channel depth. No lightering costs were calculated in this analysis, since shippers using the Chelsea River generally do not lighter their vessels.

The spreadsheet was then evaluated for conditions once the bridge is replaced, which includes both the without and with project conditions. For each channel depth evaluated, trip cost and any tidal delay or lightloading costs are calculated for each vessel movement. All vessel movements are then aggregated for each terminal. A cost per ton is developed at each depth for each terminal. This cost per ton is then multiplied by the projected tonnage to determine the shipper's cost at each channel depth.

Tidal delay and any lightloading costs change with each projected increment of channel depth as long as the vessel needs more depth than is available in the channel. As vessel loads increase with additional depth, a given volume can be transported in fewer vessels. Reducing vessel trips lowers total transportation cost. In addition to loading existing vessels more efficiently, shippers will have an incentive to shift tonnage to larger vessels. Larger vessels have greater operating costs, but because they carry proportionately more tonnage, the cost per ton mile declines. Aggregate trip cost will decline for shippers as they substitute larger vessels for smaller vessels or load existing vessels more fully, thereby reducing the number of vessel trips. The depth at which they switch to larger vessels is entered into the spreadsheet based on information provided by the shipper and using judgment based on the economics of using larger vessels. Larger vessels would have to be used efficiently with few delays and only minor lightloading requirements.

Controlling depths for the without and with project conditions were held constant over the 50-year period of analysis. No attempt was made to estimate shoaling rates over the 50-year period, as it is assumed that the project will be maintained at the authorized depth. The difference in total transportation costs between the without and with project conditions equal the benefits to the improvement dredging, deepening the channel in the Chelsea River from 38 feet to 40 feet. Total transportation costs include costs for oil tankers, oil barges, and bulk carriers (salt traffic).

The estimation of transportation costs involves hundreds of arithmetical calculations that cannot be presented in this report. The spreadsheet also contains proprietary information provided to the WCSC by shippers, information that is unlawful to disclose in a public report since disclosure could cause financial harm to the companies which provide the data. For these reasons, only summary data aggregated over all terminals is presented in this report.

4.12 Chelsea River Transportation Costs by Channel Depth

Improvement dredging of the Chelsea River would reduce the transportation costs of delivering goods to the Chelsea River. Total transportation costs at different channel depths were calculated for the conditions that will exist when the bridge is replaced. Table 12 displays an estimate of shipping costs by channel depth for the bridge replacement condition. Table 12 includes the without project condition (channel depth of 38 feet), and the with project condition (channel depth of 40 feet). Table 13 shows the expected vessel size distribution at different channel depths once the bridge is replaced and includes the without and with project conditions.

Total transportation costs were developed by channel user and aggregated by channel. Each vessel movement was evaluated as to channel depth needed and channel depth available. If loaded draft plus under keel clearance exceeded depth available for tides other than high tide, tidal delay was calculated. The tidal delay computation involves translating tidal height required into hours through a tidal chart. Transit time to dock was then added to delay and an average delay calculated. The delay was then converted to dollars using the IWR and Maritime Administration vessel operating costs. Tidal delay was summed over all vessel movements and divided by tons carried to arrive at a tidal delay cost per ton. This cost per ton was then multiplied by projected tonnage to determine tidal cost for a user at a given depth. The spreadsheet then changes the channel depth and recalculates tidal delay. This process was repeated for channel depths from the existing controlling depth to the proposed improvement channel depth.

Trip costs were determined by providing additional depth to lightloaded vessels and using dispersion rates to determine the additional tonnage that could be loaded onto vessels. This calculation was only made for vessel trips in which the operating draft was 80 percent of the depth available in the channel for the existing controlling depth. Trip costs were then summed over all vessel movements and divided by tons carried to determine trip cost per ton. Trip cost per ton was then multiplied by projected tonnage to determine trip cost per shipper.

4.13 Chelsea River Transportation Cost With Bridge Replacement

Table C2-12 shows the estimated total transportation costs after the Chelsea Street Bridge is replaced. This condition includes the projected without project condition, in which the channel is dredged to the authorized 38-foot depth and widened at the current restricted area. This condition also includes the with project condition, in which the channel is dredged to an improvement depth of 40 feet. For the without project condition, which includes bridge replacement and the authorized 38-foot channel depth, total transportation cost is estimated to be $48,989,700 annually. For the with project condition, with channel deepening to –40 feet MLLW, the estimated transportation cost is estimated to be $47,053,700 annually. The difference between these two costs is the estimated benefit to channel deepening. The annual benefit to channel deepening thus equals $1,936,000 ($48,989,700 - $47,053,700 = $1,936,000).

Table C2-12
Chelsea River
Annual Transportation Costs by Channel Depth

Depth	Trip Cost	Tidal Delay	Total Cost
33	$49,393,200	$241,700	$49,634,900
34	$49,954,300	$225,600	$50,179,900
35	$50,264,400	$220,600	$50,485,000
36	$49,017,900	$204,700	$49,222,600
37	$49,025,900	$208,800	$49,234,600
38	$48,782,300	$207,400	$48,989,700
39	$47,535,600	$211,700	$47,747,300
40	$46,835,400	$218,400	$47,053,700

Table C2-13 shows the projected number of trips by vessel size at different channel depths once the bridge is replaced, which includes both the without and with project conditions. The projected number of trips for the largest vessel class, vessels greater than 35,000 DWT, increases from 77 trips with the authorized channel depth of 38 feet, to 114 trips with the improvement depth of 40 feet. A review of Paragraph 3.2 shows that the Chelsea terminals have the capacity to accept shipments in larger vessels.

Table C2-13
Number of Vessel trips by DWT and Channel Depth

Channel Depth	Vessel DWT, tons					Total Trips
	<20,000	20,000	25,000	35,000	>=35,000	
33	401	20	74	86	0	581
34	398	5	58	108	2	571
35	383	6	41	115	14	559
36	373	6	17	132	16	544
37	363	0	10	111	47	531
38	356	0	6	81	77	520
39	345	0	6	53	99	503
40	337	0	0	38	114	489

4.14 Chelsea River Fleet Forecast With Bridge Replacement

In the without project condition represented by the channel depth of 38 feet in Table C2-13, a total of 520 vessel trips are projected for the Chelsea River in the without project condition, with 356 (68.5 %) of those trips being barges or vessels less than 20,000 DWT, 6 (1.2 %) trips of vessels in the 25,000 DWT size class, 81 (15.6 %) vessel trips in the 35,000 DWT size class, and 77 (14.8 %) trips in the size class greater than

35,000 DWT. With channel dredging to 40 feet, a total of 489 vessel trips are projected, with 337 (68.9 %) barge trips, 38 (7.8 %) trips of vessels in the 35,000 DWT size class, and 114 (23.3 %) trips of vessels in the size class greater than 35,000 DWT.

From Table C2-11, which shows the breakdown of the world tanker fleet, there are 2,168 (40.9 % of 5,300) vessels in the world fleet that are 35,000 DWT or less. Assuming each of these makes 5 trips annually results in an estimated 10,839 annual trips for the world tanker fleet. For the without project condition in the Chelsea River, it is projected that there will be 443 trips of vessels 35,000 DWT and under, or 4.1 %, of the estimated world fleet trips for vessels of that size. For the with project condition (with channel dredging to 40 feet), it is projected that there will be 375 trips of vessels 35,000 DWT and under, or 3.5 %, of the estimated world fleet trips for vessels of that size.

For vessels in the 35,000 to 55,000 DWT class, it is projected in the without project condition for the Chelsea River that there will be 77 vessel trips, or 1.2 % of the estimated 6,466 world trips for the 35,000 to 55,000 DWT class. This would represent the largest ships likely to transit the channel in the with and without project conditions. For the with project condition (with channel dredging to 40 feet), it is projected that there will be 114 vessel trips in the Chelsea River for vessels in the 35,000 to 55,000 DWT class, or 1.7 % of the estimated world trips for vessels of that size. Thus, the projected fleet distribution for the Chelsea River is reasonable for both the with and without project conditions.

4.15 Chelsea River Channel Deepening Benefit Summary

The annual benefits to deepening the Chelsea River are summarized below in Table C2-14.

Table C2-14
Annual Benefits
Chelsea River Channel Deepening

Project Depth	Without Project Transportation Cost	With Project Transportation Cost	Transportation Cost Reduced	Net Annual Benefits
39' Channel	$48,989,800	$47,747,300	$1,242,500	$1,242,500
40' Channel	$48,989,800	$47,053,600	$1,936,200	$1,936,200

BOSTON HARBOR
MASSACHUSETTS

NAVIGATION IMPROVEMENT STUDY

FINAL FEASIBILITY REPORT
AND FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
AND
MASSACHUSETTS FINAL
ENVIRONMENTAL IMPACT REPORT

APPENDIX D-1

PROJECT DESIGN

THIS APPENDIX REVISED APRIL 2013

APPENDIX D1 – PROJECT DESIGN

This appendix consists of three sections. The first section was included in the 2008 Draft and Draft Final Feasibility Report and dealt mainly with channel width design and increased channel bend apex widths, including the results of ship simulation studies.

The second section was prepared in October to December 2012 and dealt with increased depth in the harbor's entrance channel. While increased entrance depth had been analyzed and included in the 2008 report, that analysis relied on PIANC design guidance which yielded an underkeel clearance allowance 50% greater in the entrance channel (6 feet) than in the interior channels (4 feet). Current Corps design guidance used in 2012 required a more detailed and project/vessel specific analysis that forms the basis of the recommendation included in the Final Feasibility Report.

The third section presents an assessment of sea level rise with respect to harbor navigation and facility operations.

APPENDIX D1 – PROJECT DESIGN

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APPENDIX D-1
PROJECT DESIGN
BOSTON HARBOR NAVIGATION IMPROVEMENT STUDY

CHANNEL WIDTH AND BEND DESIGN

In previous improvement studies for the Boston Harbor main ship channel the Corps of Engineers Engineering Manual EM 1110-2-1613 HYDRAULIC DESIGN OF DEEP DRAFT NAVIGATION PROJECTS, dated April 8 1983, provided much of the design criteria for channel depth and width. Additionally, the May 1965 publication of the Committee on Tidal Hydraulics, "Evaluation of Present State of Knowledge of Factors Affecting Tidal Hydraulics and Related Phenomena, Report #3" provided a valuable, if somewhat dated, resource for design criteria. In the intervening years since these publications were issued, vessels have become larger and the ports have expanded to meet the needs of these vessels. New guidance was needed.

A subtle change is taking place with the development of improved knowledge of vessel and human capabilities and reactions to design criteria. The Engineering Manual has been updated with a newer version of the same title and number. Additionally, a joint report of the Permanent International Association of Navigation Congresses (PIANC) and the International Association of Ports and Harbors (IAPH) in cooperation with the International Maritime Pilots Association (IMPA) and the International Association of Lighthouse Authorities (IALA) published the final report of the Working Group II-30 titled "Approach Channels – A Guide for Design" in June 1997.

While both the revised EM and the PIANC guide follow the "traditional" design criteria of examining the location and design vessel specifics, the EM provided more of a scientific/ academic approach whereas the PIANC guide appeared to be written with a more user-friendly, albeit slightly "cook-bookish" approach. The PIANC guide will be relied upon for a majority of this appendix because its clear two-tier approach to design lends itself to this stage of the feasibility study of channel depths in Boston Harbor.

Introduction

Since the 1960s, the engineering effort that has been involved in the design of port channels has been increasingly specialized. Vessels have become larger, longer, and draw more water. They require deeper, wider channels for safety. However, there was a noticeable lack of guidance keeping pace with the industry. Early guidance included the Committee on Tidal Hydraulics report mentioned above, a 1973 report of the PIANC working group 2 on channel dimensions, a 1980 review of the 1973 report, and the EM which was initially published in 1983. For the next fifteen years there was no new guidance issued until the Guide for Design in 1997 (an earlier draft of the guide was available in 1995).

The new guidance reflected developments in ship behavior (hull designs, thrusters, and positioning capability), human factor engineering (using sophisticated computer modeling for

ship handling simulation with live ship pilot operators), and took advantage of nearly thirty years of accumulated data on channel design and ship behavior.

Navigation channel design must be cognizant of the physical location of the channel, i.e. direction of currents and wind, type of vessels calling at the port (liquid bulk, break bulk, containers), capacity for port expansion, bottom geotechnical characteristics, and transportation links. Layout of the channel must provide the correct width, depth, and maneuvering area for the vessels calling at the port.

The PIANC guide calls for two phases of design: 1) a "Concept Design" to rough in the general suggested dimensions; and, 2) a "Detailed Design" to validate the initial design primarily through computer simulation exercises. It will be a stated goal of this design effort to minimize the transit time of vessels calling at Boston Harbor and strive to make the channel available to the design vessel for as much of a tide cycle as possible.

The old adage "time is money" can have a double meaning in the case of navigation channels - it is defined here primarily as meaning the ability to get a vessel into port, off-loaded, and on its way in the minimum time possible. Because of the large hourly operating costs of these vessels, this short turn around can produce more profit to the shipper. However, making a channel capable of providing direct access can be expensive so a trade off will likely be sought.

Channel alignment should consider length of channel, winds, currents, available turning basins, avoiding bends, and avoiding areas where maintenance of channel depths can be troublesome. Straight channels are preferable but when not physically possible smooth bends as opposed to sharp turns should be the rule. Avoid cross currents by aligning the channel with the predominant tidal current. An often-overlooked aspect of channel design is to avoid channels that approach perpendicular to the berth in case of loss of control of the vessel. It is better to have the channel offset and require the vessel to stop and turn to arrive at the berth.

Physical Data

In order to proceed further with the design of the channel more detailed information will need to be documented. While the following listing of suggested data is comprehensive, not all of the inputs are pertinent to this particular analysis.

Design Ship.

- Type, size, and dimensions (length, beam, and draft).
- Maneuverability and normal operational speed.
- Engine type and power rating.
- Bow and/or stern thrusters – power and thrust.
- Number and frequency of transits.
- Type of cargo handled.
- Cargo load condition (trim and draft).
- Number and size of screws and rudders.
- Definitive maneuvering trial or computed data.
- Ballasted operation condition (trim and draft).

Waterway Traffic.

- Ship size variation for present and future channel.
- Smaller vessel use and congestion.
- Navigation cross-traffic condition.
- Ship meeting, passing, and overtaking.
- High number of small craft (sailing ships, fishing vessels).

Weather.

- Visibility, day or night transits.
- Frequency of fog, smog, snow, storms.
- Ice conditions (thickness, duration, extent).
- Rainfall and temperature.

Currents.

- Speed, direction, and duration-flood and ebb.
- Astronomical tide and/or river flow.
- Tide height/current relation.
- Wind tide-induced currents.
- Current variation with depth.

Wind and Waves.

- Wind force, direction, and duration.
- Wind generated waves-heights, period, length, direction, duration, and frequency.
- Wind variability or gustiness.
- Swell waves – heights, period, length, direction, duration and frequency.
- Waves from passing vessels.
- Surges and seiching in berthing areas, particularly where containerships are loaded and unloaded.

Navigation Constraints.

- Obstruction – sunken vessels, abandoned structures.
- Overhead bridges and power line crossing – location, type, and clearances.
- Dredging operations – location and frequency.
- Visible obstructions – high banks, headlands.
- Turns and curves with crosscurrents.
- Strong changes in banks and currents – ends of jetties, side channels, and anchorages.
- Shipyards, terminals, and other moored ships.
- Small-craft harbors and marinas.
- Underground pipelines and cables- location, type, and clearances.

Water Level.

- Tidal variation – range, type of tide (diurnal, semidiurnal, or mixed).
- Tide datum plane – average high and low water.
- Upland river inflow – frequency and duration of effect.
- Abnormal high and low hurricane, storm surge, and wind tide.

Channel Data.

- Channel and overbank hydrography.
- Channel cross section (canal, trench, shallow water).
- Alignment and configuration – turns and curves.
- Channel depth, width, and side slopes.
- Navigation traffic pattern (one-way, two-way).
- Dock and pier configuration – open (piles) or closed (solid, filled construction), finger piers, parallel to channel berthing.
- Length of channel.
- Intersecting lanes, one-way sections in two-way channels, passing areas in one-way channels.
- Approach fairways.

Operational Factors.

- Limits for ship transit operations – wind, daylight/night, tide height, current window.
- Limits for ship sizes.
- Bar closure – waves, fog, and wind.
- Required underkeel ship clearance.
- Ship traffic daily variation.
- Speed reduction to increase safety.
- Tidal advantage – riding high tide for larger draft.
- Ship lightering – offloading to smaller ships, boats, barges.
- Required spacing between ships in tandem.

Geotechnical.

- Stability of side slopes.
- Dredging conditions – hazardous, toxic, and radioactive waste (HTRW), and other polluted material.
- Subsurface bedrock.
- Soil properties – bed and bank material (soft, fluid "mud", or hard).

Sedimentation.

- Rate of and tendency for siltation.
- Sediment sizes and distribution.
- Movement – scour and shoal areas.
- Source of sediments – upland or littoral.
- Sediment management facilities and techniques.

Water Quality.

- Salinity distribution and variability.
- Dredge disposal areas.
- Biological population – type, density, and distribution.
- Environmentally sensitive areas.

Special Concerns.

- Large change in channel alignment.
- Substantial increase in ship size or load or change in type.
- Major increase in port or terminal ship traffic.
- New port with new pilots.
- Effectiveness of proposed plans to deliver benefits.
- Known safety problems.

Design Opportunities.

- Channel curves – changing to straight segments.
- Channel width – review for possible reduction or need, for local wideners.
- Duplicate channel – ensure absolute requirement.
- Multiple turning basins – possible reduction of number.
- Anchorage areas – determine usage and possibly abandon some.

Support Services.

- Licensed pilotage.
- Tug availability – power, number, and bollard pull.
- Aids to navigation – buoys, channel markers, and range markers.
- Vessel traffic service – advisory or control.
- Information availability (hydrological and hydrometerorological data).
- Dredging and charting services – frequency, accuracy.

Background for Concept Design

A channel design for the design vessel(s) will consider the speed of the vessel with regard to skill of the pilot, ship handling characteristics, and visual clues available to the pilot. Visual clues in the form of buoys generally can be added to the channel once the alignment and channel width has been determined. Although buoys provide the visual clues to pilots and therefore may be used to reduce channel width, current Coast Guard operations are making reliance on buoys being provided and maintained tentative. Buoys should not be used as a crutch for lack of consideration of other factors affecting channel design.

Because crosswinds have an effect on slow moving vessels, allowance for wind must be made. Vessels that sit high in the water present more surface area for the force of cross winds to bear against. Vessel pilots often need maneuvering room within a channel simply due to the continuous course corrections. The depth/draft ratio also plays a role in possible ship maneuverability. As the ratio nears unity bottom drag acts on the vessel which in the case crosswinds is actually beneficial since it is harder for the vessel to be blown off course. Therefore, information on wind speeds and directions are necessary for initial design scenarios.

Similarly, currents affect a vessel's maneuvering in channels to the extent that during certain stages of the tide it may not be safe for transit. A designer will need to weigh the potential time the channel will not be available to a particular vessel against the economics of providing a deeper or wider channel.

Waves and swells will have an effect on both channel depth and width. Swells mostly affect the depth of channels since the amplitude of the swell raises and lowers the vessel keel in relationship to the bottom. Waves have more affect on channel width as they may knock the vessel off course requiring maneuvering area to correct the situation.

Cargo shipped into or out of the port should have an influence on channel design. In the Port of Boston the primary cargo measured by tonnage is petroleum. Running a tanker aground or tearing a gash in its side is not acceptable. Adequate depth and width must be allowed in designing a channel. The liquid natural gas (LNG) ships, although carrying what is considered to be a hazardous cargo, are accorded a nearly complete shutdown of the harbor which is enforced by the Coast Guard when transiting to or from their berths in the Mystic River.

While two-way traffic for large vessels is not critical in Boston at this time due to the existing practice of using the naturally deep area of President Roads for passing, the potential for two-way traffic involving larger vessels in passing situations with smaller ships exists and thought should be given to allowance for a safety lane width between two passing vessels. Typically a one-way channel would be designed for the design vessel(s) and also a two-way channel for the design vessel(s) and a smaller vessel in a passing action. In Boston's case there is such a great number of weekly shallow-draft vessel movements as compared to deep-draft vessel traffic that neither a two deep-draft vessel passing scenario nor concern for passing areas were entertained, but passage between large and small ships was considered.

Bank clearance is part of channel width design. The passage of a vessel within a channel having banks either vertical or sloped is affected by how close the vessel is to the banks. Usually enough width from the bank to negate the effect of the banks is desired. Three factors – speed, bank height, and the depth/draft ratio – control the bank effect phenomenon.

Channel width in bends is also dependent on a vessel's depth/draft ratio. A large ratio (deep water) will allow a tighter bend. Considering most channels have small depth/draft ratios, bend width must be considered even during the concept design. Also, navigational aids, which help pilots keep track of where there are in the bend, may not be available and extra bend width is required for pilot disorientation.

When a vessel is underway in a channel, an effect known as "squat" occurs. This "sinking" of the vessel is related to the speed of the vessel. Designers must account for squat. For initial design it is acceptable practice to use a minimum depth/draft ratio. Typically the ratio used is 1.10 although it sometimes may be as high as 1.15 in calm waters and 1.3 where waves are present. This assumed ratio accounts for the squat as well as inadequate survey information. It must be remembered that as a vessel must travel faster in a channel in order to stay within a portion of the tidal cycle the effect of squat can become pronounced.

Bottom material must be considered when designing a channel. Soft sand is slightly more forgiving than ledge although the designer should keep under keel clearance to a safe level no matter what the bottom consistency. Corps regulations make allowance for hard bottom by permitting extra allowable overdepth in areas of ledge (ER 1130-2-520 Nov 96). This is for channels that have only a small portion of the channel consisting of hard bottom. Otherwise, the channel design depth should have already factored in the under keel clearance and should not be relying on extra overdepth.

Concept Design

The methodology presented in the PIANC guide for the initial design concept has many of the same components as the old EM. They are presented in a simple table format and are additive to a base channel width and depth. The base channel width is a multiple of the vessel beam and the base channel depth is the draft of the vessel. Table D1-1 provides the base channel width while Tables D1-2 thru D1-6 provide the necessary additive widths to complete the concept design. Vessel maneuverability is a subjective view of the design vessel in question.

Table D1-1
Basic Maneuvering Widths

Vessel Maneuverability	Good	Moderate	Poor
Base Channel Width	1.3 B	1.5 B	1.8 B

B = Vessel beam T = Vessel Draft

For demonstration purposes assume Boston's North Broad Sound Channel is being designed for a Post Panamax container ship having a length of 1100 feet, beam of 140 feet, and draft of 47 feet with poor maneuverability. The guidance from Table D1-1 would require a base channel width of 250 feet. Assuming the speed of the vessel in this entrance channel to be 14 knots with winds blowing at 30 knots across the channel requires extra channel width of 56 feet (fast vessel speed in open waters with moderate cross wind requires an adjustment of (0.1 + 0.3) x beam width).

Currents and waves will usually add additional channel width. Based on the hydrodynamic model shown in Appendix G an assumed current of 1.0 ft/sec (ft/sec x 0.5921 = knots) crosses the channel at an angle of 7 degrees the perpendicular component of the current is 0.07 knots and the longitudinal component is 0.6 knots. In this hypothetical case there would be no adjustment of channel width for currents (moderate vessel speed in protected water with cross current of 0.07 knots requires no adjustment and the longitudinal current of 0.6 knots also requires no adjustment to the channel width). Waves are generated by winds blowing over the water surface over some distance. For this channel design example, assume winds of 30 knots blowing for 14 hours over a distance of 150 miles. A significant wave height of 12 feet with a wave period of 9.5 seconds would be generated which equates with a wave length of 462 feet. The guidance indicates a channel width adjustment is needed and would range between 2.0 and 3.0. For this example a factor of 2.0 was used adding another 280 feet to the channel width.

Other factors affecting the width of the channel are the clarity of any navigation aids, the type of bottom material, the depth of the channel, type of cargo typical to the channel, amount of traffic using the channel, type of channel banks, and whether or not the channel will conduct two-way traffic. For this example, assume the navigation aids occasionally are good, the bottom surface is rough and hard, the banks are steep hard edged, the depth of the channel is less than 115 percent of the vessel draft, no hazardous cargo is transported, fewer than one

vessel per hour use the channel, and there will be no two-way traffic. Additional width of channel based on the above is 434 feet (navigation aids adjustment 0.1, bottom surface adjustment 0.2, bank slope adjustment 1.3 for each bank, channel depth adjustment 0.2, hazardous cargo adjustment 0.0, traffic density adjustment 0.0, two-way traffic adjustment 0.0).

Therefore, in this example, the total channel width would sum to 1020 feet or rounded to 1000 feet. However, suppose there were bends in the channel. These too affect the width. The PIANC guidance suggests that the greater the channel depth compared to vessel draft the wider the channel needs to be at a bend due to the vessel "sideslip" since there is little friction between it and the bottom. The variation in width can range from 130% of the vessel's beam to as much as 260% of its beam depending on the depth to draft ratio. In this example of a channel in an inner harbor the depth to draft ratio will be such that the width of the channel will not be governed by the bends.

Table D1-2

Additional Widths for Straight Channel Sections

Width	Vessel speed	Outer channel open water	Inner Channel protected water
Vessel speed (knots)			
- fast > 12		0.1 B	0.1 B
- moderate > 8 - 12		0.0	0.0
- slow 5 - 8		0.0	0.0
Prevailing cross wind (knots)			
- mild < 15 (< Beaufort 4)	all	0.0	0.0
- moderate 15 - 33	fast	0.3 B	-
(Beaufort 4 - 7)	mod	0.4 B	0.4 B
	slow	0.5 B	0.5 B
- severe > 33	fast	0.6 B	-
(Beaufort 7 - 9)	mod	0.8 B	0.8 B
	slow	1.0 B	1.0 B
Prevailing cross current (knots)			
- negligible < 0.2	all	0.0	0.0
- low 0.2 - 0.5	fast	0.1 B	-
	mod	0.2 B	0.1 B
	slow	0.3 B	0.2 B
- moderate 0.5 - 1.5	fast	0.5 B	-
	mod	0.7 B	0.5 B
	slow	1.0 B	0.8 B
- strong > 1.5 - 2.0	fast	0.7 B	-
	mod	1.0 B	-
	slow	1.3 B	-

Prevailing longitudinal current (knots)				
- low < 1.5	all	0.0	0.0	
- moderate 1.5 - 3	fast	0.0	-	
	mod	0.1 B	0.1 B	
	slow	0.2 B	0.2 B	
- strong > 3	fast	0.1 B	-	
	mod	0.2 B	0.2 B	
	slow	0.4 B	0.4 B	
Significant wave height H_s and length λ (m)				
- $H_s < 1$ and $\lambda < L$	all	0.0	0.0	
- $3 > H_s > 1$ and $\lambda = L$	fast	~2.0 B	-	
	mod	~1.0 B	-	
	slow	~0.5 B	-	
- $H_s > 3$ and $\lambda > L$	fast	~3.0 B	-	
	mod	~2.2 B	-	
	slow	~1.5 B	-	
Aids to Navigation				
- excellent with shore traffic control		0.0	0.0	
- good		0.1 B	0.1 B	
- moderate with infrequent poor visibility		0.2 B	0.2 B	
- moderate with frequent poor visibility		>0.5 B	>0.5 B	
Bottom surface				
- if depth > 1.5 T		0.0	0.0	
- if depth < 1.5 T then				
- smooth and soft		0.1 B	0.1 B	
- smooth or sloping and hard		0.1 B	0.1 B	
- rough and hard		0.2 B	0.2 B	
Depth of waterway				
> 1.5 T		0.0	> 1.5 T	0.0
- 1.5 T - 1.25 T		0.1 B	< 1.5 T - 1.15 T	0.2 B
- < 1.25 T		0.2 B	< 1.15 T	0.4 B
Cargo hazard level				
- low		0.0	0.0	
- medium		~0.5 B	~0.4 B	
- high		~1.0 B	~0.8 B	

Table D1-3
Additional Width for Two-Way Traffic

Additional Width	Outer Channel Open Water	Inner Channel Protected Water
Vessel speed (knots)		
- fast > 12	2.0 B	-
- moderate 8 - 12	1.6 B	1.4 B
-slow 5 - 8	1.2 B	1.0 B
Traffic Density		
- light	0.0	0.0
- moderate	0.2 B	0.2 B
- heavy	0.5 B	0.4 B

Table D1-4
Additional Width for Bank Clearance

Bank conditions	Vessel Speed	Outer Channel open water	Inner Channel protected water
Sloping edges			
	fast	0.7 B	-
	moderate	0.5 B	0.5 B
	slow	0.3 B	0.3 B
Steep hard edges			
	fast	1.3 B	-
	moderate	1.0 B	1.0 B
	slow	0.5 B	0.5 B

Table D1-5
Hazardous Cargo Classification

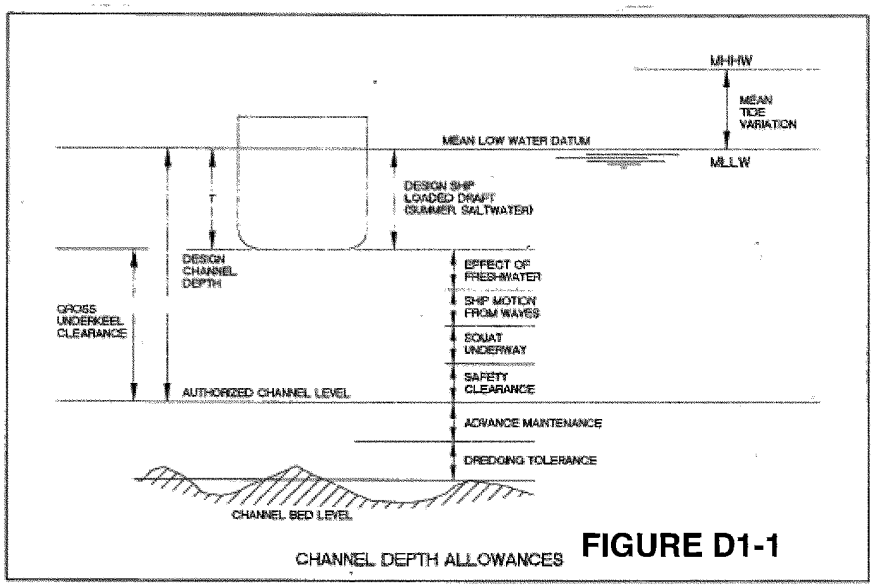
Cargo	Category
Dry bulk, break bulk, containers, passengers, general freight, trailer freight	Low
Oil in bulk	Medium
Aviation fuel, LPG, LNG, Chemicals	High

Table D1-6
Traffic Density Classification

Vessels per Hour	Category
0-1	Light
2 - 3	Moderate
>3	Heavy

Channel depth below a fixed datum is derived from the vessel's draft, squat, wave action, and a safety factor. Typically the tide should not factor into the calculations unless the intent is to "ride the tide" and enter the channel at times other than the minimum tide. Squat is defined as "the tendency of a vessel to sink and trim when underway" in other words as the vessel moves it's underkeel clearance is reduced. These factors are illustrated in Figure D1-1. The PIANC guide provided a formula and a figure to graphically calculate squat. However, the guide also suggested that a minimum depth to draft ratio be used for initial channel depth. The ratio should be 1.1 for calm water all the way up to 1.5 for waters subject to severe wave action

Figure D1-1 is taken from Engineering Manual 1110-2-1613 (2006) – deep draft navigation design. This illustrates in general the various considerations in channel depth design



From: EM 1110-2-1613 (2006)

Design Vessels

The vessels examined in this appendix will be:

Suez-Line	Post Panamax Ship	Typical Ranges
Capacity:	7500 TEUs	7200 - 8500 TEUs
Length:	1050'	1000' - 1200'
Beam:	141'	140' - 150'
Draft:	47'	46' - 48'

Existing Lines	Largest Panamax Ships	Typical Ranges
Capacity:	4500 TEUs	
Length:	900'	up to 900'
Beam:	106'	105' - 106'
Draft:	43'	42' - 43'

Excursion Boat	Boston Cruise Lines
Capacity:	600 passengers
Length:	145'
Beam:	40'
Draft:	12.5'

Tanker	Mystic River
Capacity:	87,000 dwt
Length:	840'
Beam:	138'
Draft:	45' (will be light loaded)

LNG Tank Vessel	Mystic River
Capacity:	125,000 cubic meters
Length:	940'
Beam:	140'
Draft:	42'

Tug	
Length:	100'
Beam:	29'
Draft:	12.5'

Channel Widths

Design conditions to be used for developing channel widths for the various design vessels and one- and two-way traffic are as follows:

Vessel maneuverability without tug support	poor – factor 1.8
Vessel maneuverability with tug support	good – factor 1.3

Vessel speed (pilots indicate 14 knots in entrance channel but slow say to 8-10 knots when meeting tugs in inner channel) without tugs (entrance channel) – fast – factor 0.1
with tugs (inner channel) – moderate – factor 0.0

Cross winds (pilots indicated max wind for operations 30 knots)
without tugs (entrance channel) – moderate – factor 0.3
with tugs (inner channel) – moderate – factor 0.4

Cross current (1993 study of current speeds within Boston Harbor predicted a maximum current in the harbor of less than 2 knots parallel with existing channel)
without tugs (entrance channel) – negligible – factor 0.0
with tugs (inner channel) – negligible – factor 0.0

Longitudinal current (1993 study of current speeds within Boston Harbor predicted a maximum current in the harbor of less than 2 knots parallel with existing channel although the 2005 study indicated stronger currents in the vicinity of Deer Island)
without tugs (entrance channel) – fast – factor 0.0
with tugs (inner channel) – moderate – factor 0.1

Significant waves (pilots indicated max wind for operations 30 knots and considering a fetch length of 300 miles we would have a fully arisen sea state with a significant wave height of 18' and a period of 13 seconds however it was assumed that pilots would not operate when waves were that large so judgment was used in selecting adjustment factor)
without tugs (entrance channel) – fast – factor 2.0
with tugs (inner channel) – slow – factor 0.0

Navigation aids without tugs (entrance channel) – good – factor 0.1
with tugs (inner channel) – good – factor 0.1

Bottom surface (based on existing ledge locations and elevations)
without tugs (entrance channel) – rough and hard – factor 0.2
with tugs (inner channel) – rough and hard – factor 0.2

Channel Depth without tugs (entrance channel) – <1.25 T – factor 0.2
with tugs (inner channel) <1.15 T – factor 0.4

Hazardous cargo (judgment was used on the criteria by assuming the LNG shipments high hazard and the oil shipments medium hazard whether in the entrance or inner harbor channels) without tugs (entrance channel) – high/medium – factor 1.0/0.5
with tugs (inner channel) – high/medium – factor 0.8/0.4

Vessel traffic (traffic is considered light for two-way traffic and in particular the LNG traffic causes the channel to close to other traffic)
without tugs (entrance channel) – light– factor 0.0
with tugs (inner channel) – light– factor 0.0

Bank Clearance (existing ledge creates steep banks factor assigned to inner harbor because of past mishaps with ledge contact)
without tugs (entrance channel) – steep hard edge – factor 1.3
with tugs (inner channel) – steep hard edge – factor 1.0

Using the Concept Design criteria and the Design Vessels Table D1-7 provides suggested channel widths for various combinations for one-way and two-way traffic entering the port of Boston. Although wind roses for various months (see end of appendix) show the greatest winds coming from the west, pilots relate that it is the easterly winds that most affect their operations. Vessel speeds reported by the pilots were 14 knots in the entrance channel, and wind speeds of 30 knots were used for the entrance channel simulation. Channel widths were calculated without tugs. The excursion boat was used for two-way traffic scenarios (larger vessels currently use President Roads for passing). A range of channel depths are shown since further refinement to balance the cost of dredging compared to lost benefits during periods of the tidal cycle when the channel will not have adequate depth for design vessels requires economic analysis.

Tidal delays are something shippers are loath to endure. With a tide range of 9.5 feet most companies plan ahead to load vessels appropriately for expected conditions upon arrival or departure. It is an imprecise exercise but with forethought it becomes a means of providing several extra feet of operating draft. The basic concept is to enter the harbor on a rising tide and be at the berth off loading before the tide falls. Consideration must be given to the rate of tidal fluctuation (9.5 feet in 6 hours or 1.6 feet/hour), tide cycle (predictable), vessel speed (varies by vessel/weather conditions/location in harbor), required underkeel clearance (typically 4 feet), berth depth, and general sea conditions.

Suppose a container vessel with a loaded draft of 42 feet with a required underkeel clearance of 4 feet desired to begin its approach to the harbor three hours before high tide. Water depth at the ocean end of the entrance channel would be approximately 44.7 feet (40 feet + (9.5 feet – 3 x 1.6 feet)). There is not enough depth to begin the transit and a delay is encountered,. In this case a depth of 48 feet is required at the entrance to the harbor (42 feet + 4 feet + 2 feet due to wave conditions at the entrance). The vessel would need to slow its approach to the harbor by two hours allowing a rise in tide level of 3.2 feet thus providing the minimum depth of 47.9 feet (which should be adequate for passage through the entrance).

Traveling at 14 knots it should take roughly 15 minutes to travel the 3.4 miles the North Broad Sound and arrive at the President Roads reach. Slowing to 12 knots it would take another 5 minutes to travel the 0.8 miles to the bends at Spectacle Island and a final 20 minutes to travel the 2.1 miles at 8 knots to the Reserved Channel Turning Area. To get to a berth in the Reserved Channel takes another 25 minutes. Accounting for this transit time the vessel arrives at the berth with a depth in the channel of about 49.5 feet (47.9 feet + 1.6 feet) which allows more than two hours to begin off-loading before depth at the berth becomes an issue. Similar timing is required for out-bound vessels although the drafts tend to be less so there is a larger window of opportunity to leave the berth and still have the required depth at the outer channel entrance. The main report provides more details in a section titled "Tidal Navigation" and Tables 27 and 28.

Table D1-7

CHANNEL DESIGN BY REACH
BROAD SOUND NORTH ENTRANCE CHANNEL

Channel Segment	**North Broad Sound**	Type Traffic	1 Way	1 Way	1 Way
Vessel					
		Type	Container	Tanker	LNG
		Length	1100	840	940
		Beam	141	138	140
		Draft	47	45	42
		Speed	14	14	14
Maneuver ability		Poor	1.8	1.8	1.8
Speed	14 knots	fast	0.1	0.1	0.1
Winds	30 knots	Moderate	0.3	0.3	0.3
Cross Currents		negligible	0	0	0
Long Currents	2 knots	fast	0	0	0
Waves	12 ft	fast	2	2	2
Aids to Navigation		good	0.1	0.1	0.1
Bottom		hard	0.2	0.2	0.2
Channel Depth		<1.25	0.2	0.2	0.2
Hazard			low	med 0.5	high 1
Sub-Total			4.7	5.2	5.7
Bank	steep hard	fast	1.3	1.3	1.3
Passing - Speed			0	0	0
- Density			0	0	0
Total			7.3	7.8	8.3
Required Width			1029	1076	1162

Table D1-7 (Continued)

CHANNEL DESIGN BY REACH – PRESIDENT ROADS CHANNEL REACH OF MAIN SHIP CHANNEL

Channel Segment	**President Roads**				
		Type Traffic	1 Way	1 Way	1 Way
Vessel					
		Type	Container	Tanker	LNG
		Length	1100	840	940
		Beam	141	138	140
		Draft	47	45	42
		Speed	10	10	10
Base		good	1.3	1.3	1.3
Speed	10 knots	moderate	0	0	0
Winds	30 knots	moderate	0.4	0.4	0.4
Cross Currents		negligible	0	0	0
Long Currents	2 knots	moderate	0.1	0.1	0.1
Waves			0	0	0
Aids to Navigation		good	0.1	0.1	0.1
Bottom		hard	0.2	0.2	0.2
Depth		<1.15T	0.4	0.4	0.4
Hazard			low 0	med 0.4	high 0.8
Sub-Total			2.5	2.9	3.3
Bank	steep hard	moderate	1	1	1
Passing - Speed		moderate	0	0	0
- Density		light	0	0	0
Total			4.5	4.9	5.3
Required Width			634.5	676.2	742

Table D1-7 (Continued)

CHANNEL DESIGN BY REACH – PRESIDENT ROADS CHANNEL REACH OF MAIN SHIP CHANNEL – TWO-WAY TRAFFIC

Channel Segment	**President Roads**			
		Type Traffic	2 Way	2 Way
Vessel				
		Type	Container	Tanker
		Length	1100	840
		Beam	141	138
		Draft	47	45
		Speed	10	10
Base		poor	1.8	1.8
Speed	10 knots	moderate	0	0
Winds	30 knots	moderate	0.4	0.4
Cross Currents		negligible	0	0
Long Currents	2 knots	moderate	0.1	0.1
Waves	3 ft	moderate	0.5	0.5
Aids to Navigation		good	0.1	0.1
Bottom		hard	0.2	0.2
Depth		<1.15T	0.4	0.4
Hazard			low 0	med 0.4
Sub-Total			3.5	3.9
Bank	steep hard	moderate	1	1
Passing - Speed		moderate	1.4	1.4
- Density		light	0	0
Total			10.4	11.2
Required Width			1466.4	1545.6

Table D1-7 (Continued)

CHANNEL DESIGN BY REACH – LOWER MAIN SHIP CHANNEL REACHES

Channel	**Lower Main Ship**	Type Traffic	Lower Main Ship 1 Way		Lower Main Ship 1 Way		Lower Main Ship 1 Way	
Vessel								
		Type		Container		Tanker		LNG
		Length		1100		840		940
		Beam		141		138		140
		Draft		47		45		42
		Speed		6		6		6
Base			good	1.3	good	1.3	good	1.3
Speed	6 knots	neg.		0		0		0
Winds	30 knots	moderate		0.4		0.4		0.4
Cross Currents	.2 knots	negligible		0		0		0
Long Currents	2 knots	moderate		0.2		0.2		0.2
Waves				0		0		0
Aids to Nav		good		0.1		0.1		0.1
Bottom		hard		0.2		0.2		0.2
Depth		<1.15		0.4		0.4		0.4
Hazard			low	0	med	0.4	high	0.8
Sub-Total				2.6		3		3.4
Bank	steep hard	slow		0.5		0.5		0.5
Passing - Speed				0		0		0
- Density				0		0		0
Total				3.6		4		4.4
Req'd Width				507.6		552		616

Based on the validated numerical model and the deepening alternatives modeled, current speeds will not change significantly in the Boston Harbor Navigation Channel and that it is likely that changes in channel layout would have more of an impact on ship handling. The maximum increases were found to be less than 5% which likely falls within modeling error and/or the natural variation in real life currents due to spring and neap tide cycles and wind generated current impacts.

Channel width appears to be governed by the LNG ship primarily due to the hazardous nature of its cargo. Since the vessel is only a weekly visitor to the port consideration to other vessels should be given higher priority.

Channel width in the outer entrance channel to Finns Ledge (1100 feet) and the next straight reach to Deer Island turn (900 feet) appear to be adequate. Usually tugs meet the vessels going to the Mystic or Chelsea Rivers in the vicinity of Commonwealth Pier upstream of the Reserved Channel. However, vessels bound for Reserved Channel are met at President Roads. Therefore, channel widths would not necessarily need to account for tugs until after the Deer Island turn. Existing channel width in President Roads reach is 1200-foot wide indicating all of the design vessels would pass easily as verified by the existing practice. It is the 600-foot Spectacle Island, Middle Ground Shoals, and Castle Island channel reaches that appear to need widening.

Since there are no longer oil terminal facilities in the Reserved Channel, both the oil tanker and the LNG design vessels would be docking upstream of the Reserved Channel and the oil tankers would have no need for tugs until past the Reserved Channel. That leaves the two containerships with tugs and a containership and excursion boat upon which to base the channel width for the Main Ship Channel seaward of the Reserved Channel.

A suggested channel width of 500 feet would suffice for either containership for one-way traffic. However, channel widths in the entrance and bends would need to be increased. Table D1-8 shows the effects of the bends between channel segments and the required adjustments are shown in Figures D1-2 thru D1-5. The Ship Simulation exercises conducted for this study (see Appendix H) recommended widening a portion of the inner harbor reach in the vicinity of the bends.

Table D1-9 provides vessels transiting the port. For large carriers the asymmetrical channel configuration at Boston Harbor, with its 35 and 40-foot lanes, does not allow for passing situations, except for smaller vessels using the shallower lane to pass larger ships. Passing of two large vessels only occurs at President Roads and more rarely in the channel lane cross-over off Fort Point. President Roads is a passing reach and retains its 1200-foot width partly for that purpose. However, deepening the entire 1500 to 1200-foot wide entrance and main ship channels would be economically impractical. Any widening of the deeper lane for increased vessel size would be accomplished by incorporating a portion of the shallower lane. This means that the existing passing situation would be incorporated into any plans for channel improvement and would therefore be both a without-project and with-project condition. Given the short main channel transit times to South Boston of 1.25 hours, passing situations for two large vessels would continue to be rare, even in the with-project condition base case, or with the expected increase in container shipping in the higher end economic scenarios that add an additional liner service at Boston. Total transits of the Main Ship Channel under the with-project condition would still be only about 15 to 16 large vessels weekly, an insufficient level to warrant two-way traffic for large vessels passing each other. One-way traffic of large vessels will remain a component of any improvement plans.

Table D1-8

Suggested Bend Widths

	One-Way Traffic								Two-Way Traffic	
Design Vessel	Post-Panamax		Panamax		Tanker		LNG		Post-Panamax	
Beam Width (ft)	141	199	106	164	138	196	140	198	181	239
Length (ft)	1050	1050	900	900	840	840	940	940	1050	1050
Draft (ft)	47 (w/o tugs)	47 (w/tugs)	43 (w/o tugs)	43 (w/tugs)	45 (w/o tugs)	45 (w/tugs)	42 (w/o tugs)	42 (w/tugs)	47 (w/o tugs)	47 (w/tugs)
Criteria (Bends)										
Depth to Draft Ratio (min = 1.10)										
@42	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
@44	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
@46	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
@48	1.1	1.1	1.1	1.1	1.1	1.1	1.15	1.15	1.1	1.1
@50	1.1	1.1	1.15	1.15	1.1	1.1	1.2	1.2	1.1	1.1
@52	1.1	1.1	1.2	1.2	1.1	1.1	1.2	1.2	1.1	1.1
Swept Bend Width (ft)										
@42	543	766	408	631	600	853	679	960	733	968
@44	543	766	408	631	600	853	679	960	733	968
@46	543	766	408	631	600	853	679	960	733	968
@48	543	766	408	631	600	853	686	970	733	968
@50	543	766	413	640	600	853	692	978	733	968
@52	543	766	418	646	600	853	692	978	733	968

D1-20

Table D1-8 (Cont.)

Suggested Bend Widths

	One-Way Traffic								Two-Way Traffic	
Design Vessel	Post-Panamax		Panamax		Tanker		LNG		Post-Panamax	
Beam Width (ft)	141	199	106	164	138	196	140	198	181	239
Length (ft)	1050	1050	900	900	840	840	940	940	1050	1050
Draft (ft)	47	47	43	43	45	45	42	42	47	47
	(w/o tugs)	(w/tugs)	(w/o tugs)	(w/tugs)	(w/o tugs)	(w/tugs)	(w/o tugs)	(w/tugs)	(w/o tugs)	(w/tugs)
Criteria (Bends)										
Turning Radius (ft)										
@42	15540	15540	13320	13320	12852	12852	14852	14852	15750	15750
@44	15540	15540	13320	13320	12852	12852	14852	14852	15750	15750
@46	15540	15540	13320	13320	12852	12852	14852	14852	15750	15750
@48	15540	15540	13320	13320	12852	12852	11562	11562	15750	15750
@50	15540	15540	10170	10170	12852	12852	10152	10152	15750	15750
@52	15540	15540	8820	8820	12852	12852	10152	10152	15750	15750

D1-21

Upstream of the Reserved Channel and downstream of the depth-limiting Ted Williams Tunnel the suggested one-way traffic channel width is 650 feet for a Post-Panamax vessel and 500 feet for a Panamax dry-bulk vessel (the most likely design vessel to use the Massport Marine Terminal, the one deep-draft facility on this channel reach). However, considering the area between the channel and the berth would need to be dredged to the same depth as the channel to permit vessels to safely traverse to the berth, an allowance was made and the proposed deep channel width will remain at 600 feet. Also, as suggested during the Independent Technical Review of this Appendix, the adjacent 35-foot channel lane would also provide adequate depth for tugs alongside the lager transiting boats, allowing the existing 600-foot width of the channel's deep lane to suffice for these larger bulk carriers.

Bend Widths

However, the Boston Harbor Entrance Channel is not a single straight segment. It consists of several segments connected by channel bends. The bend at Finn's Ledge is a 25-degree bend to port upon entry, the bend at Deer Island consists of three bends – two 21-degree bends and a 9-degree bend all to starboard, the bend at Spectacle Island is also a combination to starboard of 10-degrees and 20-degrees, and the final bend at Middle Ground Shoal is another starboard bend of 22-degrees.

The PIANC guide suggests that at high depth to draft ratios, the width of a bend needs to increase since there is little friction between the vessel and the bottom to prevent "sideslips". The guide provides two figures for use in determining bend widths. Each figure uses the channel depth to draft ratio and the rudder angle during the turn. For the Concept Design phase a rudder angle less than "full rudder" is recommended to allow a margin of safety. A depth to draft ratio of 1.1 is the minimum ratio as anything lower produces very sluggish maneuverability. Examining the figures, which were based on a single screw/single rudder containership, a rudder angle of 15 degrees and depth to draft ratio of 1.1, the turning radius should be 12 times the vessel length and the swept width will be 1.1 times the vessel beam. However, to be conservative, it should be realized that vessels entering the Boston Harbor main ship channel would likely do so near high tide or on a rising tide in order to take advantage of the nine-foot tide. This would change the depth to draft ratio to 1.2 changing the swept width only by 0.1 additional beam width but drastically reduces the turning radius down to 7 times the vessel length.

Laying the turning radius aside for the moment, the bend width necessary would be the base of 1.1-1.2 times the beam plus accounting for the same factors mentioned above which affect the straight segments for a total of 3.9-4 times the beam or 546-560 feet which is just slightly more than the straight segments so the suggested width of the required channel would be constant throughout at say 550 feet.

Channel bends on the other hand present more of a challenge. The turn at Finns Ledge has a radius of 12,000 feet but according to Table D1-8 the Post Panamax design vessel requires a radius of 15,550. This assumes the need for two-way traffic does not exist as the excursion boats follow the Narrows Channel on their way to Provincetown. An 800-foot channel with the 15,550-foot radius on the centerline will not fit within the limits of

the existing Federal channels. A bend easing would be required at the inside of the bend. See Figure D1-2.

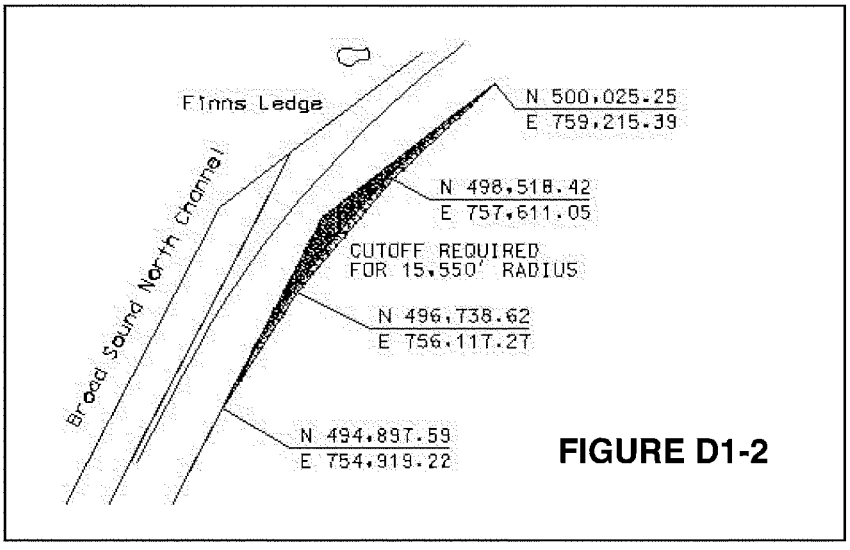


FIGURE D1-2

At the Deer Island bend the combination of three turns within a short distance creates a very difficult situation. A turn radius of 15,550 creates a swath that totally is outside of the existing channel at the apex of the bend. However, vessels are currently negotiating the bend within the existing channel limits. Figure D1-3 shows an 800-foot wide channel bend with a radius of 5000 feet. Pilots may be taking advantage of the wider channel in this bend. Ship simulation with the larger Post Panamax vessels showed the short radius will work with the extra width provided in the bend.

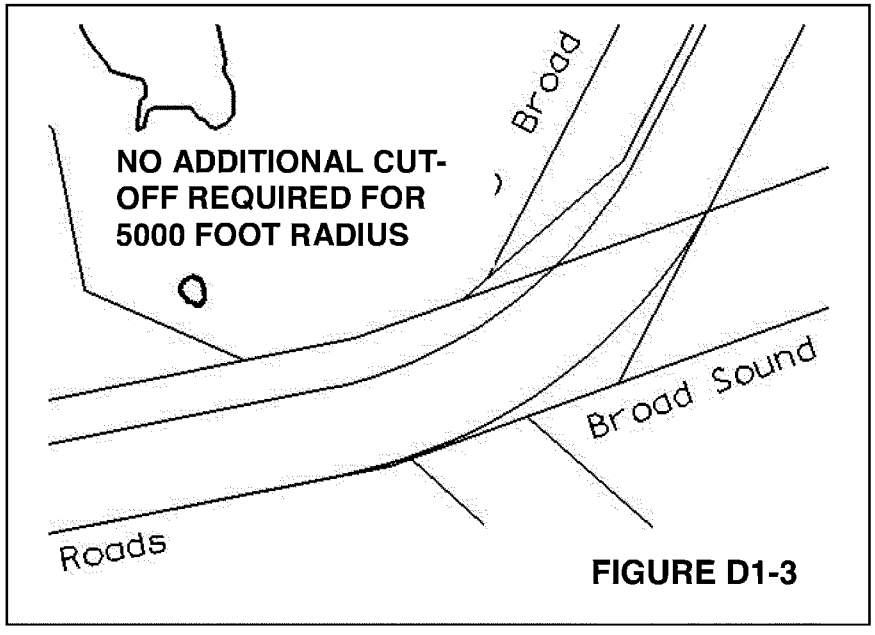


FIGURE D1-3

Similarly, Spectacle Island reach will not allow a 15,550-foot radius bend. Figure D1-4 shows a 10,000-foot radius bend which requires significant bend easing in the 35–foot channel as well as a slight widening adjacent to Spectacle Island.

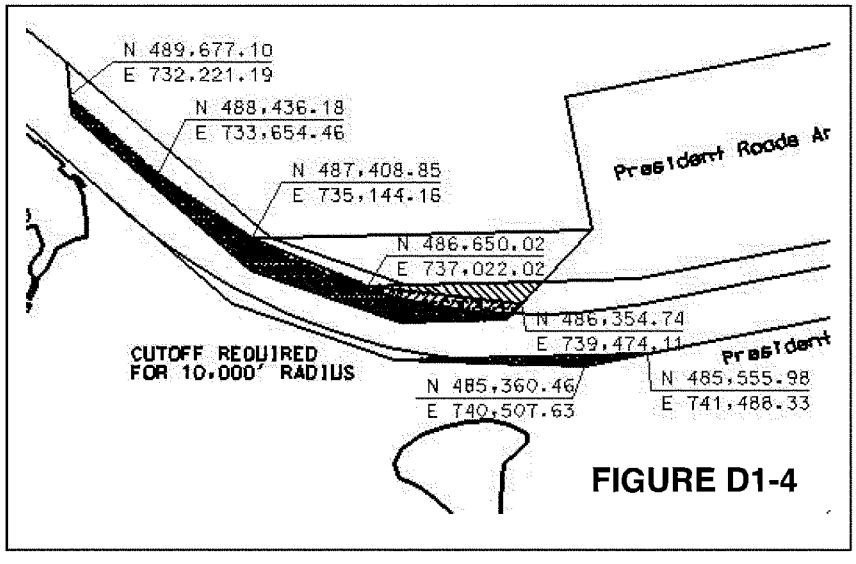


FIGURE D1-4

Figure D1-5 is similar to Figure D1-4 but depicts an 8400-foot radius and does not require any channel widening adjacent to Spectacle Island. This layout assumes vessels would make use of the full 1200 feet of channel width within President Roads. Furthermore, if a triangular portion of the 35-foot channel south of the 35-foot trapezoidal anchorage area is included in the bend easing then the transition from the 1200-foot wide President Roads channel to an 800-foot Main Ship channel is made easier. This has been further refined by the ship simulation exercise and now the recommended channel does not protrude into the existing 35-foot channel as much as initially contemplated.

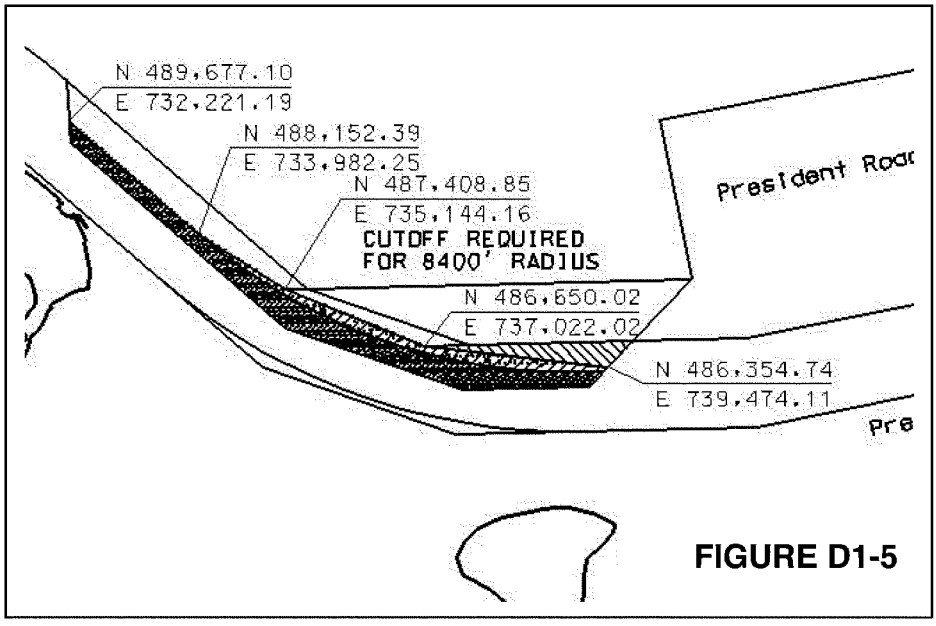


FIGURE D1-5

Mystic and Chelsea Channels

The only modification under consideration for the Mystic River Channel at this time is an extension of the 40-foot channel cut along the southern, Charlestown, shoreline, upstream above Massport's Boston Autoport (Moran Terminal) to the Medford Street Terminal.

The 1992-93 ship simulation study examined widening of the 40-foot channel downstream of the Inner Confluence as a means of providing tankers a safer access to the Mystic River. These improvements were accomplished during the recent deepening of the Mystic River channel to 40 feet.

The 1995 simulation recommended slight modifications to the Chelsea Channel by minor widening in the two bridge approaches and in the wide bend between the two bridges. An increase in channel width of 50 feet has been incorporated in the design along the East Boston shore immediately upstream of the McArdle Bridge and in the bend between the bridges.

Construction of the new Chelsea Street Bridge is scheduled to begin in 2008 and will require two years to complete the new vertical lift span, after which the old span will be removed. At that time the Corps would widen the channel cut through the bridge to the authorized 38-foot depth under its operations and maintenance authority.

Deepening of the channel to 40 feet would include the widened channel limits through the new bridge passage. The 1992-93 ship simulation study examined the current design vessel for transits of Chelsea Creek under a scenario that considered replacement of the Chelsea Street Bridge, so additional simulation studies for this waterway segment were not repeated for this study.

The impact of the channel widening and deepening on physical parameters such as sedimentation and shoaling rates is expected to be negligible. With a dredging cycle measured in decades it is difficult to predict specific changes to these rates that could be associated with the proposed work. The 1993 Numerical Model Study concluded the proposed improvements will have little effect on tidal circulation in the harbor. Differences in current speeds throughout the harbor were less than 0.1 fps with no significant change in current direction. The 2005 hydrodynamic model reached similar conclusions about current speeds indicating that the predicted different current speeds were within the error margin of the model. Ship wakes would be most noticeable in the entrance channel and comparable to small swells impinging on the outer islands. Within the harbor, under tug assistance, the wake is limited. Concern has been expressed about erosional forces caused by tidal currents and the "drawdown" and "return velocity" effects, particularly in the Chelsea River due to the narrow channel. A 1994 report on the impacts to existing wharves concluded that a review of various formulas for movement of a vessel during post-improvement conditions showed minimal and in some cases no change in drawdown, or bow velocities and thus associated erosional changes were expected to be minimal. Tides and storm surge will not be affected by the proposed improvements.

Conclusions

The vessels examined in this Concept Design phase of the Boston Harbor Entrance Channel Deepening Study appear to be capable of traversing an 800-foot wide channel. As the design effort continues to evolve, the bends will need further refinement. Ship simulation provided the reasonableness of the assumptions made during this early examination. Although the Concept Design suggests bend radii of 15,550 feet this only seems practicable at Finns Ledge and was recommended at that location due to the need of a conservative entrance design. In the case of Spectacle Island/Middle Ground Shoal a recommended bend easing appears to be necessary but the Deer Island bend with a significantly shorter radius than desired proved to be acceptable given the extra channel width in the bend's existing cut-off.

Project plans and survey plots are included at the end of this appendix as follows:

Hydrographic Surveys and Channel Design Layout – Figures D1-6A to 6U
Ledge Removal Areas – Figures D1-7A to 7G
Associated Maintenance Dredging Areas – Figures D1-8A to 8E

ADDITIONAL DEPTH FOR ENTRANCE CHANNEL

Introduction

The Boston Harbor Deep Draft Navigation Improvement Study recommends a design depth of 47 feet below mean lower low water for the interior channels accessing Massport's Conley Terminal from the outer harbor. That recommendation was based on an economic analysis of the future with-project container vessel fleet calling on Boston Harbor. The economic evaluation included foot-by-foot incremental analysis of various proposed project depths from -42 feet to -50 feet MLLW. This included consideration of vessel movement on the tides, vessel loading, departure depths from prior port calls, channel transit times, and industry requirements for minimum safe underkeel clearance of 10 percent of the vessel's loaded draft. This underkeel requirement, adopted by the carriers, vessel insurers and pilots, accounts for all underkeel effects in the inner harbor.

At mean lower low water (MLLW) a vessel drawing 43 feet would require about 47 feet to transit the harbor's inner channels. At Boston the line of harbor islands stretching south across the harbor mouth from approximately Deer Island in the north to Peddocks Island and Pemberton Point in the south marks the boundary between the exposed outer harbor and the more protected lower and inner harbor. The line of peninsulas, islands and headlands results in a reduced wave climate and surface winds in the inner harbor. The different conditions experienced in the exposed outer harbor result in a requirement for additional channel depth in the entrance channel for vessels safety, and to make the improved depths in the inner harbor fully usable.

The recommendation for deepening Boston Harbor includes deepening the existing 40-foot lane of the Broad Sound North Entrance Channel; currently the harbor's deepest entrance. The Broad Sound North Entrance Channel extends northeasterly from the harbor's outer confluence south of Deer Island to deep water in Massachusetts Bay. The 40-foot lane of this channel has a width of 900 feet in its inner main reach out to Finns Ledge, and then 1100 feet wide in its shorter outer approach reach seaward. Ship simulation studies found these channel widths adequate except that bend widening at the junction of the two reaches opposite Finns Ledge was recommended and is included in the plan.

The example analysis of increased channel depth requirements in the Entrance Channel is based on a 100 DWT design vessel with a draft of 43 feet, 1100 feet in length and a beam of 140 feet. This was the equivalent draft of a vessel loaded to 48 feet but riding at least a five-foot tide which is the Boston Pilots current practice and which they intend on doing in the with-project condition. Additional calculations were made for the conditions under which the pilots intend on operating and the minor differences are mentioned in the text.

The following references were used:

EM 1110-2-1613 "Hydraulic Design of Deep Draft Navigation Projects" 31 May 2006

ERDC/CHL CHETN-I-72 "Ship Squat Predictions for Ship/Tow Simulator" Michael J. Briggs August 2006

SANDIA Report SAND2008-1020 "Ship Dynamics for Maritime ISAR Imaging" Armin W. Doerry, Sandia National Laboratories

Wave Information Studies U.S. Army Corps of Engineers Atlantic WIS Station 63053

DISCUSSIONS WITH BOSTON HARBOR PILOTS – October 2012 and December 2012

Underkeel Clearance for Boston Harbor Entrance

In assessing the adequacy of Gross Underkeel Clearance for the Entrance Channel, the following factors must be taken into account:

- Nominal draft of the vessel in salt water
- Freshwater effects
- Wave effects on ship motion
- Squat at the anticipated maximum transit speed
- Trim and/or list effects
- Tide and current effects
- Safety clearance
- Bottom factors: allowance of bed level uncertainties (soundings and sedimentation), allowance for changes between dredging and dredging execution tolerances

Discussions with the Boston Harbor Pilots provided insight to current operational procedures that are followed for vessels transiting the Outer Harbor to Conley Terminal and the pilots anticipated procedures for handling the larger 1100-foot long containerships anticipated with for Boston Harbor the project. The typical speed of the design vessel would be 13 knots in the approach from buoy BG (about 2.7 NM east of the entrance to the North Channel), reducing to 10 knots through the North Channel and President Roads, reducing to 6-8 knots above the Roads and to 6 knots approaching Castle Island to the Reserved Channel.

The Pilots also use 10% underkeel clearance in the entrance channel with added factors for increased squat and roll (heal). Using the pilots stated speed of 10 knots in the entrance adds an additional 1.5 feet underkeel allowance for squat alone above that in the inner channels. The Pilots operational procedures do not include allowances for pitch. The Pilots indicated they do not operate in winds of 35 knots or greater, or in seas of 10 feet or greater. The Pilots also indicate that they do not transit in lesser winds/seas under conditions where other than minimal pitch or roll is expected to be encountered.

NOMINAL DRAFT:

As stated above, the design depth has been calculated for a ship having a nominal draft of 43 feet and operating at low water, and for a vessel with a draft of 48 feet but riding at least a five-foot tide.

FRESH WATER EFFECTS:

Effect of fresh water is negligible given the distance of the nearest fresh water source, therefore will not impact this channel and will not be discussed.

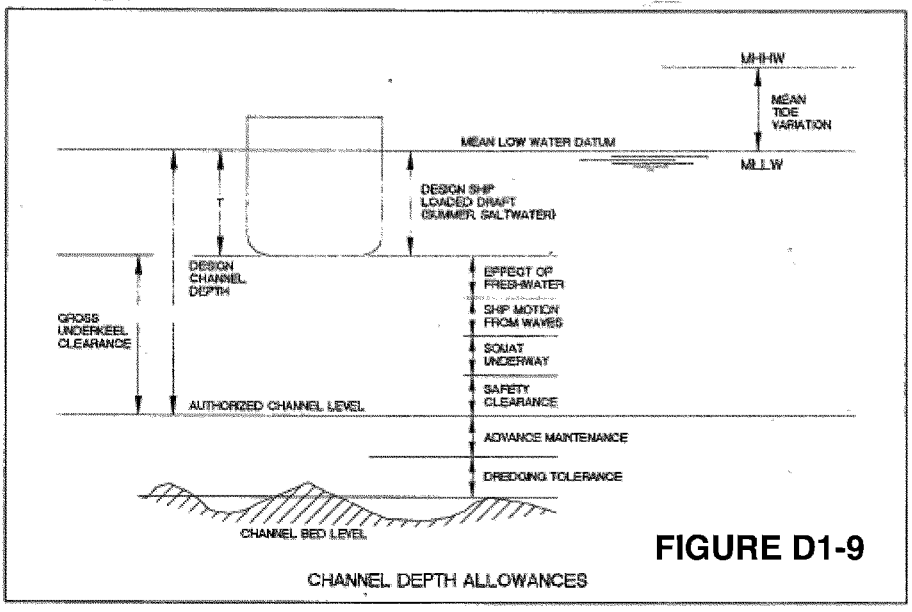


Figure D1-1 from Design Appendix and EM 1110-2-1613

WAVE EFFECTS

Ship motion due to waves is much more pronounced in the entrance channel where open ocean waves have a greater impact on the ship than in the more protected inner harbor channels. Vessel loading typically would prevent significant uneven trim in perfectly flat water but waves acting on the hull cause the vessel to rotate about the plane of even trim. As the bow of the vessel rides either up or down an oncoming wave the stern will follow the movement moments later as the wave passes along the hull.

Unfortunately wave action has a more complex effect than a single direct wave passing along the hull. Motions of pitch, roll, heave, yaw, sway, and surging are all introduced by waves acting on the vessel. While all are important the first three, pitch, roll and heave, have the potential for the greatest impact on channel depth.

Pitch

Pitch is movement of the bow or stern relative to the plane of flat water as measured at the center of the vessel rotating about the lateral axis. So as the vessel sails into an oncoming wave the bow will be forced up relative to the center of the vessel while the stern moves downward. The longer the vessel the more pronounced the effect of pitch. As an example, the assumed container vessel's length of 1100 feet with a rotation of just a half degree would cause the bow or stern to pitch over 4 feet.

X = tan angle x L/2 = tan 0.5° x 550' = 4.8'

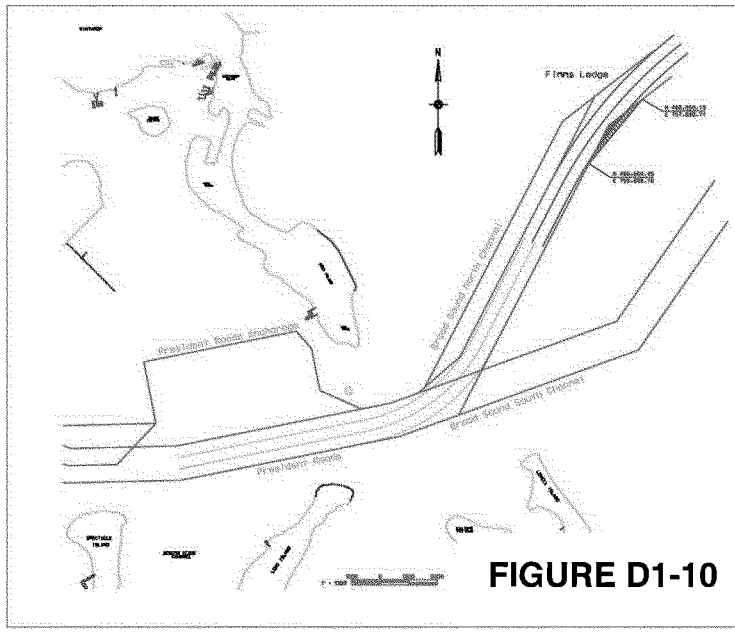
Roll

Roll is movement of the sides of the vessel relative to the plane of flat water as measured at the center of the vessel rotating about the longitudinal axis. Calculated roll is the rocking motion from side to side and what is being measured is the motion at the extreme edge of the vessel. Since the vessel beam is perhaps only a tenth of the length the numbers may not seem as critical but this motion can be additive to the pitch motion. Rotation of perhaps five degrees would cause the outer edge of the vessel to move over 6 feet.

X = tan angle x B/2 = tan 5° x 70' = 6.1'

Heave

Heave is the vertical motion of the vessel relative to the plane of flat water. A vessel moves upwards as a wave crest passes and moves down as the trough passes. This movement can be significant for larger waves and swells.



The orientation of the Boston Harbor entrance channel is shown above. The three motions of pitch, roll, and heave are somewhat controlled by the direction of the waves compared to the channel axis. Waves moving parallel to the channel result in the greatest values of motion. The Wave Information Studies Atlantic WIS Station 63053 was selected to provide general wave characteristics for the Boston Harbor entrance channel. Waves approaching the channel from the direction of NNE to ENE tended to have the largest wave height and period although they are not the most common. A percent occurrence wave rose showing wave direction is provided below. Direction bands are in 22.5 degree increments from 0 to 360 degrees. The data indicates that most waves are approaching from the ocean to the east. The wave hindcast chart is also provided below to show the relationship of the existing channel orientation to the larger waves with the large wave periods.

EM 1110-2-1613 (31 May 06) provides several graphs for determining suggested vertical vessel movement in channels due to waves. While the graphs were made based on a particular vessel speed they might be useful to highlight vessel movement in the entrance channel. It was assumed that both inbound and outbound vessels would be loaded to a 43 foot draft.

Figures from the EM are provided below. For an inbound vessel the calculations for vessel vertical movement resulting from pitch involved the following steps:

Calculate the pitch period ($\mathbf{T_{pitch}}$) of the vessel

$\mathbf{T_{pitch} = 2.44 + .032L - .000036L^2}$ **sec** (from Ship Dynamics for Maritime ISAR Imaging –SANDIA Report SAND2008-1020))

Where **L** in meters (Length between Perpendiculars) = length overall x .85 or for this case 1100 feet x .85 = 935 feet or 285 m

$\mathbf{T_{pitch} = 8.64}$ **sec**

Calculate ratio of wave period ($\mathbf{T_{wave}}$) to pitch period

$\mathbf{T_{wave} = 5.7}$ **sec** from Wave Information Studies (WIS)

$\mathbf{T_{pitch}}$ = 8.64 sec

Ratio = 5.7 / 8.64 = .66

Utilize Figure 6-11 in EM 1110-2-1613 for above ratio and assumed speed of 9 knots and following seas to determine the RMS (Root Mean Squared) wave height response of the given vessel in 1 foot seas

RMS response in 1 foot seas= 0.108 ft/ft

Calculate RMS response at a given wave height using Mean Wave Height in feet from WIS data. Mean Wave Height is 4.3 feet.

0.108ft/ft x 4.3 ft = 0.460 feet

Utilize Figure 6-12 in EM to determine Displacement Response Ratio for assumed 100 DWT vessel with following seas ($\Theta = 180°$)

Displacement Response Ratio = 1.3

Apply the Displacement Response Ratio to the Mean Wave Height to determine the final RMS response for the given vessel.

0.460 x 1.3 = 0.599 feet

Utilize Figure 6-15 in EM for Period of Encounter seas ($\Theta = 180°$ so F = -1) with assumed speed of 10 knots and wave period of 5.7 sec to determine the period of encounter

Period of Encounter = 15.3 sec

Calculate number of wave encounters

Distance / Speed = [(14,050 ft x .000165) nm / 10 kn] x 3600 / 15.3 = 54.55

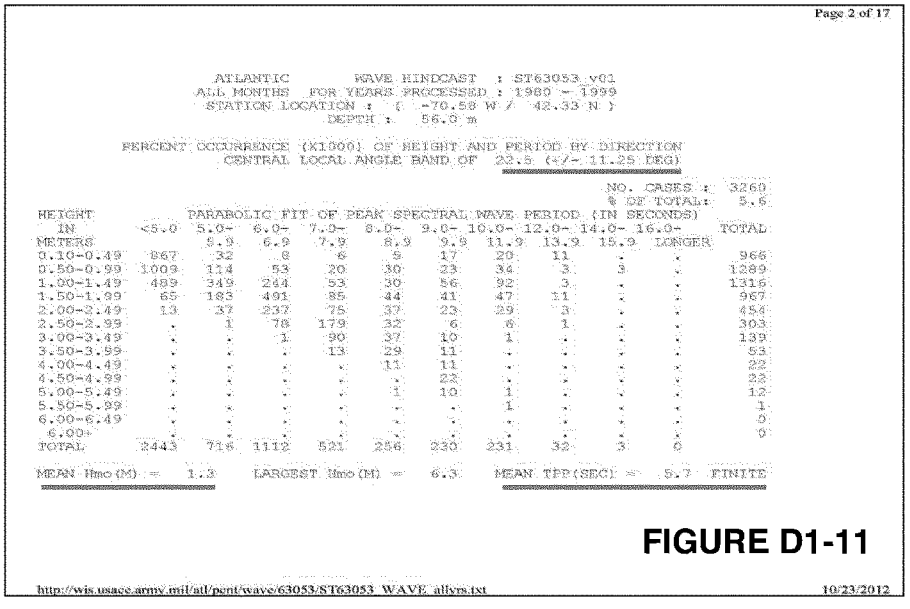
Utilize Figure 6-14 in EM to determine Wave Encounter Multiplier

Wave Encounter Multiplier = 4.18

Calculate total vertical movement due to waves (wave allowance for underkeel clearance) which is the Wave Encounter Multiplier times the final RMS response.

4.18 x .599 ft = 2.5 feet

Note: Similar calculations for an Outbound vessel but using a vessel speed of 9 knots and Figure 6-7 for head seas resulted in a total vertical movement due to waves of 1.6 feet. Calculations were also made for wind directions causing beam seas and quartering seas resulting in vertical movements resulting from roll of 2.3 and 1.2 feet. Thus, the vertical movement caused by wind and waves from the NNE direction would be controlling by 0.2 feet.



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ATLANTIC WAVE HINDCAST : ST63053_v01
ALL MONTHS FOR YEARS PROCESSED : 1980 - 1999
STATION LOCATION : (-70.50 W / 42.33 N)
DEPTH : 56.0 m

PERCENT OCCURRENCE (X1000) OF HEIGHT AND PERIOD BY DIRECTION
CENTRAL LOCAL ANGLE BAND OF 22.5 (+/- 11.25 DEG)

NO. CASES : 3260
% OF TOTAL: 5.6

HEIGHT IN METERS	PARABOLIC FIT OF PEAK SPECTRAL WAVE PERIOD (IN SECONDS) <5.0	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 11.9	12.0- 13.9	14.0- 15.9	16.0- LONGER	TOTAL
0.10-0.49	867	32	8	6	5	17	20	11	.	.	966
0.50-0.99	1009	114	53	20	30	23	34	3	3	.	1289
1.00-1.49	489	349	244	53	30	56	92	3	.	.	1316
1.50-1.99	65	183	491	85	44	41	47	11	.	.	967
2.00-2.49	13	37	237	75	37	23	29	3	.	.	454
2.50-2.99	.	1	78	179	32	6	6	1	.	.	303
3.00-3.49	.	.	1	90	37	10	1	.	.	.	139
3.50-3.99	.	.	.	13	29	11	.	.	.	.	53
4.00-4.49	.	.	.	.	11	11	.	.	.	.	22
4.50-4.99	.	.	.	.	.	22	.	.	.	.	22
5.00-5.49	.	.	.	.	1	10	1	.	.	.	12
5.50-5.99	.	.	.	.	.	.	1	.	.	.	1
6.00-6.49	.	.	.	.	.	.	.	.	.	.	0
6.50+	.	.	.	.	.	.	.	.	.	.	0
TOTAL	2443	716	1112	521	256	230	231	32	3	0	

MEAN Hmo (M) = 1.3 LARGEST Hmo (M) = 6.3 MEAN TPP(SEC) = 5.7 FINITE

FIGURE D1-11

http://wis.usace.army.mil/atl/pent/wave/63053/ST63053_WAVE_allyrs.txt 10/23/2012

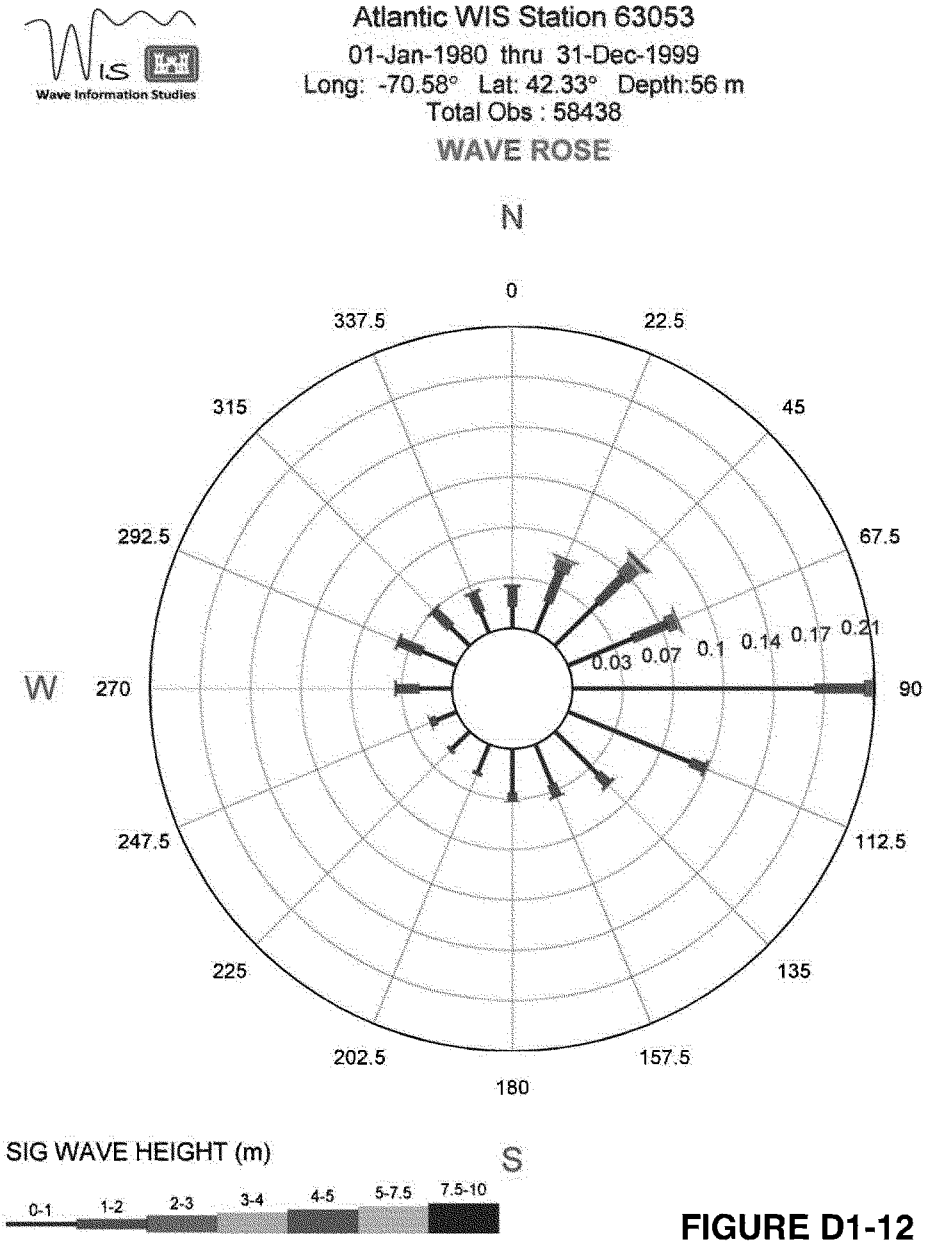

Wave Information Studies
Atlantic WIS Station 63053
01-Jan-1980 thru 31-Dec-1999
Long: -70.58° Lat: 42.33° Depth:56 m
Total Obs : 58438
WAVE ROSE
N
0
22.5
45
67.5
90
112.5
135
157.5
180
202.5
225
247.5
270
292.5
315
337.5
W
S
0.03
0.07
0.1
0.14
0.17
0.21
SIG WAVE HEIGHT (m)
0-1
1-2
2-3
3-4
4-5
5-7.5
7.5-10

FIGURE D1-12

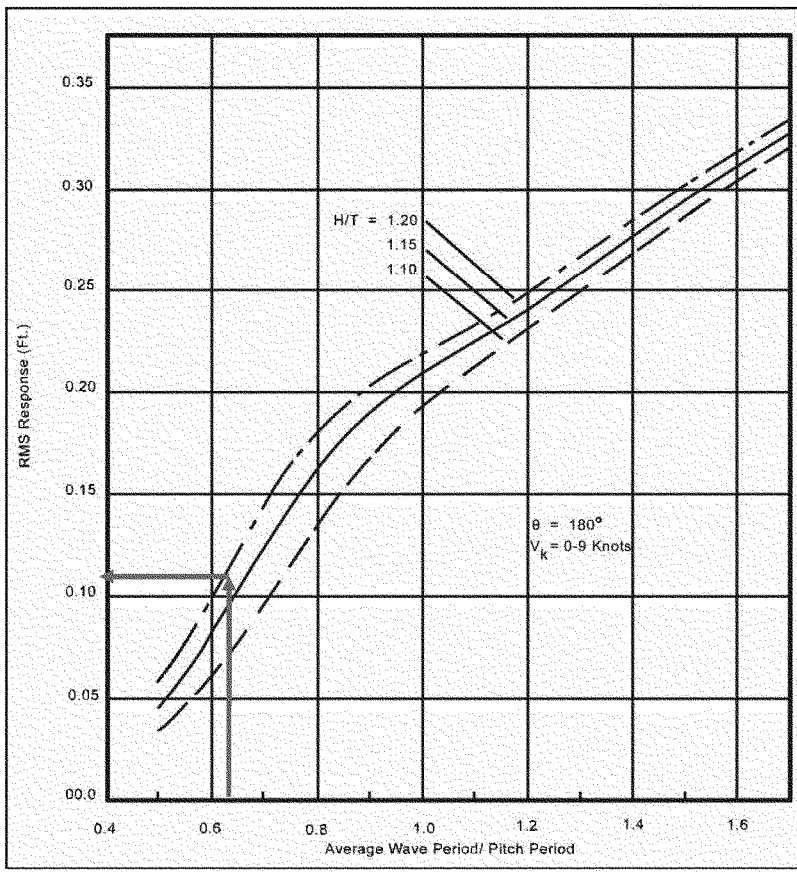


Figure 6-11. Following sea response, V_K = 0-9 knots

FIGURE D1-13

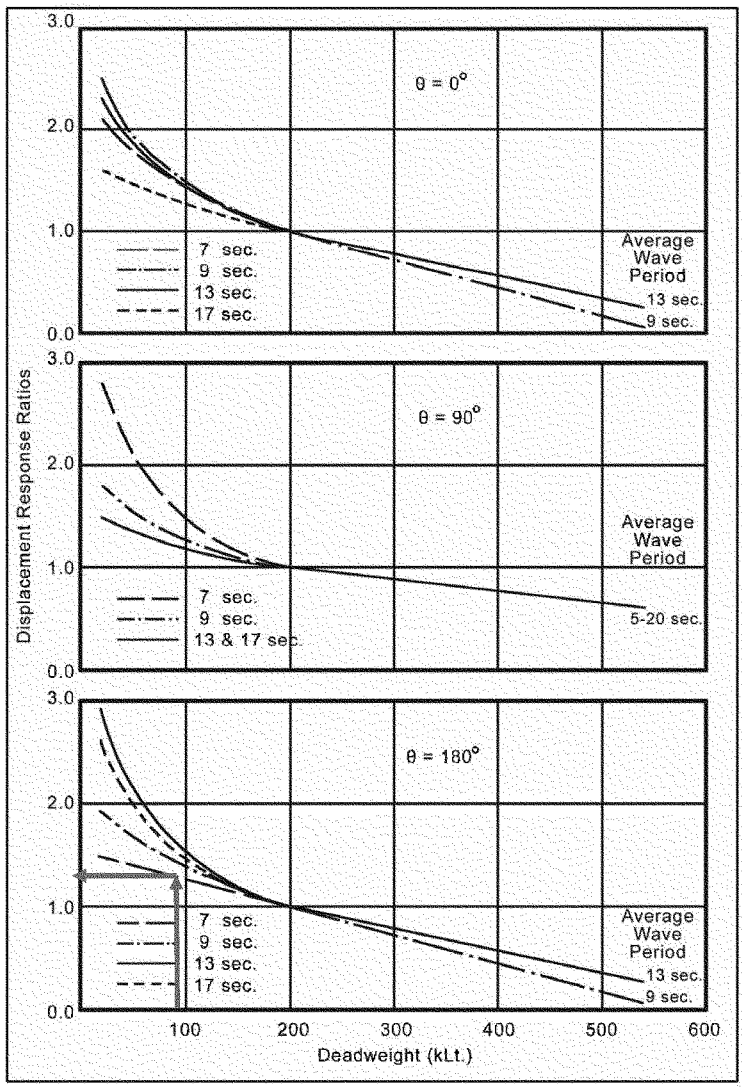


Figure 6-12. Displacement response ratios, θ = 0°, 90°, 180°

FIGURE D1-14

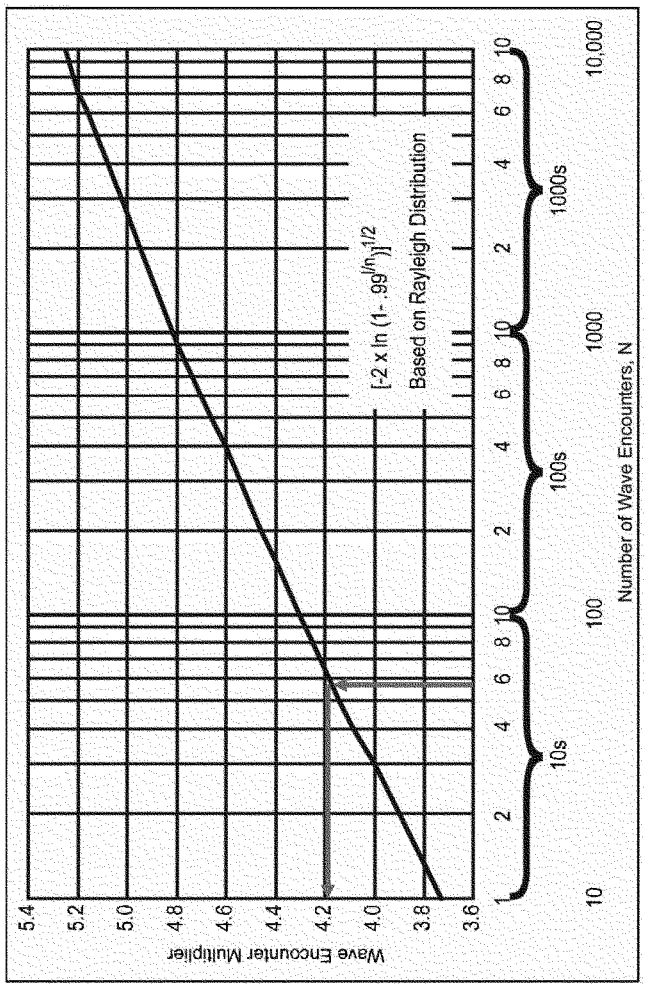


Figure 6-14. Wave encounter multiplier

FIGURE D1-15

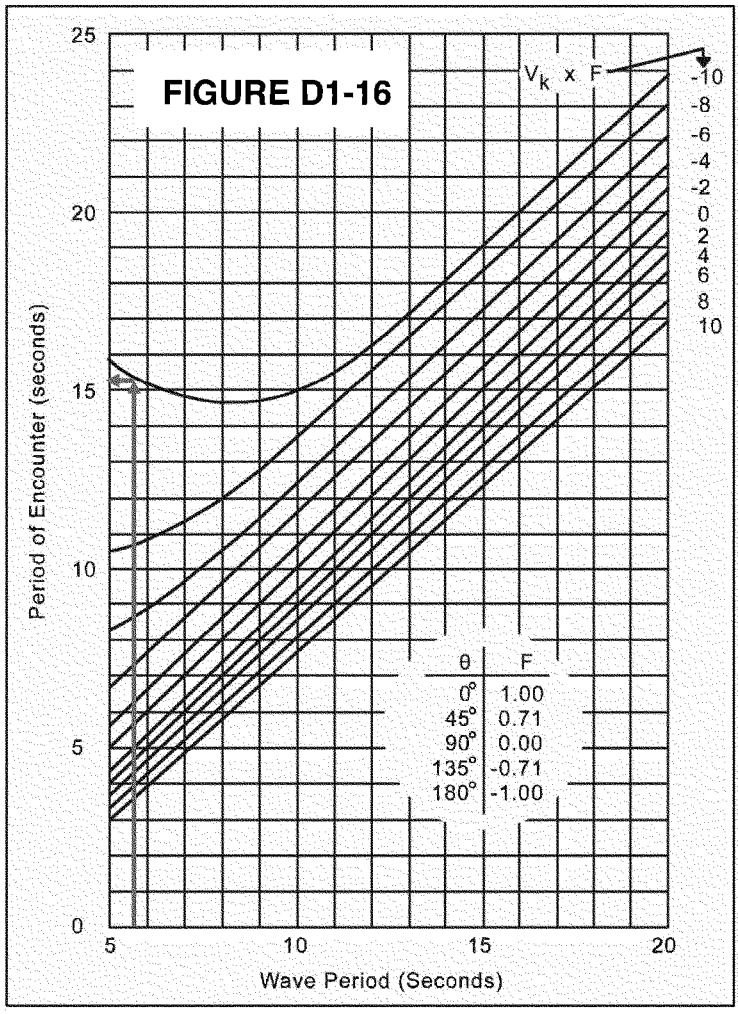


Figure 6-15. Wave encounter period

The above calculations were performed using a mean wave height of 4.3 feet. Since this was a mean height larger waves were also used in calculations to provide a range of vertical movement. A 10 foot wave can be expected to produce a 5.8 foot vertical movement. However as the Boston Harbor Pilots have stated, they use tidal assistance to transit the channels with larger or more heavily laden vessels and will not transit during conditions when pitch and roll are more than minimal. The pilots state that they encounter transit delays from sea states about 20 to 30 times a year, about half of which are with containership transits; among the largest ships calling on the port. The three containership services each make one weekly call, for a total of 312 transits annually. Sea state delays thus account for only about 4 percent of containership transits. Since the larger waves occur less frequently and when other weather related conditions might cause the

pilots not to transit the channel, it was decided to use the movement caused by the mean wave height and rely on the additional safety clearance normally required for entrance channels.

SQUAT

Squat is the phenomenon whereby the ship's draft is increased in shallow water due to the hydrodynamic effects between the ship and the sea floor which causes an increase in draft. It effectively reduces the under-keel clearance in areas where clearance may be critical. Squat is approximately proportional to the speed squared of the ship, hence halving the speed reduces the squat effect by a factor of four. In general, a squat effect starts to be felt in waters where the depth/draft ratio is less than four. Various formulas have been derived over the years for vessels depending on the vessel's block coefficient. The block coefficient is the non-dimensional ratio of the displacement volume (underwater volume) of the molded form of a ship to the volume of a rectangular block with the main ship dimensions of the effective length, beam, and draft. For background on the above and how Huuska/Guliev and Barrass correlate to other methods (see EDRC/CHL CHETN-I-72 August 2006 attached).

The formulas were populated for both Inbound and Outbound vessels. The results shown below are for an Inbound vessel:

Huuska/Guliev Formula:

$\mathbf{S_b = (2.4)(BTL/L^2)(F^2/(1-F^2)^{0.5})(K_s)}$

Where $\mathbf{S_b}$ = vessel squat in meters

$\mathbf{B}$ = vessel beam in meters

$\mathbf{T}$ = vessel draft in meters

$\mathbf{L}$ = vessel length in meters

$\mathbf{F}$ = Froude number $= (V/(gh)^{0.5})$

$\mathbf{K_s}$ = blockage factor correction

$\mathbf{S_1}$ = blockage factor = A_s/A_{ch}

Values used are as follows (converted to meters and m/s): L=1100 feet or 335.28 m; V= 10 knots or 5.144 m/sec; h=50 feet or 15.24 m ; B=140 feet or 42.6 m; T=43 feet or 13.1 m; and an assumed C_B=.87.

Solving:

$\mathbf{F} = (V/(gh)^{0.5}) = 5.144/[(9.81)(15.24)]^{0.5} = 0.42$

$\mathbf{L^2} = (335)^2 = 112{,}412\ m^2$

$\mathbf{A_s = .98\ B\ T} = (.98)(42.6)(13.1) = 546\ m^2$

$\mathbf{A_{cb}} = (1200)(.3048)(15.24) = 5574\ m^2$ assumed 1200' channel width at 50'

$\mathbf{S_1} = (A_s/A_{ch})/K_1 = (546/5574)/K_1 = 0.1/K_1 > 0.03$ where $K_1 = 2.5$ (see Fig C6 in PIANC "Approach Channels A Guide for Design" or ERDC/CHL CHETN-1-72 Fig 5) and $K_s = 1$

$\mathbf{S} = (2.4)[(42.6)(13.1)(335.28)/112{,}412][(.42)^2/(1-.42^2)](1.0) = .779$ m or 2.7 feet

Barrass Formula:

$\mathbf{S_b = C_B\ S_2^{2/3}\ V_k^{2.08} / 30}$

Where $\mathbf{S_b}$ = vessel squat in meters

$\mathbf{C_B}$ = block coefficient

$\mathbf{S_2}$ = ratio between ship's cross section and the net cross section of the waterway

$\mathbf{V_k}$ = ship velocity in knots

Values used are as follows (converted to meters and m/s): L=1100 ft or 335.28 m; V= 10 knots or 5.144 m/sec; h=50 ft or 15.24 m ; B=140 ft or 42.6 m; T=43 ft or 13.1 m; and an assumed C_B=.87.

Solving:

$\mathbf{S_2 = A_s / A_w} = .10$

$\mathbf{A_s = .98\ B\ T} = (.98)(42.6)(13.1) = 546\ m^2$

$\mathbf{A_w = Wh} = (1200)(.3048)(15.24) = 5574\ m^2$ assumed 1200' channel width at 50'

$\mathbf{S_b} = (.87)(.10)^{-.667}(10)^{2.08}/30 = .741$ meters or 2.4 feet

A variant of the above formula was suggested for effectively open water. A multiple of the ship's beam called "width of influence" which ranges from about 8 for tankers to about 11 for container vessels and is used along with a slightly different blockage factor as follows:

$\mathbf{S_b = C_B\ S_2^{.667}\ V_k^{2.08}/30}$

Where $\mathbf{S} = (\mathbf{b} \times \mathbf{T})/(\mathbf{B} \times \mathbf{b} \times \mathbf{h})$ and $\mathbf{B} = 7.04/\mathbf{C_B}^{.85}$

Solving:

$\mathbf{B} = 7.04 / .87^{.85} = 7.9$

$\mathbf{S} = (42.6 \times 13.1)/(7.9 \times 42.6)(15.24) = .11$

$\mathbf{S_2 = S/(1 - S)} = .11/(1 - .11) = .12$

$\mathbf{S_b} = (.87)(.12)^{-.667}(10)^{2.08}/30 = .85$ m or 2.8 feet

A third, simplified variation of the Barrass formula for unrestricted open water use is as follows:

$\mathbf{S_b = C_B\ V^2/100}$

Solving:

$\mathbf{S_b} = (.87)(10)^2/100 = .87$ meters or 2.9 feet

Given the above, inbound vessel squat for the entrance channel which is not quite an open water unrestricted situation is assumed to be 2.9 feet. Because the vessel draft is included in the above equations and it is expected that the pilots will operate with deeper drafts than the 43 feet used above additional calculations for a 48 foot draft assuming at least a five foot tidal assist were performed. Results were predictably higher but only by a few tenths. The value of squat to be used, therefore, will be increase to 3.1 feet.

Note: The Outbound vessel (traveling at 9 knots) squat for the entrance channel calculated to be 2.1 feet, 2.0 feet, and 2.3 feet for the above equations resulting in an assumed squat of 2.3 feet. Likewise, calculations for the deeper draft and tide produced a squat of 2.5 feet. Therefore, the Inbound vessel squat will control.

TRIM OR LIST

Loading of a vessel or adding ballast affects the location of the water line on the hull and more importantly the function of the rudder and propeller. For Boston Harbor it is assumed that vessels arriving have little need to adjust trim and thus the entrance channel depth is not affected.

TIDES

The tidal range for Boston Harbor is 10.3 feet between Mean Lower Low Water (MLLW) and Mean Higher High Water (MHHW). The design appendix listed the mean tide range as 9.5 feet which was between Mean High Water (MHW) and Mean Low Water (MLW). The lowest observed tide was 3.7 feet below MLLW recorded in March 1940. It also should be noted that for any month there will be between 5 and 7 days where the tide level is at least a foot lower than MLLW. For this reason 1 foot additional clearance is recommended for the reasonable probability that actual tide would be lower than MLLW.

SAFETY CLEARANCE

A required under keel safety clearance of 2 feet is assumed based on USACE guidance (EM 1110-2-1613, etc). There is intermittent hard bottom (ledge) in areas of the North Entrance Channel, Main Ship Channel, Reserved Channel and Anchorage. In the case of hard bottom USACE guidance recommends a 3-foot safety clearance (EM 1110-2-1613, etc) with EDRC recommending 4 feet (EDRC/CHL CHETN-I-72 August 2006). The improvement project includes an additional 2 feet of required removal in areas of ledge in addition to the normal 2 feet of allowable overdepth. For this reason 2 feet safety clearance is considered sufficient.

BOTTOM FACTORS

Bottom factors include allowance of bed level uncertainties (soundings and sedimentation), allowance for changes between dredging and dredging execution tolerances. As mentioned above, the assumed safety clearance has made allowances for hard bottom. The accuracy of soundings is not a major concern since the existing channel does not shoal at a rate that requires dredging more frequently than every twenty years.

OTHER FACTORS

Atmospheric Pressure: Note that at the time of the in the incident on 11 March 1996 where the M/T LIMAR hit a rock in Boston Harbor, it appears the atmospheric pressure was in the range of 1050mm which could result in a lowering of surface elevation of 55 cms (1.8 feet) (Capt Ajit Vadakayil in his blog: http://ajitvadakayil.blogspot.com/2011/01/ships-squat-bernoulli-and-under-keel.html)

Conclusion and Recommendation for Entrance Channel Depth

Considering the potential vessel movement and other factors identified above in paragraphs 2.a through 2.i, the calculated depth of the Entrance Channel required for the project design vessel is -51.3 feet MLLW. This is a combination of the following considerations: 48 foot Nominal draft+ 2.5 feet Wave effects + 3.1 feet Squat + 1.0 feet Tide effects + 2.0 feet Safety Clearance -5.3 feet of tidal assistance for "riding the tide".

The Recommended Entrance Channel design depth is -51 Feet MLLW with an additional 2 feet Required Overdepth (to -53 Feet MLLW) component in areas of ledge, plus two feet allowable overdepth (to -55 Feet MLLW) in all areas.

Note 1: Eight scenarios were analyzed for combined wave and squat effects as follows:

Outbound Vessel: 43 foot draft - 9 knot squat plus 9 knot wave effect (head seas response) equals 2.3 feet + 1.6 feet = 3.9 feet; 9 knot squat plus 9 knot wave effect (beam seas response) equals 2.3 feet + 2.3 feet = 4.6 feet; 48 foot draft - 9 knot squat plus 9 knot wave effect (head seas response) equals 2.5 feet + 1.6 feet = 4.1 feet; and, 9 knot squat plus 9 knot wave effect (beam seas response) equals 2.5 feet + 2.3 feet = 4.8 feet

Inbound Vessel: 43 foot draft -10 knot squat plus 10 knot wave effect (following seas response) equals 2.9 feet + 2.5 feet = 5.4 feet; 10 knot squat plus 10 knot wave effect (beam seas response) equals 2.9 feet + 2.3 feet = 5.2 feet; 48 foot draft - 10 knot squat plus 10 knot wave effect (following seas response) equals 3.1 feet + 2.5 feet = 5.6 feet; and, 10 knot squat plus 10 knot wave effect (beam seas response) equals 3.1 feet + 2.3 feet = 5.4 feet

The control will be the 48 foot draft Inbound Vessel (5.6 feet) in following seas. The 48 foot draft Inbound vessel was assumed to be riding at least a five foot tide which would equate to a 43 foot draft vessel transiting at MLLW.

Note 2: The District's analysis examined a worse case of an 1100-foot ship at a partially loaded 43-foot draft transiting without regard to the tide and the same ship loaded to 48-foot draft. In a December 21, 2012 letter the Boston Harbor Pilots made their own analysis on the 1100-foot ship near fully loaded to 48+ feet moving on the top third of the tide to ensure themselves that such a vessel transit would work with respect to transit time v available water.

TABLE D1-9
BOSTON HARBOR, MASSACHUSETTS 2005
WATERBORNE COMMERCE STATISTICS - VESSEL TRANSITS FOR THE PORT OF BOSTON

	Inbound Vessel Transits						Outbound Transits						Total All Transits	35-Foot and Up Transits
	Total Inbound	Self-Propelled Vessels			Non-Self Propelled Vessels		Total Outbound	Self-Propelled Vessels			Non-Self Propelled Vessels			
		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		
Total for Waterway	20,389	18,080	530	279	209	563	20,176	18,810	386	263	196	521	40,565	596
Foreign	852	449	380	11	0	12	862	451	381	15	1	14	1,714	591
43	2	2	-	-	-	-	0	-	-	-	-	-	2	
42	16	16	-	-	-	-	7	7	-	-	-	-	23	
41	29	28	1	-	-	-	25	25	-	-	-	-	54	
40	21	21	-	-	-	-	22	22	-	-	-	-	43	
39	26	23	3	-	-	-	20	20	-	-	-	-	46	
38	39	19	20	-	-	-	17	17	-	-	-	-	56	
37	30	9	21	-	-	-	11	11	-	-	-	-	41	
36	163	29	134	-	-	-	26	21	5	-	-	-	189	
35	97	25	72	-	-	-	40	22	18	-	-	-	137	
34	44	10	34	-	-	-	52	13	39	-	-	-	96	
33	30	7	23	-	-	-	19	9	10	-	-	-	49	
32	24	7	17	-	-	-	5	4	1	-	-	-	29	
31	14	0	14	-	-	-	5	-	5	-	-	-	19	
≤30	317	253	41	11	-	12	613	280	303	15	1	14	930	
Total	852	449	380	11	0	12	862	451	381	15	1	14	1,714	
Domestic	19,537	18,359	150	268	209	551	19,314	18,359	5	248	195	507	38,851	5
37	2	-	2	-	-	-	0	-	-	-	-	-	2	
36	1	-	-	-	-	1	1	-	1	-	-	-	2	
35	1	-	1	-	-	-	0	-	-	-	-	-	1	
34	0	-	-	-	-	-	0	-	-	-	-	-	0	
33	0	-	-	-	-	-	0	-	-	-	-	-	0	
32	4	-	-	-	-	4	0	-	-	-	-	-	4	
31	1	-	-	-	-	1	0	-	-	-	-	-	1	
≤30	19,528	18,359	147	268	209	545	19,313	18,359	4	248	195	507	38,841	
Total	19,537	18,359	150	268	209	551	19,314	18,359	5	248	195	507	38,851	

TABLE D1-9 (Continued)
BOSTON HARBOR, MASSACHUSETTS 2005
WATERBORNE COMMERCE STATISTICS - VESSEL TRANSITS FOR THE RESERVED CHANNEL

	Inbound Vessel Transits						Outbound Transits						Total All Transits	35-Foot and Up Transits
	Total Inbound	Self-Propelled Vessels			Non-Self Propelled		Total Outbound	Self-Propelled Vessels			Non-Self Propelled			
		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		
Total for Waterway	628	479	-	56	50	43	621	477	1	53	51	39	1,249	272
Foreign	310	309	-	1	-	-	309	307	1	1	-	-	619	272
43	2	2	-	-	-	-	0	-	-	-	-	-	2	
42	16	16	-	-	-	-	7	7	-	-	-	-	23	
41	28	28	-	-	-	-	25	25	-	-	-	-	53	
40	21	21	-	-	-	-	22	22	-	-	-	-	43	
39	14	14	-	-	-	-	20	20	-	-	-	-	34	
38	10	10	-	-	-	-	16	16	-	-	-	-	26	
37	5	5	-	-	-	-	7	7	-	-	-	-	12	
36	21	21	-	-	-	-	17	17	-	-	-	-	38	
35	20	20	-	-	-	-	21	21	-	-	-	-	41	
34	9	9	-	-	-	-	10	10	-	-	-	-	19	
33	5	5	-	-	-	-	6	6	-	-	-	-	11	
32	4	4	-	-	-	-	4	4	-	-	-	-	8	
31	0	-	-	-	-	-	0	-	-	-	-	-	0	
≤30	155	154	-	1	-	-	154	152	1	1	-	-	309	
Total	310	309	0	1	0	0	309	307	1	1	0	0	619	
Domestic	318	170	-	55	50	43	312	170	-	52	51	39	630	0
27	1	1	-	-	-	-	1	1	-	-	-	-	2	
≤15	317	169	-	55	50	43	311	169	-	52	51	39	628	
Total	318	170	0	55	50	43	312	170	0	52	51	39	630	

TABLE D1-9 (Continued)
BOSTON HARBOR, MASSACHUSETTS 2005
WATERBORNE COMMERCE STATISTICS - VESSEL TRANSITS FOR THE MYSTIC RIVER

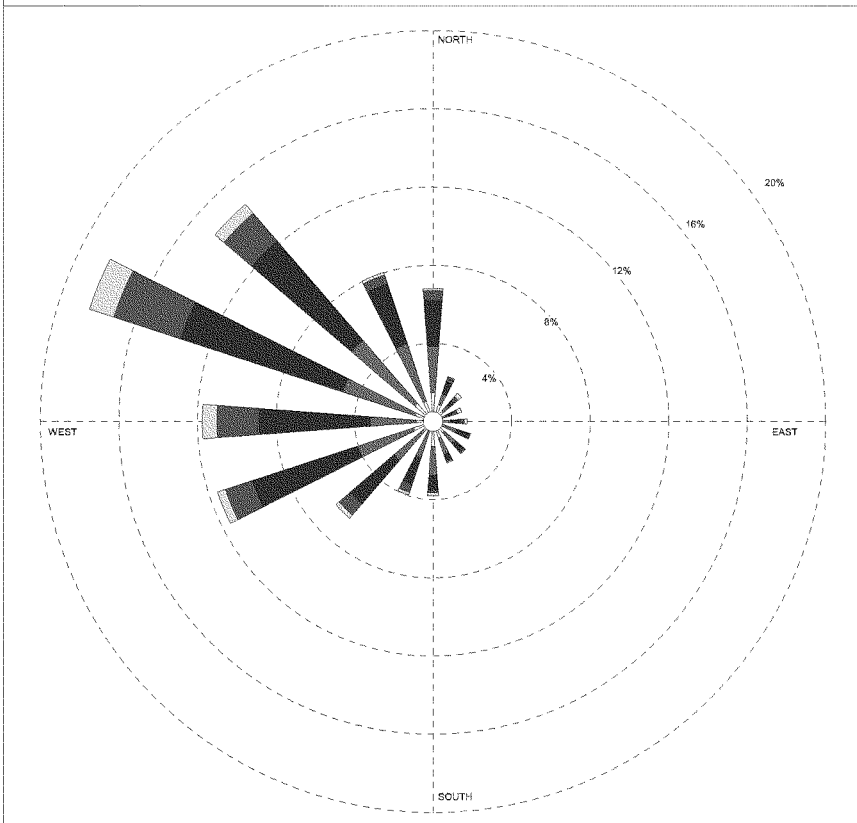
	Inbound Vessel Transits						Outbound Transits						Total All Transits	35-Foot and Up Transits
	Total Inbound	Self-Propelled Vessels			Non-Self Propelled		Total Outbound	Self-Propelled Vessels			Non-Self Propelled			
		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		
Total for Waterway	419	58	159	32	101	69	384	62	133	34	91	64	803	157
Foreign	236	58	157	10	-	11	218	62	132	12	-	12	454	157
39	2	-	2	-	-	-	0	-	-	-	-	-	2	
38	24	5	19	-	-	-	1	1	-	-	-	-	25	
37	20	1	19	-	-	-	4	4	-	-	-	-	24	
36	67	1	66	-	-	-	6	3	3	-	-	-	73	
35	19	1	18	-	-	-	14	1	13	-	-	-	33	
34	12	1	11	-	-	-	41	3	38	-	-	-	53	
33	5	-	5	-	-	-	12	3	9	-	-	-	17	
32	7	1	6	-	-	-	0	-	-	-	-	-	7	
31	1	-	1	-	-	-	3	-	3	-	-	-	4	
≤30	79	48	10	10		11	137	47	66	12	-	12	216	
Total	236	58	157	10	0	11	218	62	132	12	0	12	454	
Domestic	183	-	2	22	101	58	166	-	1	22	91	52	349	0
27	6	-	-	-	6	-	1	-	-	-	-	1	7	
≤26	177	-	2	22	95	58	165	-	1	22	91	51	342	
Total	183	0	2	22	101	58	166	0	1	22	91	52	349	

TABLE D1-9 (Continued)
BOSTON HARBOR, MASSACHUSETTS 2005
WATERBORNE COMMERCE STATISTICS - VESSEL TRANSITS FOR THE CHELSEA RIVER

	Inbound Vessel Transits						Outbound Transits						Total All Transits	35-Foot and Up Transits
	Total Inbound	Self-Propelled Vessels			Non-Self Propelled		Total Outbound	Self-Propelled Vessels			Non-Self Propelled			
		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		Dry Cargo	Tanker	Tow or Tug	Dry Cargo	Tanker		
Total for Waterway	559	28	119	90	0	322	558	31	150	84	1	292	1,117	112
Foreign	143	28	115	-	-	-	178	31	147	-	-	-	321	109
39	10	9	1	-	-	-	0	-	-	-	-	-	10	
38	4	4	-	-	-	-	0	-	-	-	-	-	4	
37	3	3	-	-	-	-	0	-	-	-	-	-	3	
36	54	6	48	-	-	-	1	1	-	-	-	-	55	
35	34	1	33	-	-	-	3	-	3	-	-	-	37	
34	5	-	5	-	-	-	0	-	-	-	-	-	5	
33	10	2	8	-	-	-	0	-	-	-	-	-	10	
32	6	2	4	-	-	-	0	-	-	-	-	-	6	
31	5	-	5	-	-	-	1	-	1	-	-	-	6	
≤30	12	1	11	-	-	-	173	30	143	-	-	-	185	
Total	143	28	115	0	0	0	178	31	147	0	0	0	321	
Domestic	416	-	4	90	-	322	380	-	3	84	1	292	796	3
37	0	-	-	-	-	-	0	-	-	-	-	-	0	
36	2	-	1	-	-	1	0	-	-	-	-	-	2	
35	1	-	1	-	-	-	0	-	-	-	-	-	1	
34	0	-	-	-	-	-	0	-	-	-	-	-	0	
33	0	-	-	-	-	-	0	-	-	-	-	-	0	
32	4	-	-	-	-	4	0	-	-	-	-	-	4	
31	1	-	-	-	-	1	0	-	-	-	-	-	1	
≤30	408	-	2	90	-	316	380	-	3	84	1	292	788	
Total	416	0	4	90	0	322	380	0	3	84	1	292	796	

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA



Wind Speed (m/s)

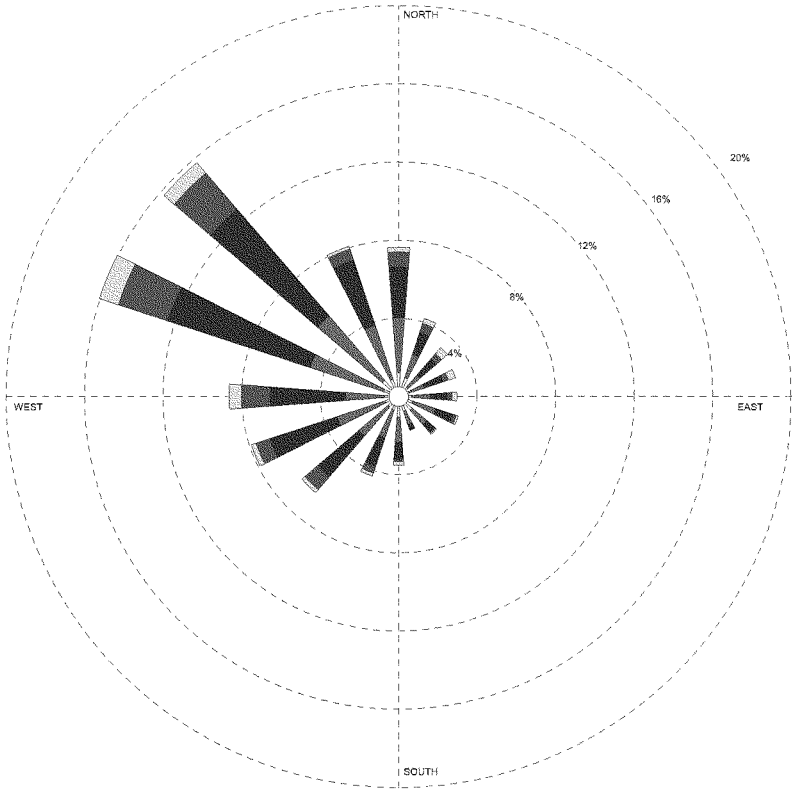
- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE	COMPANY NAME
Sara West	**10/29/2002**	**USDA-ARS**
DISPLAY	UNIT	COMMENTS
Wind Speed	**m/s**	
AVG. WIND SPEED	CALM WINDS	
6.20 m/s	**0.48%**	
ORIENTATION	PLOT YEAR-DATE-TIME	
Direction (blowing from)	**1961 Jan 1 - Jan 31 Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

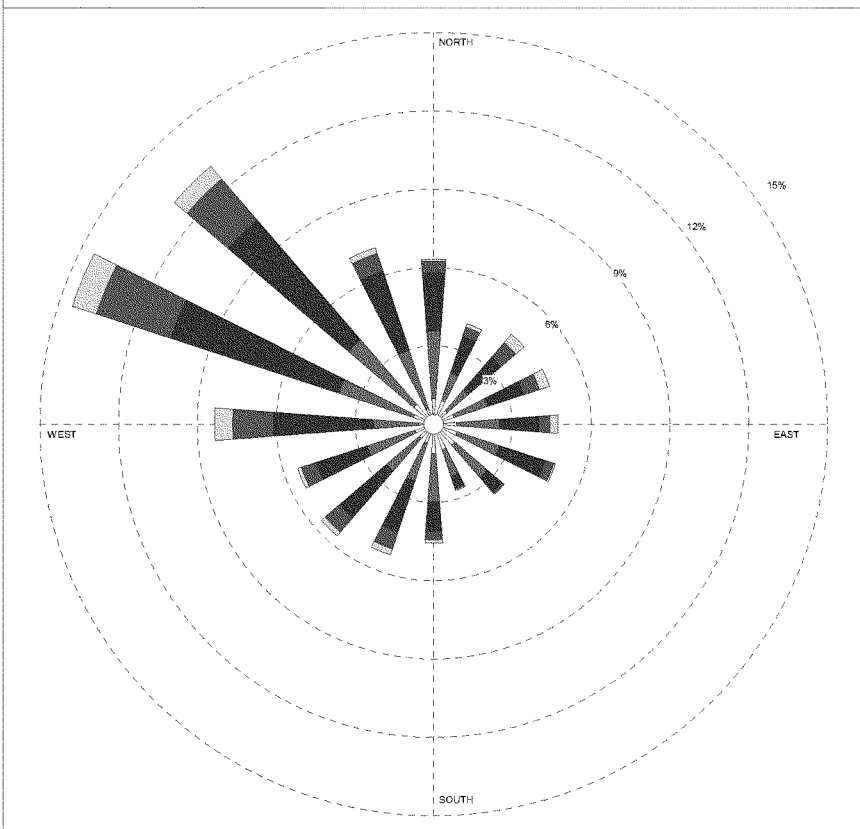


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **6.15 m/s**	CALM WINDS **0.58%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Feb 1 - Feb 29** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA



Wind Speed (m/s)

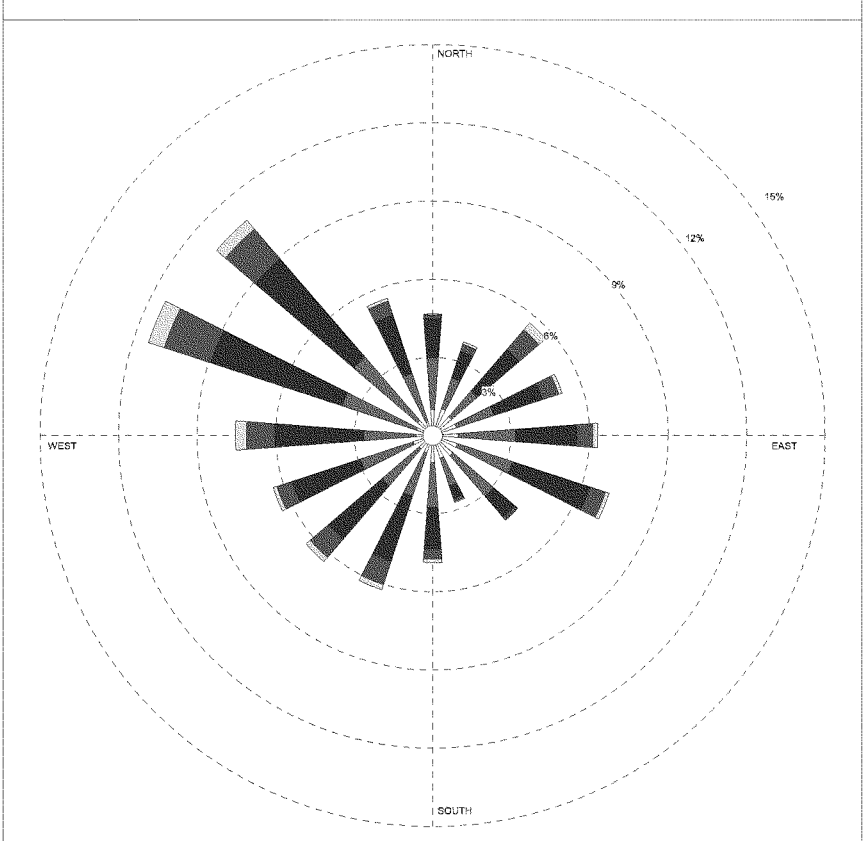
- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER **Sara West**	DATE **10/29/2002**	COMPANY NAME **USDA-ARS**
DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
AVG. WIND SPEED **6.17 m/s**	CALM WINDS **0.79%**	
ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Mar 1 - Mar 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

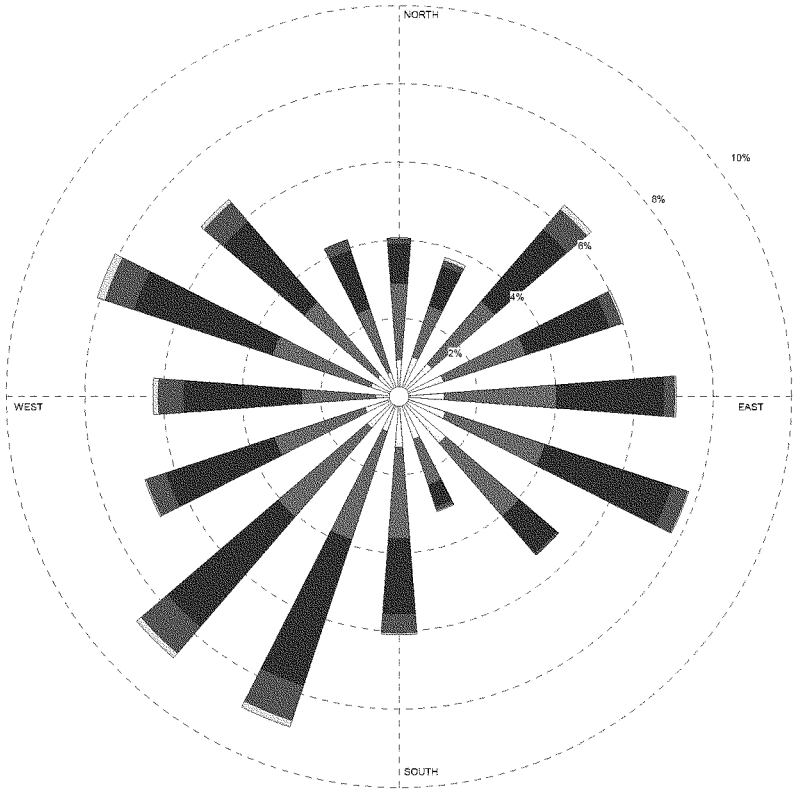


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.98 m/s**	CALM WINDS **0.97%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Apr 1 - Apr 30** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

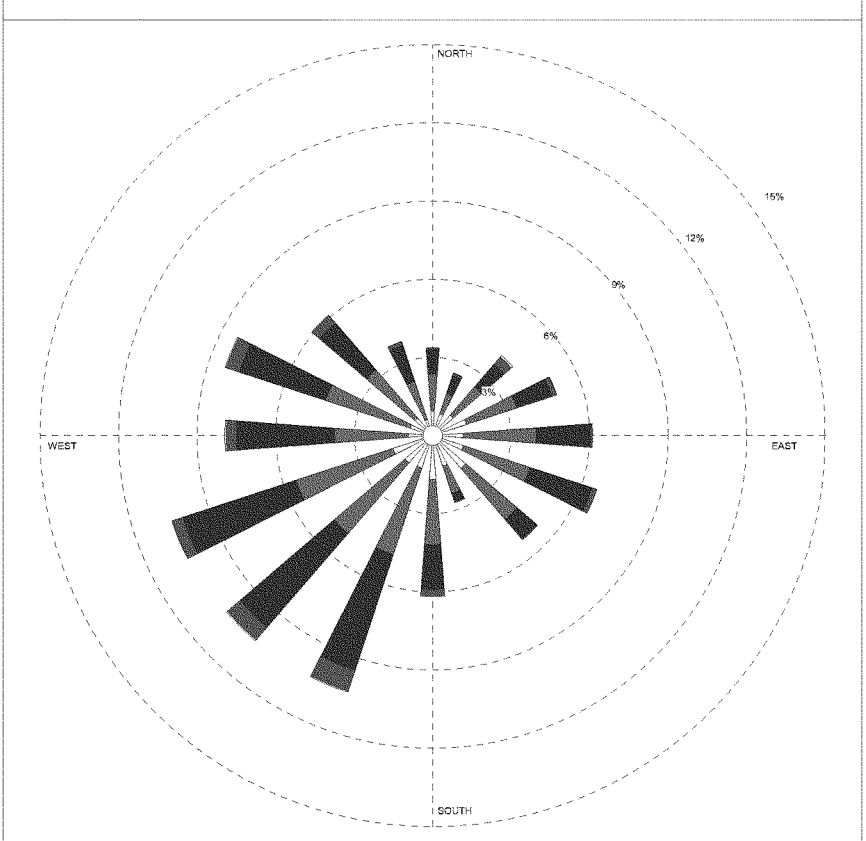


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.48 m/s**	CALM WINDS **0.61%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **May 1 - May 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

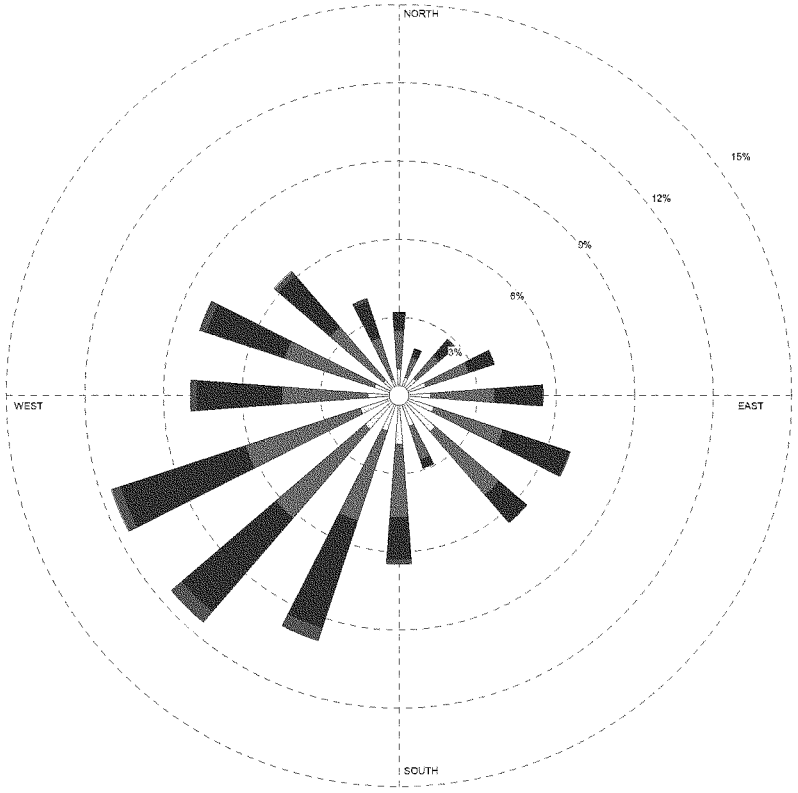


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.16 m/s**	CALM WINDS **0.78%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Jun 1 - Jun 30** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA



Wind Speed (m/s)

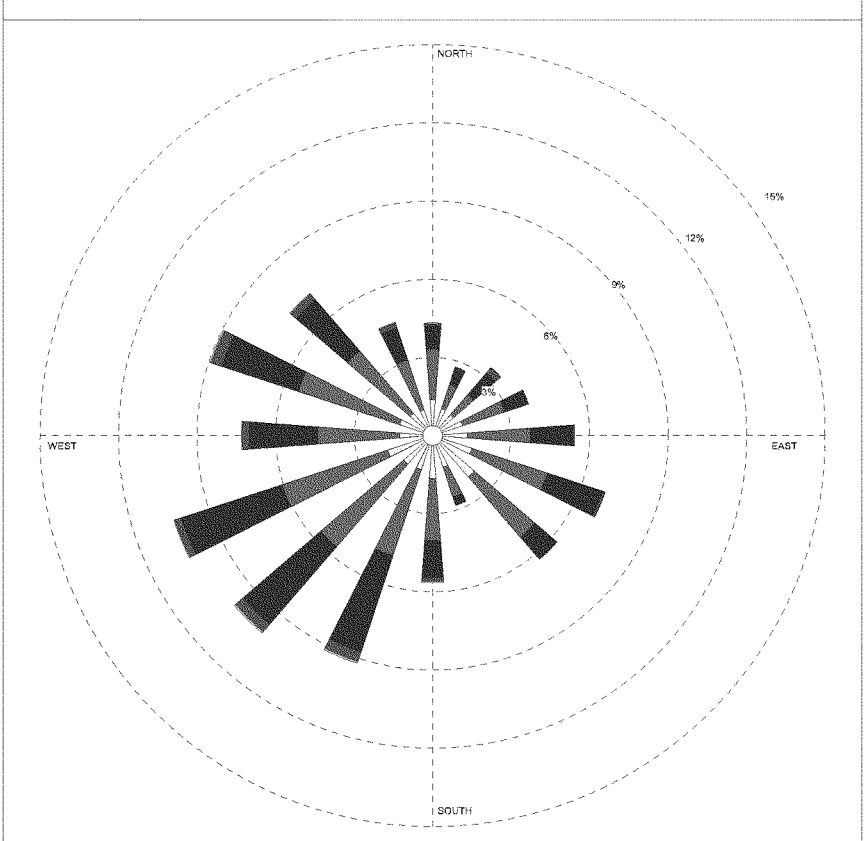
- > 11.06
- 8.49 - 11.06
- 5.40 - 8.49
- 3.34 - 5.40
- 1.80 - 3.34
- 0.51 - 1.80

MODELER	DATE	COMPANY NAME
Sara West	**10/29/2002**	**USDA-ARS**
DISPLAY	UNIT	COMMENTS
Wind Speed	**m/s**	
AVG. WIND SPEED	CALM WINDS	
4.96 m/s	**0.85%**	
ORIENTATION	PLOT YEAR-DATE-TIME	
Direction (blowing from)	**1961 Jul 1 - Jul 31 Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

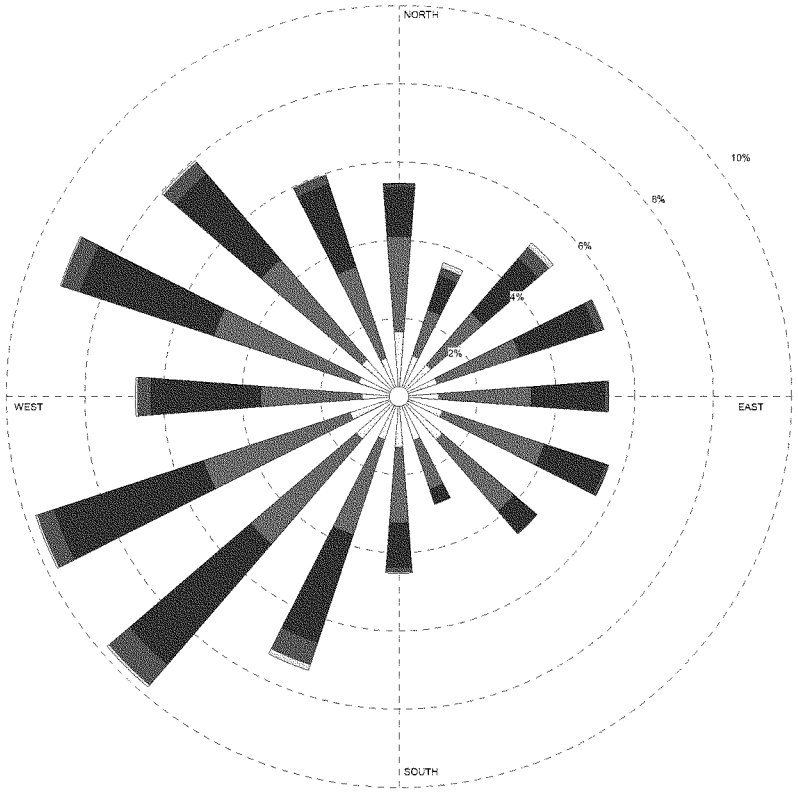


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **4.87 m/s**	CALM WINDS **0.92%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Aug 1 - Aug 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

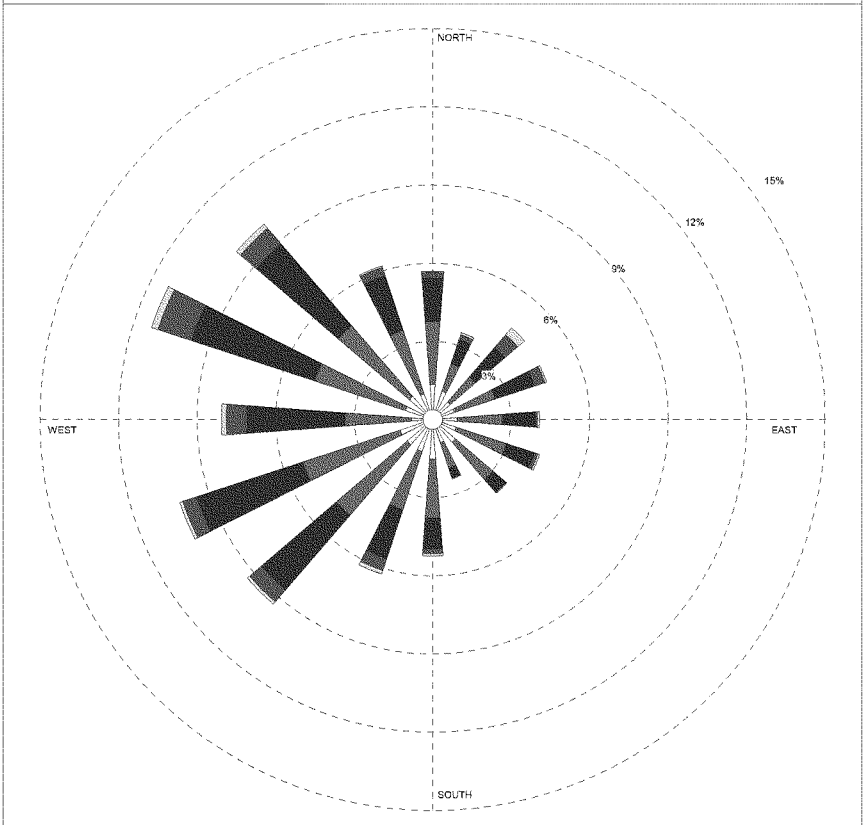


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.10 m/s**	CALM WINDS **0.61%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Sep 1 - Sep 30** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

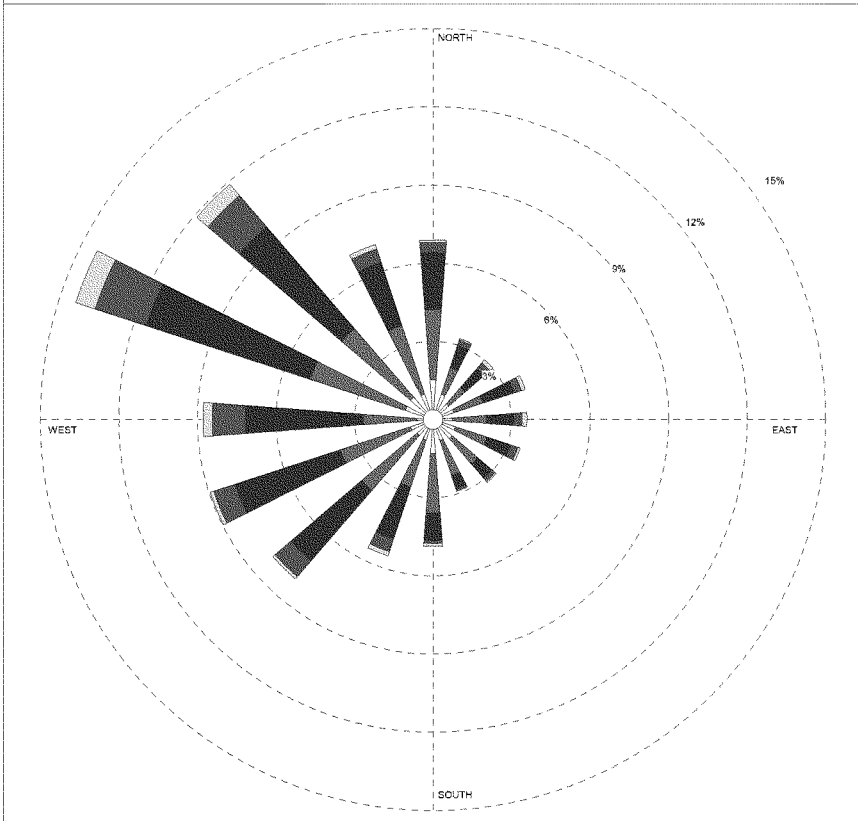


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.41 m/s**	CALM WINDS **0.64%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Oct 1 - Oct 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA

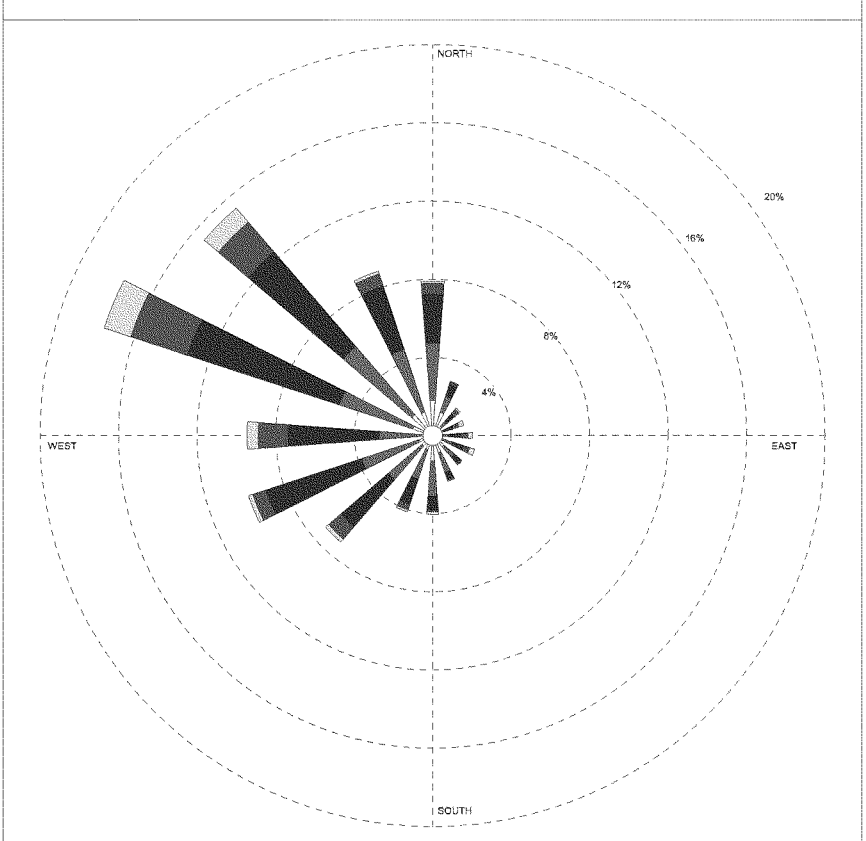


Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **5.82 m/s**	CALM WINDS **0.46%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Nov 1 - Nov 30** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

WIND ROSE PLOT

Station #14739 - BOSTON/LOGAN INT'L ARPT, MA



Wind Speed (m/s)	MODELER	DATE	COMPANY NAME
> 11.06 8.49 - 11.06 5.40 - 8.49 3.34 - 5.40 1.80 - 3.34 0.51 - 1.80	**Sara West**	**10/29/2002**	**USDA-ARS**
	DISPLAY **Wind Speed**	UNIT **m/s**	COMMENTS
	AVG. WIND SPEED **6.09 m/s**	CALM WINDS **0.50%**	
	ORIENTATION **Direction (blowing from)**	PLOT YEAR-DATE-TIME **1961** **Dec 1 - Dec 31** **Midnight - 11 PM**	

WRPLOT View 3.5 by Lakes Environmental Software - www.lakes-environmental.com

Sea Level Rise Assessment

With navigation projects the impacts of projected sea level rise resulting from climate change and post-glacial continental margin subsidence is a consideration principally relative to port facility elevation and operations. Consideration is given to whether port facilities will be able to continue operations under various sea level rise scenarios, or whether modifications to those facilities will be necessary to enable performance over the project life in support of project benefits.

At Boston Harbor Massport's three cargo terminals have deck elevations of between 10.5 and 12 feet above mean sea level (MSL = +5.2 feet MLLW). At mean high water freeboard at these facilities is between 5.9 and 7.4 feet.

Conley Terminal (Reserved Channel)	10.5 to 12.0 feet
Massport Marine Terminal	10.5 to 11.5 feet
Medford Street Terminal (Mystic River)	11.7 to 11.9 feet

The calculation sheet in Table D1-10 uses the latest Corps guidance on eustatic sea level rise (EC 1165-2-212) to calculate sea level rise for the 2016-2066 project life. As shown in the Table D1-11, low, medium and high projections of sea level rise at Boston are 1.03, 1.84 and 2.65 feet over a 60-year period measured from 2010 levels, or 0.87, 1.56 and 2.25 feet as computed over the 50-year project life,. While terminal freeboard will be reduced under these scenarios the terminals will still be operational throughout the anticipated 50-year project life.

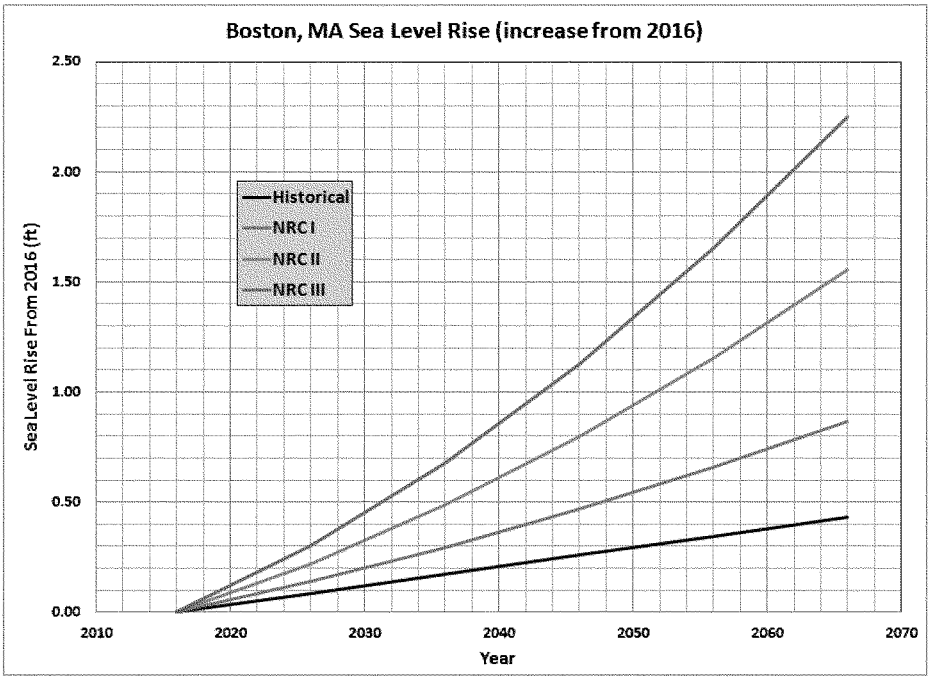


FIGURE D1-17 – Sea Level Rise Projections

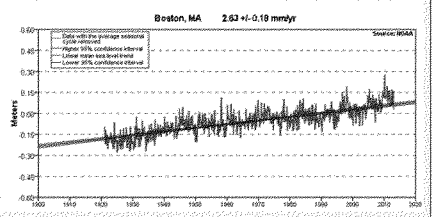
Table D1-10 - Sea Level Rise Calculations – Boston Harbor – 2016-2066 Project Life

Start Date for Calculation (t_1): 2016
(Ex: 2010)
Ending Date for Calculation (t_2): 2066
(Ex: 2060)

Variables used in SLR Equations:

	(m/yr^2)
b (Curve I) =	2.71E-05
b (Curve II) =	7.00E-05
b (Curve III)=	1.13E-04

Example M+0.0017=6.39 mm/yr = 0.00639 m/yr



$$E(t_2) - E(t_1) = 0.0017(t_2 - t_1) + b(t_2^2 - t_1^2)$$

EC 1165-2-212, Eustatic SLR:

Eustatic SLR from year: 2016
To year: 2066

	m	ft
Curve I:	0.22	0.71
Curve II:	0.43	1.40
Curve III:	0.64	2.10

EC 1165-2-211, Eustatic SLR:

Eustatic SLR from year: 2016
To year: 2066

	m	ft
Curve I:	0.23	0.77
Curve II:	0.47	1.54
Curve III:	0.71	2.32

Old Guidance (NRC, 1987):

Eustatic SLR from year: 2016
To year: 2066

	mm	ft
Curve I:	0.21	0.69
Curve II:	0.45	1.46
Curve III:	0.68	2.24

$$RSL(t_2) - RSL(t_1) = (0.0017 + M)(t_2 - t_1) + b(t_2^2 - t_1^2)$$

EC 1165-2-212, RSLR:

M+0.0017 0.00263 (m/yr) (see *, below)

RSLR from year: 2016
To year: 2066

	m	ft
Curve I:	0.26	0.87
Curve II:	0.47	1.56
Curve III:	0.69	2.25

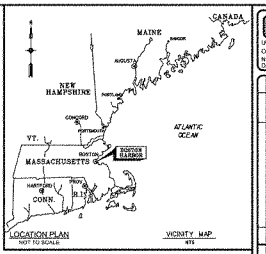
* M is the local adjustment for RSLR in m/yr.
0.0017+M = rate of change observed at gage data at site of interest.
M can be estimated from:
http://tidesandcurrents.noaa.gov/sltrends/index.shtml

NOTE: SLR values are limited to no greater than 0.01m precision. Reporting values to 0.1m precision may be more appropriate due to surveying limitations as described in EM 1110-2-6056.

Other than facility operations, the effect of sea level rise is more of a benefit to navigation. Either the ships can load deeper in response to greater available navigable depth, or after adjusting the sea level and tidal datum project maintenance dredging can be deferred while that additional depth shoals.

TABLE D1-11 Sea Level Rise Scenarios for Boston Harbor				
Sea Level Rise over Project Life				
Year	**Historical**	**NRC I**	**NRC II**	**NRC III**
2016	0.00	0.00	0.00	0.00
2026	0.09	0.14	0.22	0.30
2036	0.17	0.29	0.48	0.68
2046	0.26	0.47	0.80	1.13
2056	0.35	0.66	1.15	1.65
2066	0.43	0.87	1.56	2.25
60-Year Sea Level Rise – 2010-2070				
Year	**Historical**	**NRC I**	**NRC II**	**NRC III**
2010	0.00	0.00	0.00	0.00
2020	0.09	0.13	0.19	0.26
2030	0.17	0.27	0.43	0.59
2040	0.26	0.43	0.71	0.99
2050	0.35	0.62	1.04	1.47
2060	0.43	0.81	1.42	2.03
2070	0.52	1.03	1.84	2.65

DEEP DRAFT FEASIBILITY STUDY
BOSTON HARBOR
BOSTON, MASSACHUSETTS



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4	D1-6D	BOSC102.S04	MAIN CHANNELS PLAN - BROAD SOUND NORTH ENTRANCE CHANNEL
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17	D1-6Q	BOSC115.S17	CHELSEA RIVER CHANNEL
18	D1-6R	BOSC116.S18	CHELSEA RIVER CHANNEL
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21	D1-6U	BOSC119.S21	CHELSEA RIVER CHANNEL AND TURNING BASIN

U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

NO.	DESCRIPTION	DATE	APPD.

NO.	DESCRIPTION	DATE	APPR. DRAWN

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

DESIGNED BY: Bob Nelson | DATE: July 2004
DRAWN BY: | CHECKED BY: | EDC/WDC/NCAD
SUBMITTED BY: | SUPERVISOR: | CONTRACT NO.:
FILE NAME: BOSGCS.DGN | DRAWING CODE:
SCALE: | FACILITY ENGINEERING

DEEP DRAFT FEASIBILITY STUDY
REPORT BURIED
BOSTON HARBOR
BOSTON, MASSACHUSETTS
COVER SHEET

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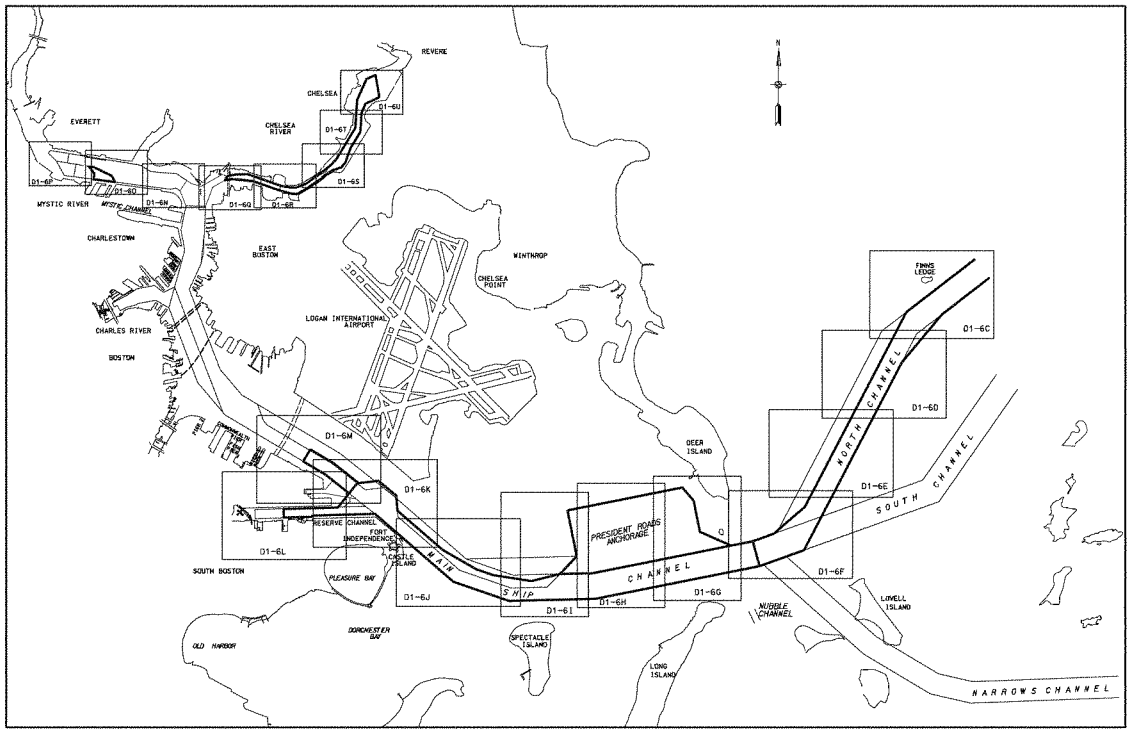
D1-6A



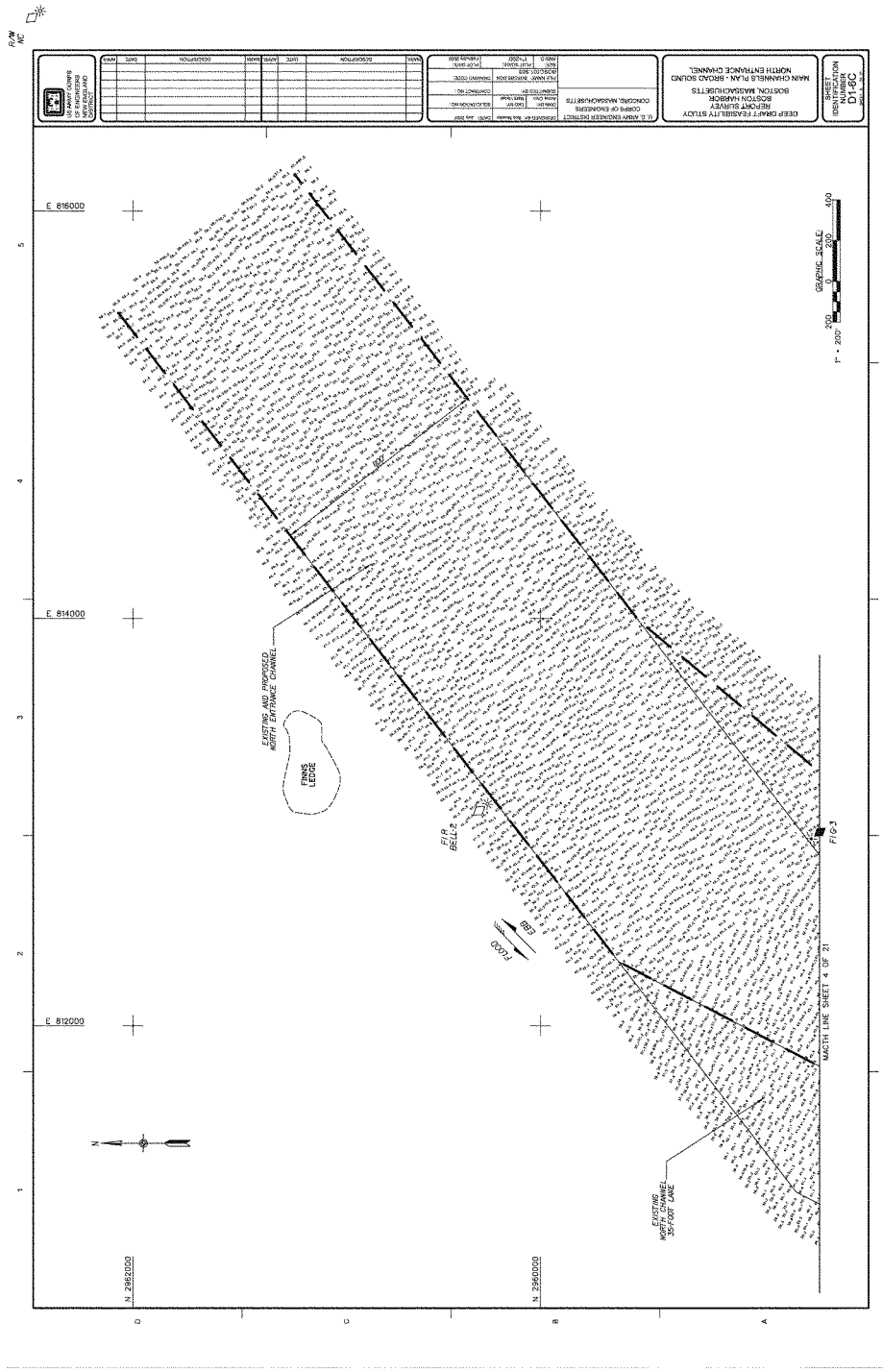
KEY PLAN
NOT TO SCALE

US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
KEY PLAN

SHEET IDENTIFICATION NUMBER
D1-6B


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT
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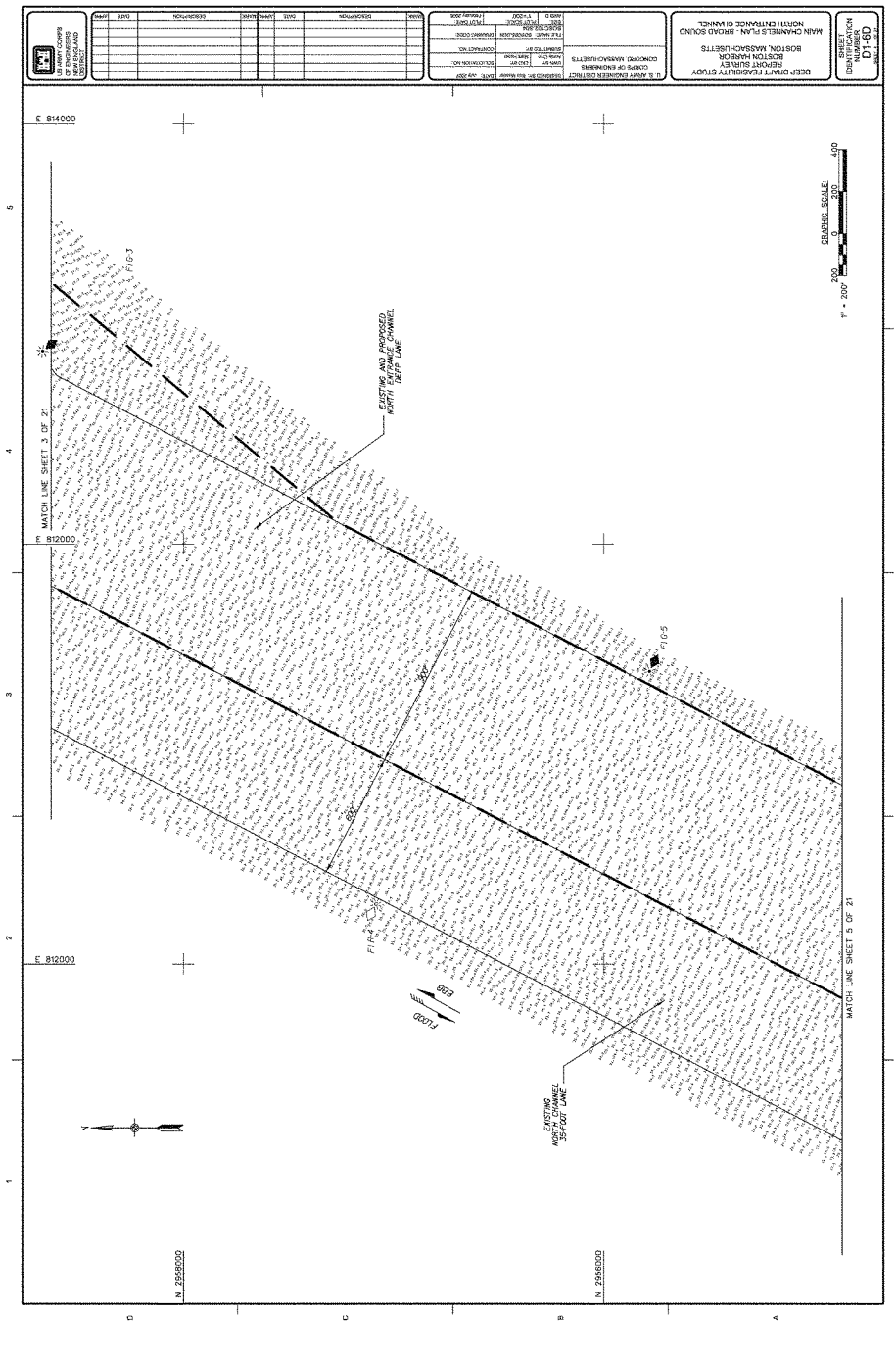
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
MAIN CHANNELS PLAN - BROAD SOUND
NORTH ENTRANCE CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6C
GRAPHIC SCALE:
1" = 200'
E 816000
E 814000
E 812000
N 2982000
N 2960000
EXISTING AND PROPOSED NORTH ENTRANCE CHANNEL
FINNS LEDGE
FLOOD
EBB
MACTH LINE SHEET 4 OF 21
EXISTING NORTH CHANNEL 35-FOOT LANE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DEEP DRAFT FEASIBILITY STUDY
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BOSTON HARBOR
BOSTON, MASSACHUSETTS
MAIN CHANNELS PLAN - BROAD SOUND
NORTH ENTRANCE CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6D
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
GRAPHIC SCALE
1" = 200'
MATCH LINE SHEET 3 OF 21
MATCH LINE SHEET 5 OF 21
EXISTING AND PROPOSED NORTH ENTRANCE CHANNEL DEEP LANE
EXISTING NORTH CHANNEL 35-FOOT LANE
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EBB
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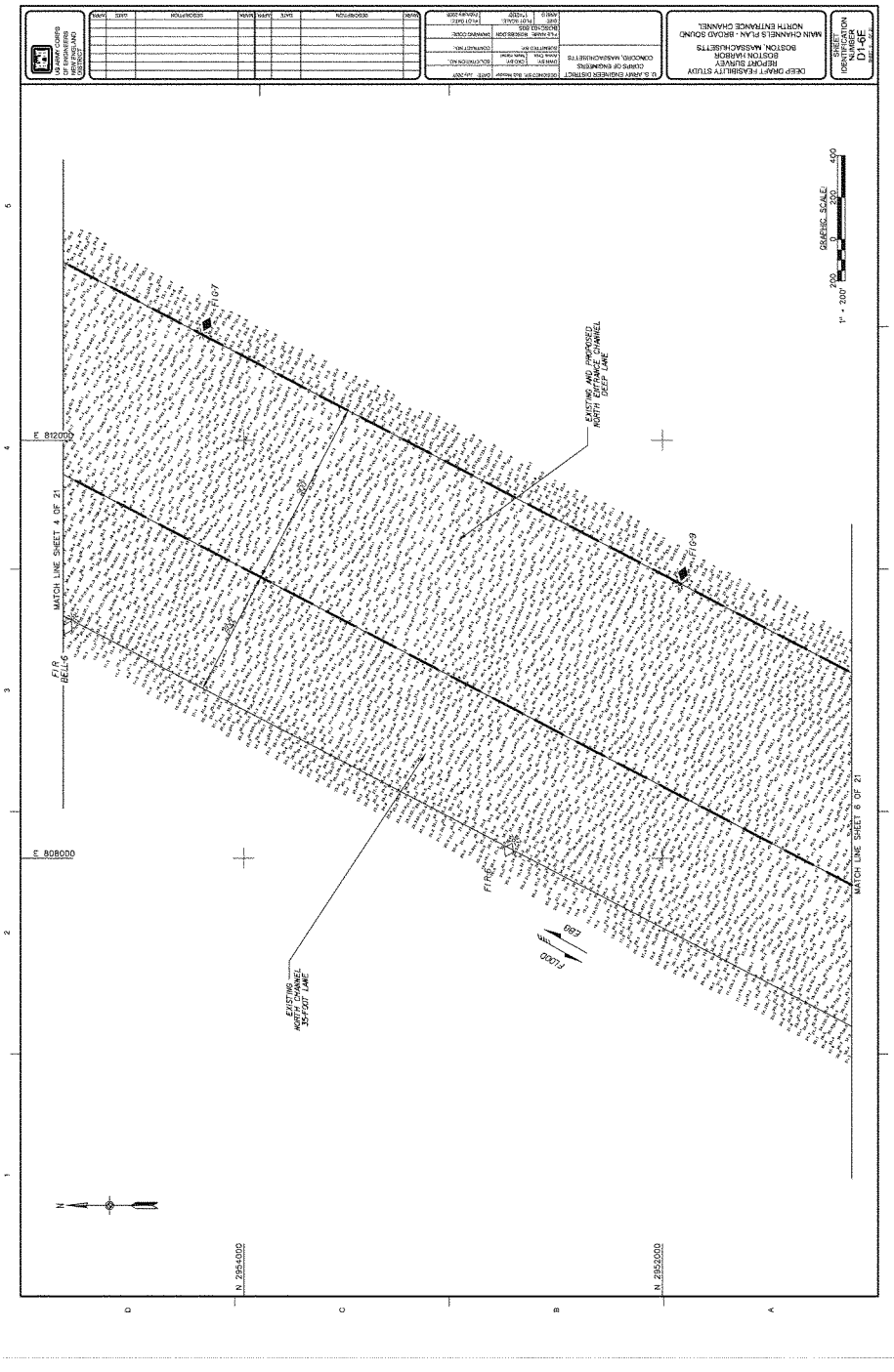
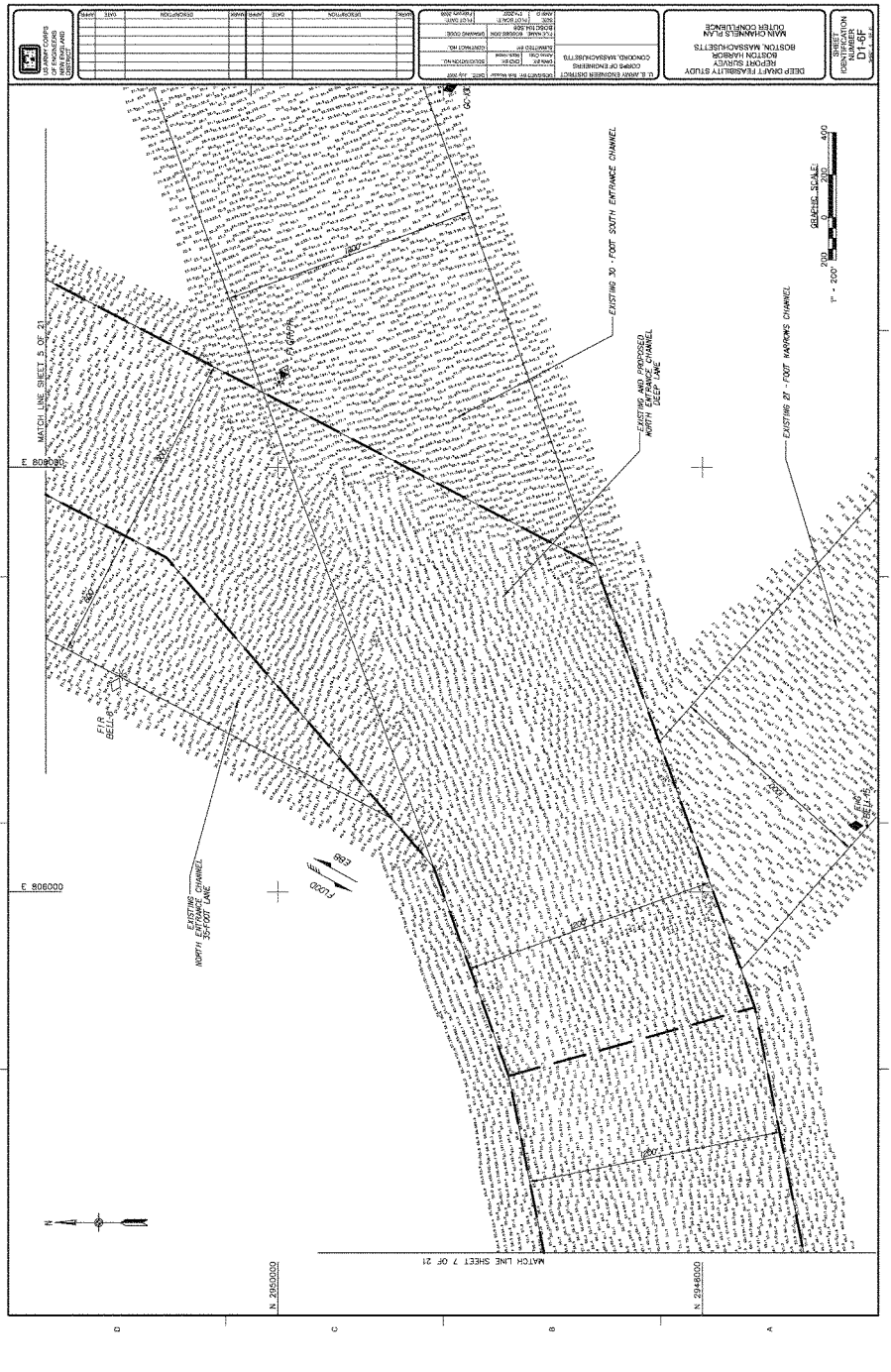
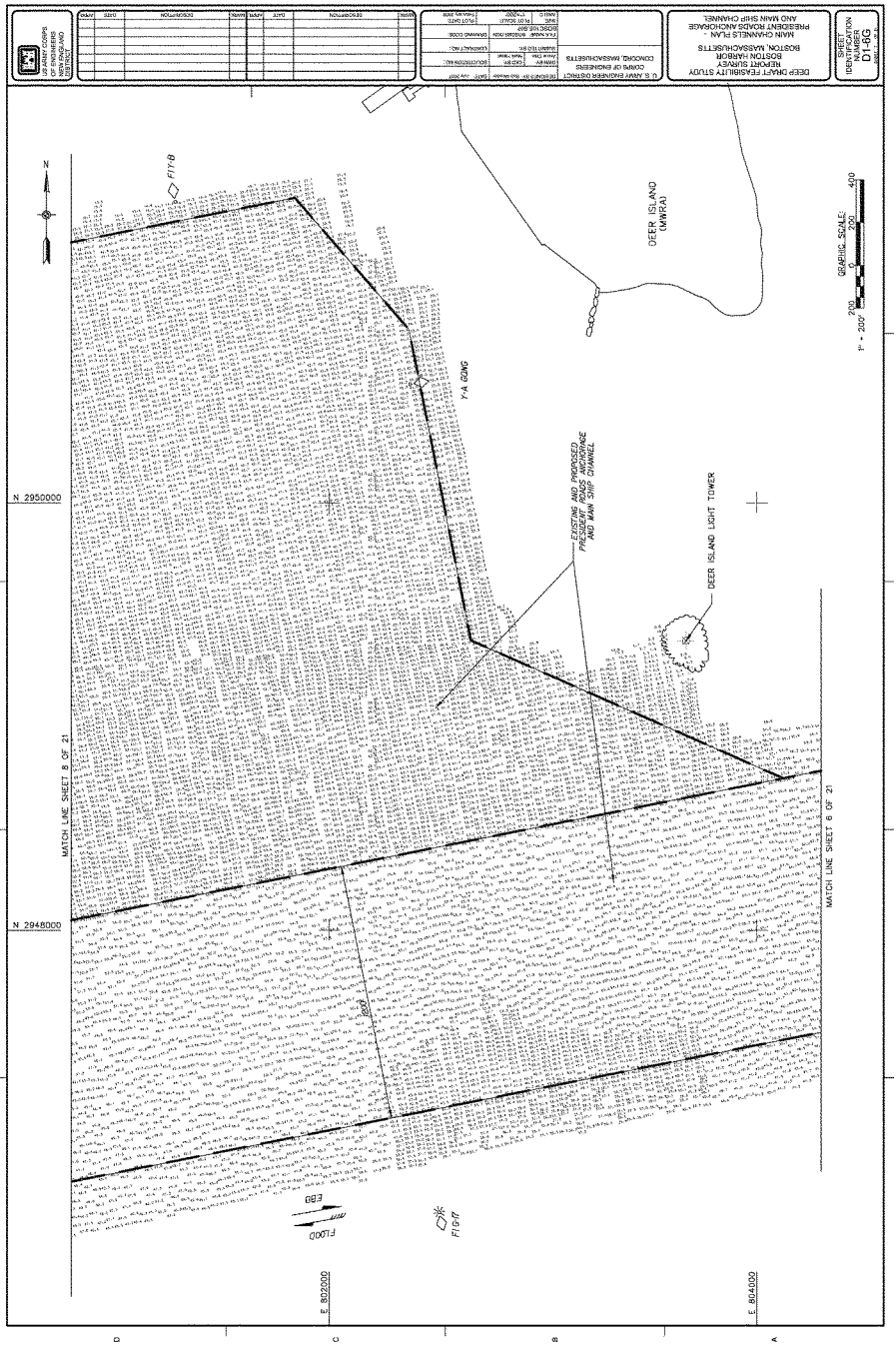
E 812000
N 2958000
N 2956000


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
MAIN CHANNELS PLAN - BROAD SOUND
NORTH ENTRANCE CHANNEL
BOSTON, MASSACHUSETTS
SHEET IDENTIFICATION NUMBER
D1-6E
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
GRAPHIC SCALE
1" = 200'
MATCH LINE SHEET 4 OF 21
MATCH LINE SHEET 8 OF 21
EXISTING AND PROPOSED
NORTH ENTRANCE CHANNEL
DEEP LINE
EXISTING
NORTH CHANNEL
DEEP LINE
FLOOD
FLOOD
E 812000
E 808000
N 2954000
N 2952000


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY REPORT SURVEY BOSTON HARBOR BOSTON, MASSACHUSETTS
MAIN CHANNELS PLAN OUTER CONFLUENCE
SHEET IDENTIFICATION NUMBER D1-6F
MATCH LINE SHEET 5 OF 21
MATCH LINE SHEET 7 OF 21
E 808000
E 806000
N 2950000
N 2948000
EXISTING 30 - FOOT SOUTH ENTRANCE CHANNEL
EXISTING AND PROPOSED NORTH ENTRANCE CHANNEL DEEP LANE
EXISTING 27 - FOOT NARROWS CHANNEL
EXISTING NORTH ENTRANCE CHANNEL 35-FOOT LANE
FIR BELL-8
FLOOD
EBB
GRAPHIC SCALE
1" = 200'



DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
MAIN CHANNELS PLAN -
PRESIDENT ROADS ANCHORAGE
AND MAIN SHIP CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6G
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEER ISLAND (MWRA)
Y-A GONG
EXISTING AND PROPOSED PRESIDENT ROADS ANCHORAGE AND MAIN SHIP CHANNEL
DEER ISLAND LIGHT TOWER
GRAPHIC SCALE:
1" = 200'
MATCH LINE SHEET 8 OF 21
MATCH LINE SHEET 6 OF 21
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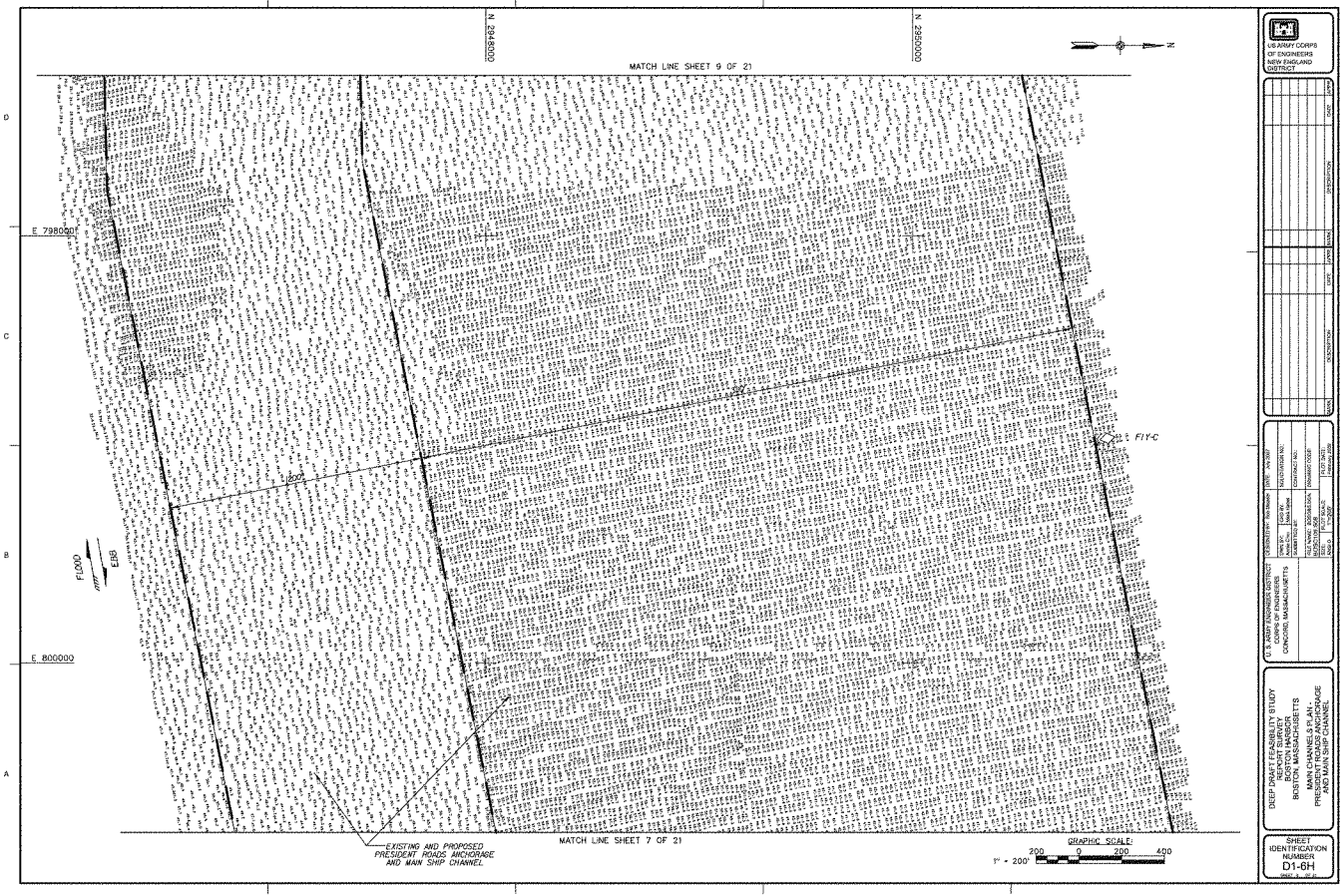
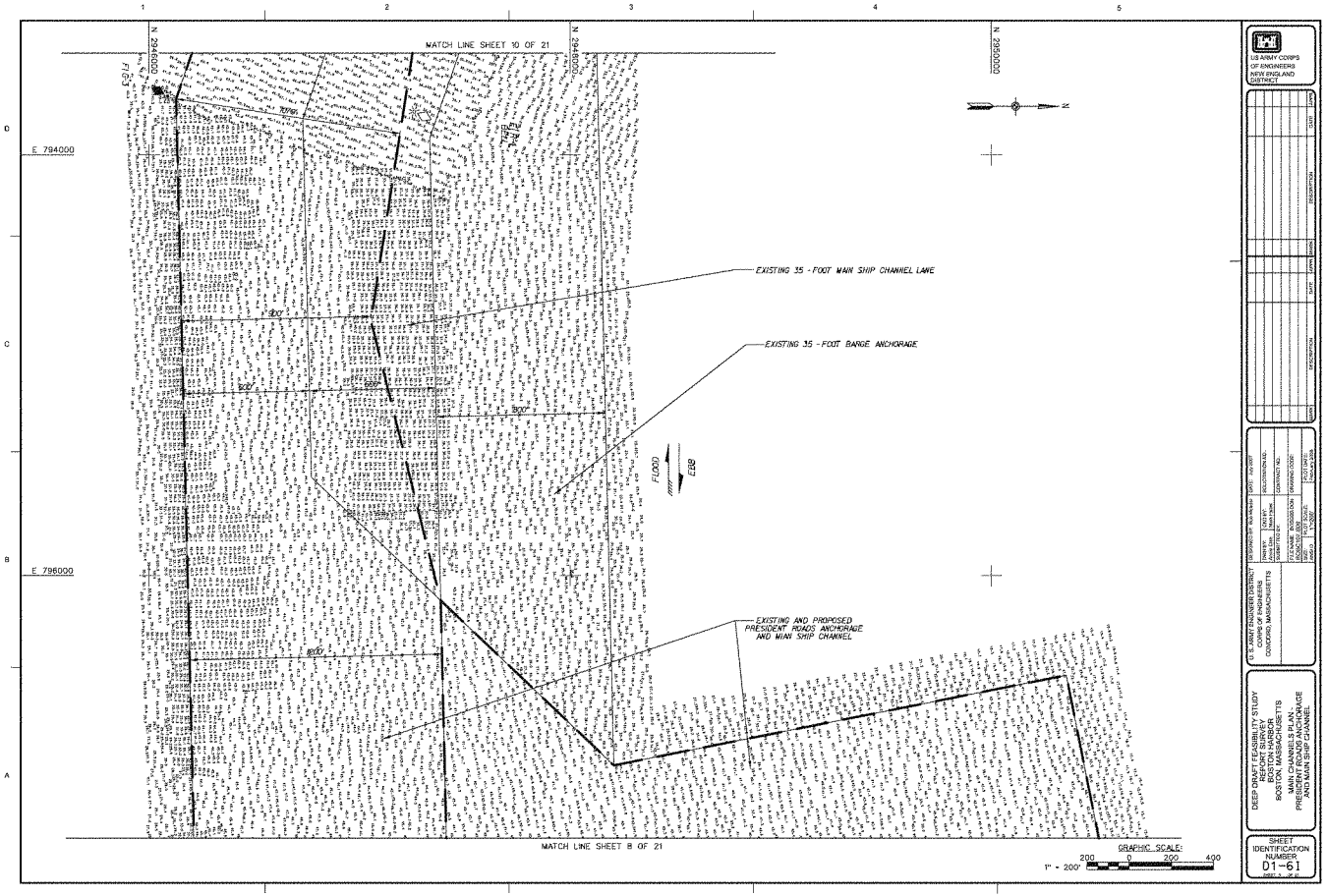
N 2948000
E 802000
E 804000
FLOOD
EBB
FIY-B
FIG-A



MATCH LINE SHEET 9 OF 21
MATCH LINE SHEET 7 OF 21
N 2948000
N 2950000
E 798000
E 800000
FLOOD
EBB
FIY-C
EXISTING AND PROPOSED PRESIDENT ROADS ANCHORAGE AND MAIN SHIP CHANNEL
GRAPHIC SCALE:
200 0 200 400
1" = 200'
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY REPORT SURVEY BOSTON HARBOR BOSTON, MASSACHUSETTS
MAIN CHANNELS PLAN - PRESIDENT ROADS ANCHORAGE AND MAIN SHIP CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6H


MATCH LINE SHEET 10 OF 21
MATCH LINE SHEET 8 OF 21
N 2946000
N 2948000
N 2950000
E 794000
E 796000
EXISTING 35 - FOOT MAIN SHIP CHANNEL LANE
EXISTING 35 - FOOT BARGE ANCHORAGE
EXISTING AND PROPOSED PRESIDENT ROADS ANCHORAGE AND MAIN SHIP CHANNEL
FLOOD
EBB
GRAPHIC SCALE:
1" = 200'
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY REPORT SURVEY BOSTON HARBOR BOSTON, MASSACHUSETTS
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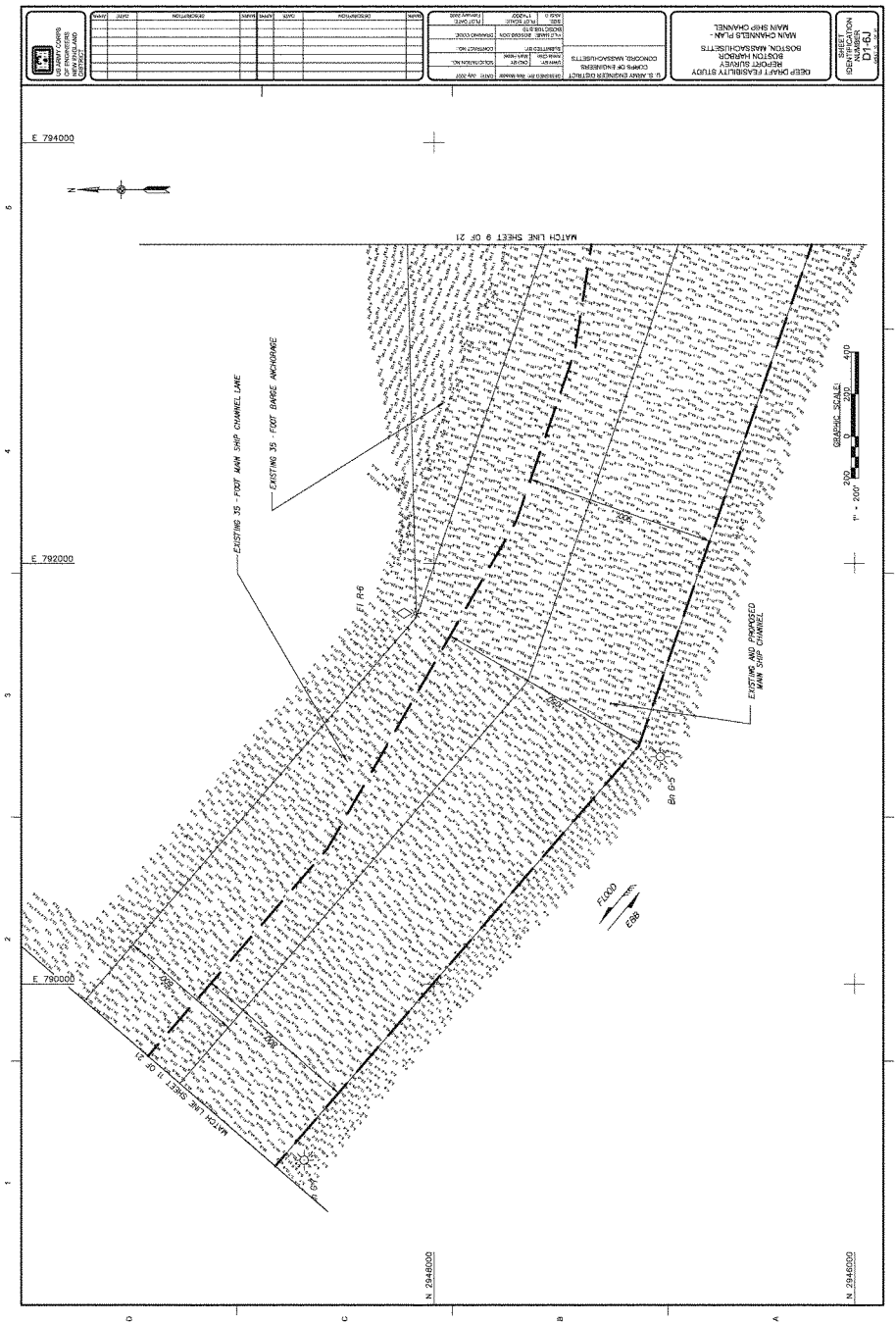
D1-6I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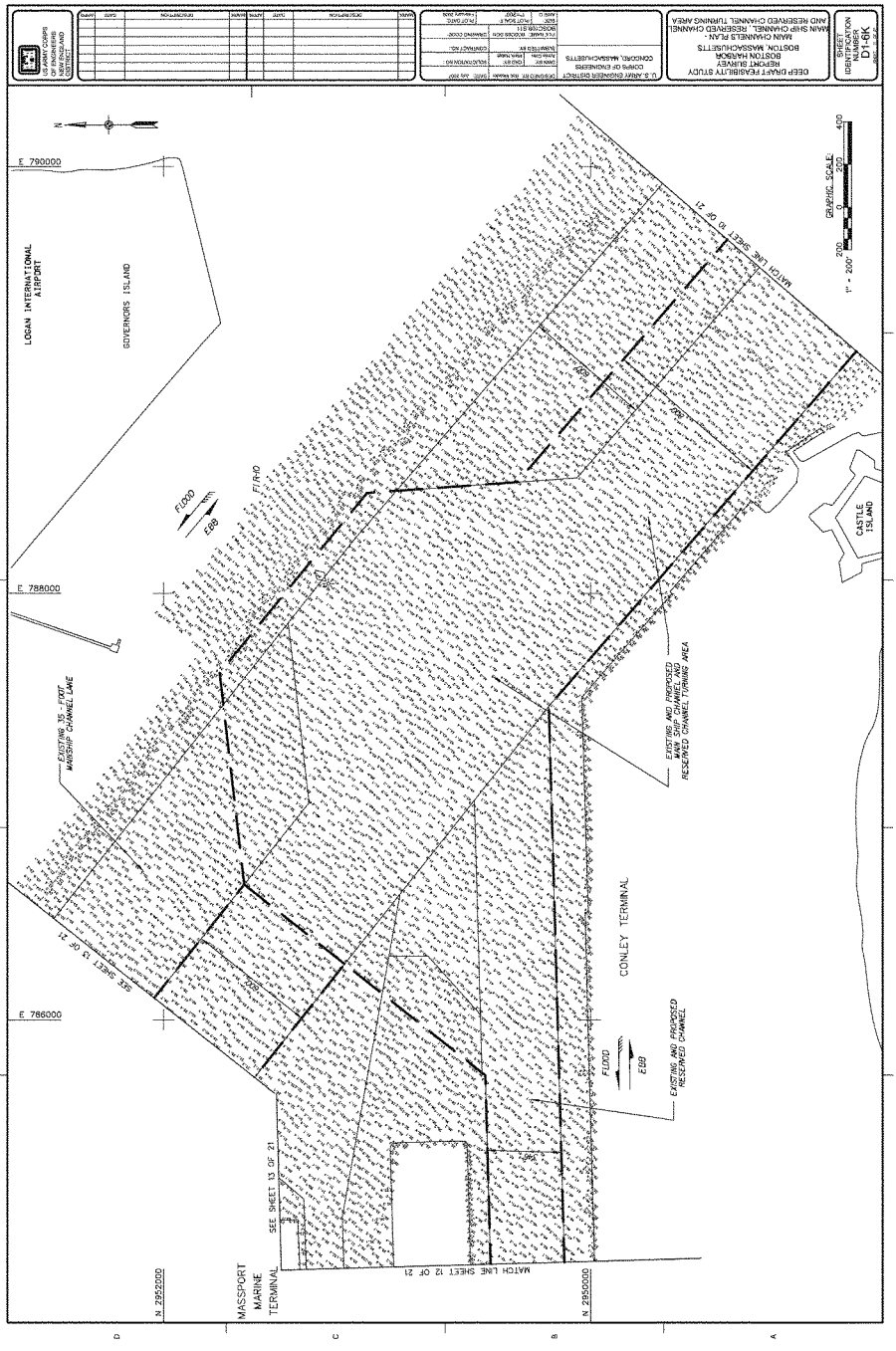
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
MAIN CHANNELS PLAN -
MAIN SHIP CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6J
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
E 794000
E 792000
E 790000
N 2948000
N 2946000
MATCH LINE SHEET 9 OF 21
MATCH LINE SHEET 11 OF 21
EXISTING 35 - FOOT MAIN SHIP CHANNEL LANE
EXISTING 35 - FOOT BARGE ANCHORAGE
EXISTING AND PROPOSED MAIN SHIP CHANNEL
FI R-6
Bn G-5
FLOOD
EBB
GRAPHIC SCALE
1" = 200'


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
MAIN CHANNELS PLAN
MAIN SHIP CHANNEL, RESERVED CHANNEL
AND RESERVED CHANNEL TURNING AREA
BOSTON, MASSACHUSETTS
SHEET IDENTIFICATION NUMBER
D1-6K
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
LOGAN INTERNATIONAL AIRPORT
GOVERNORS ISLAND
CASTLE ISLAND
CONLEY TERMINAL
MASSPORT MARINE TERMINAL
EXISTING AND PROPOSED MAIN SHIP CHANNEL AND RESERVED CHANNEL TURNING AREA
EXISTING AND PROPOSED RESERVED CHANNEL
EXISTING 35 - FOOT MAINSHIP CHANNEL LANE
FLOOD
EBB
FLOOD
EBB
MATCH LINE SHEET 10 OF 21
MATCH LINE SHEET 12 OF 21
SEE SHEET 13 OF 21
SEE SHEET 12 OF 21
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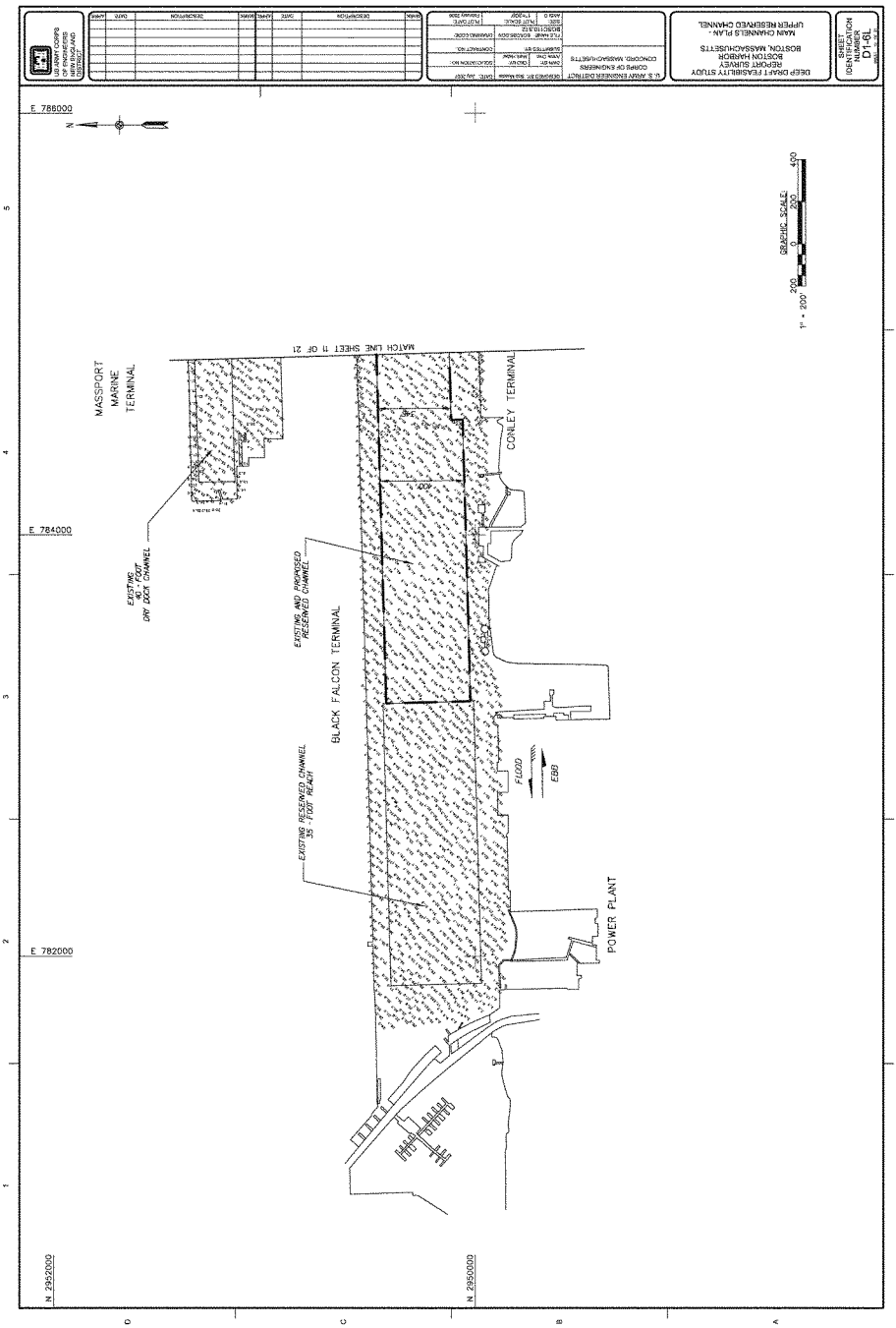
E 788000
E 786000
N 2952000
N 2950000
GRAPHIC SCALE
1" = 200'
400
200
0
200


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
- MAIN CHANNELS PLAN -
UPPER REDEPENED CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6L
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CENCOED, MASSACHUSETTS
GRAPHIC SCALE
1" = 200'
MATCH LINE SHEET 11 OF 21
MASSPORT MARINE TERMINAL
CONLEY TERMINAL
BLACK FALCON TERMINAL
POWER PLANT
EXISTING 40 - FOOT DRY DOCK CHANNEL
EXISTING AND PROPOSED RESEAVED CHANNEL
EXISTING RESEAVED CHANNEL 35 FEET DEEP
FLOOD
EBB
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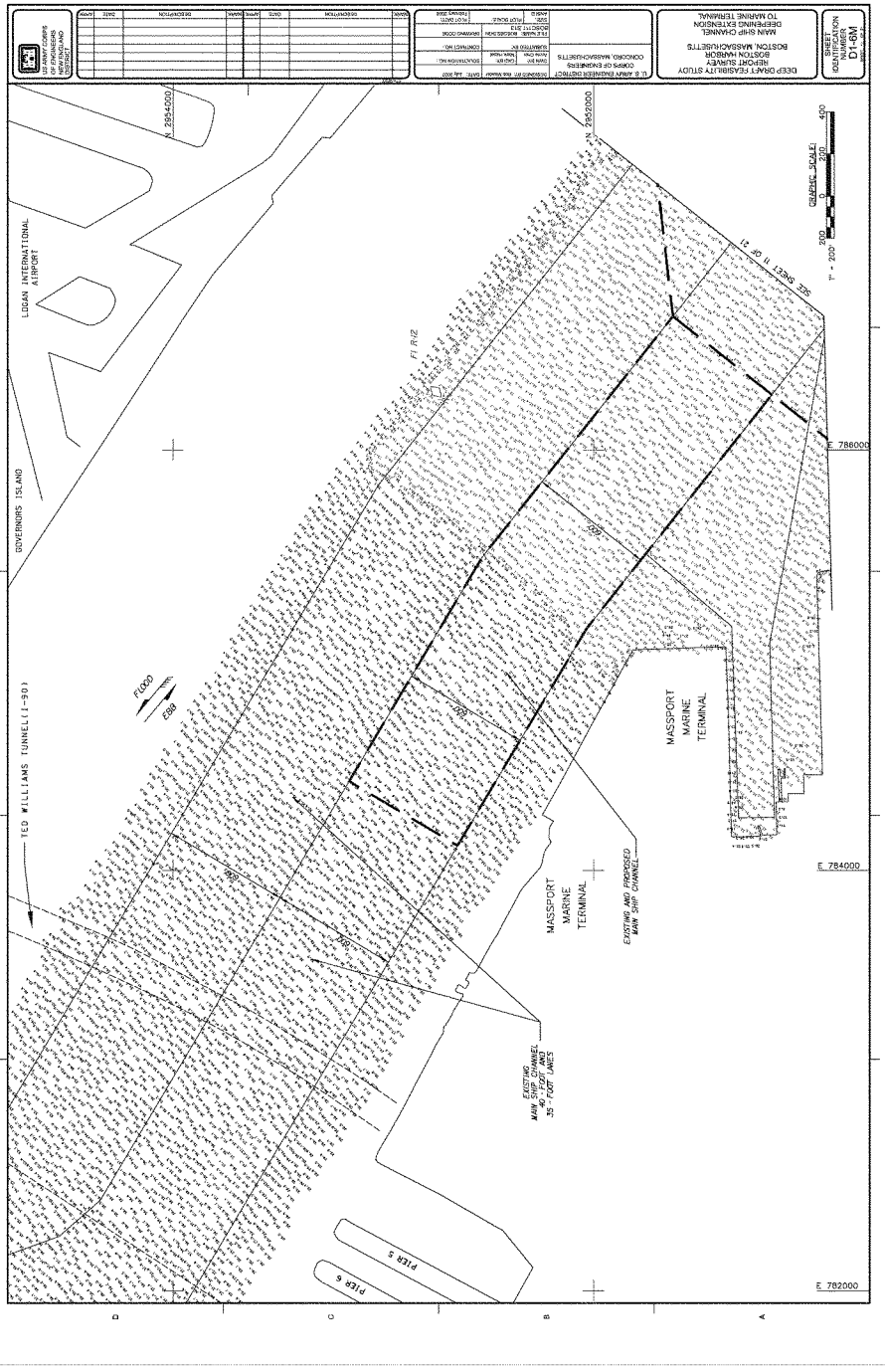
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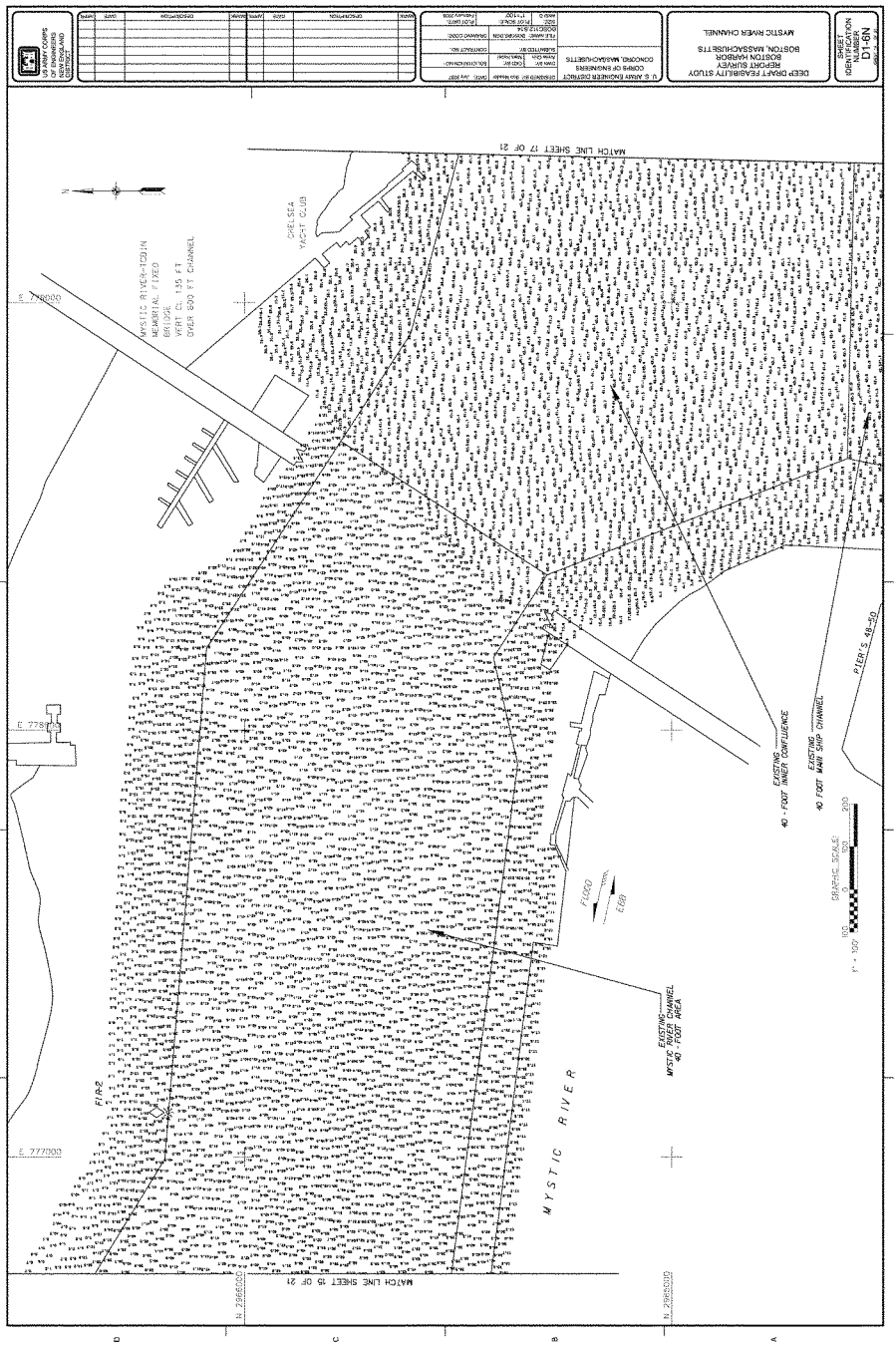
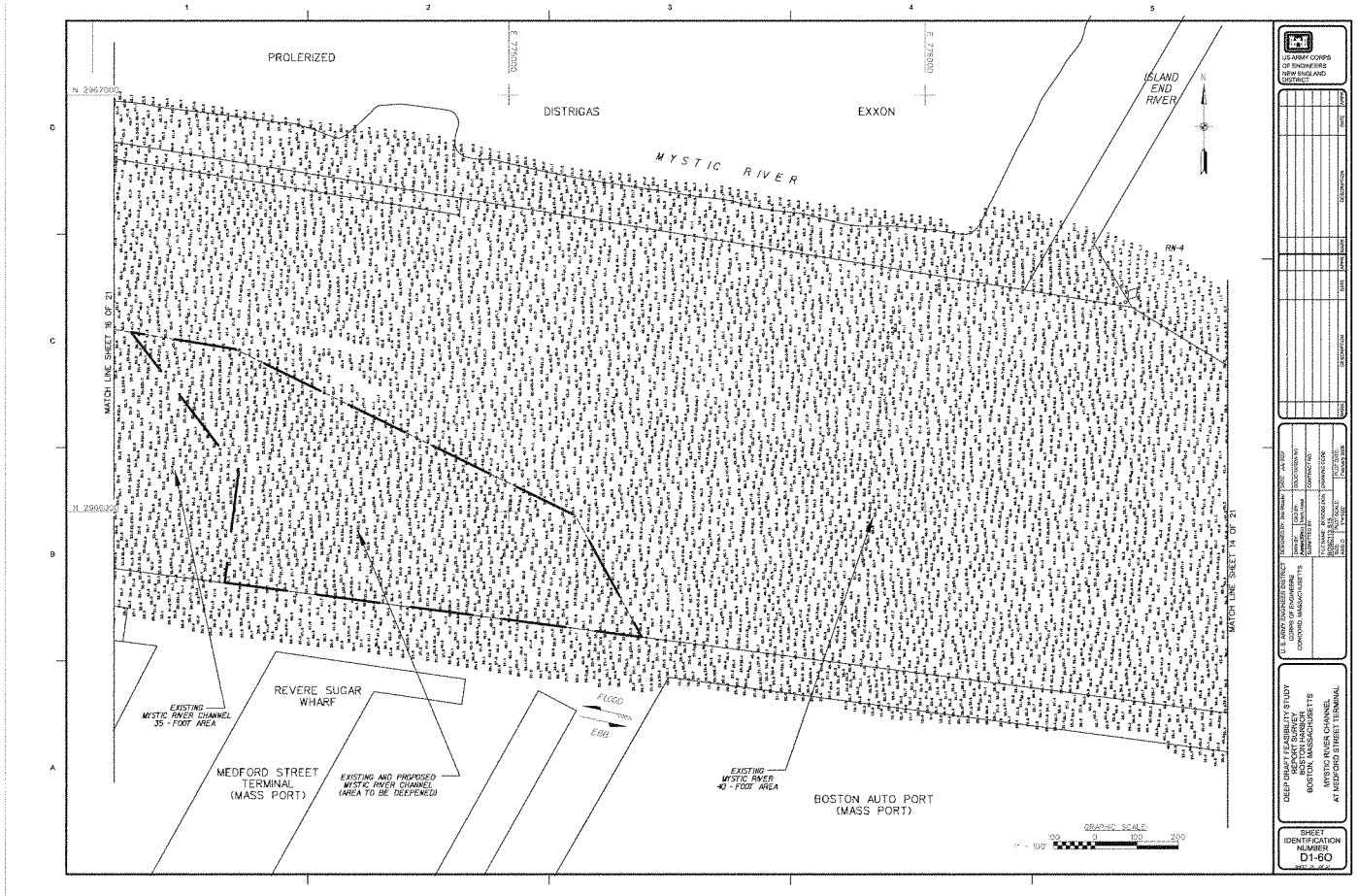
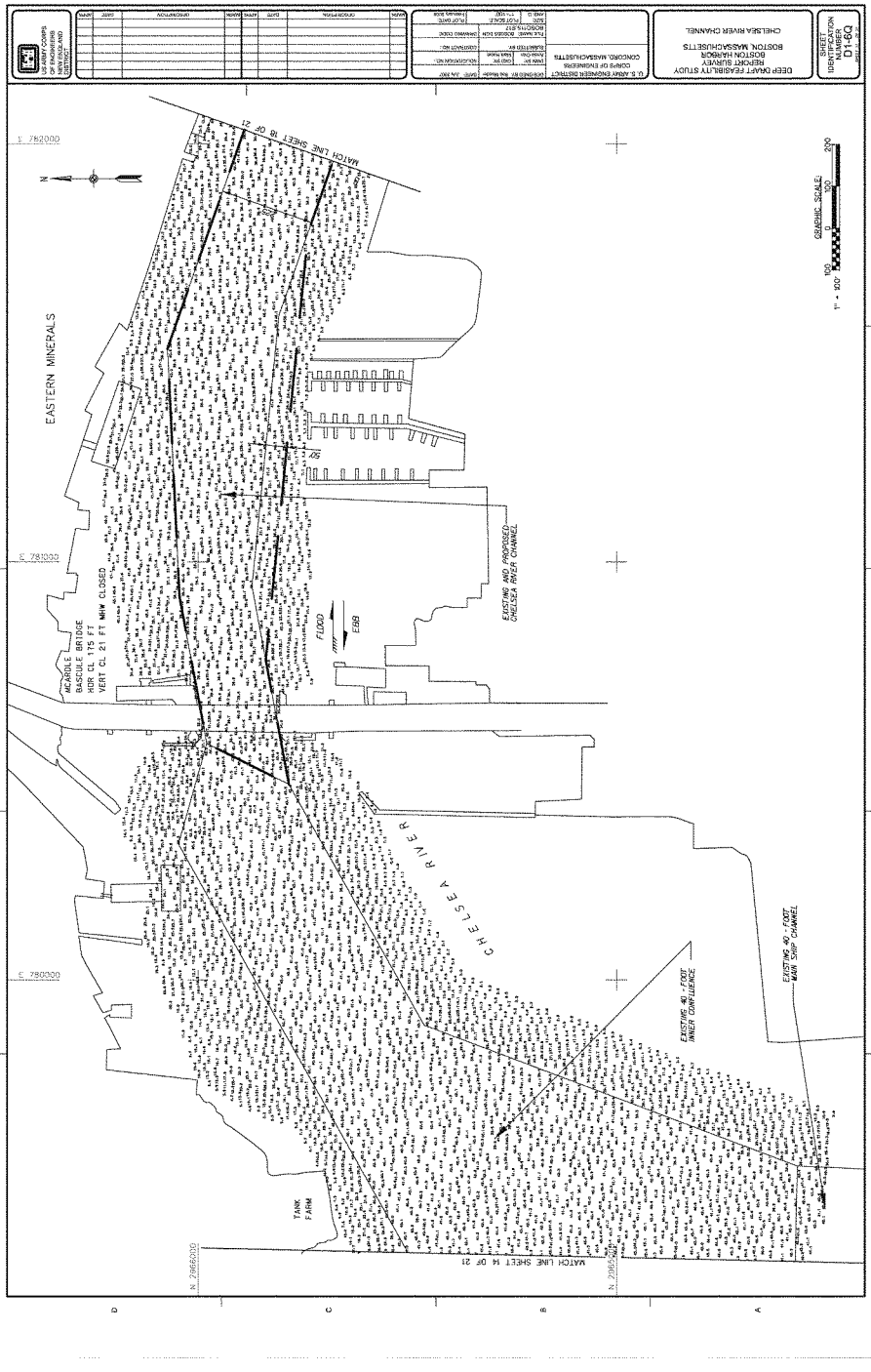
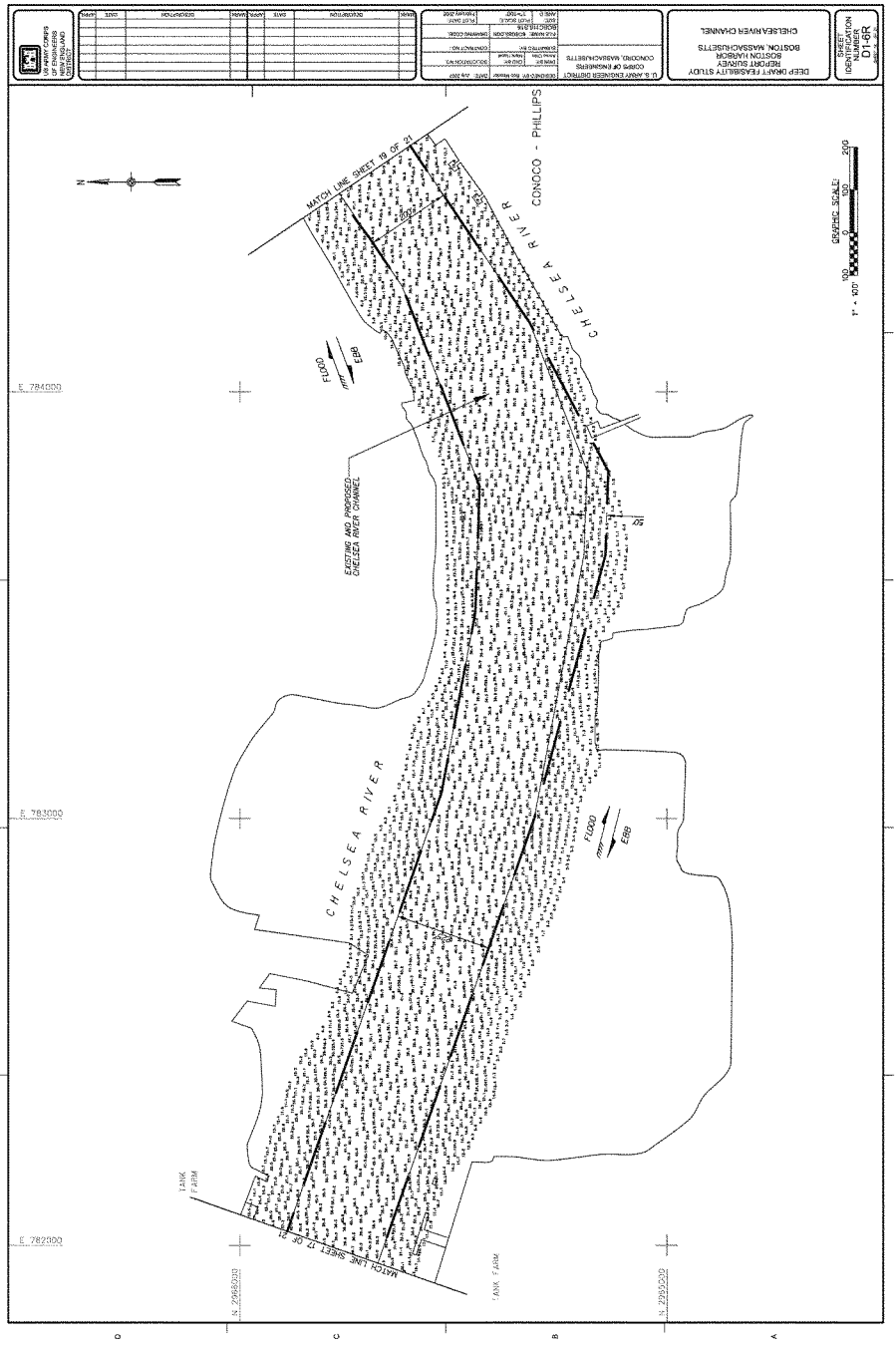
BOSTON, MASSACHUSETTS
MAIN SHIP CHANNEL
DEEPENING EXTENSION
TO MARINE TERMINAL
SHEET IDENTIFICATION NUMBER
D1-6M
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
LOGAN INTERNATIONAL AIRPORT
GOVERNORS ISLAND
TED WILLIAMS TUNNEL (I-90)
FLOOD
EBB
N 2954000
N 2952000
E 786000
E 784000
E 782000
SEE SHEET 11 OF 21
GRAPHIC SCALE
1" = 200'
MASSPORT MARINE TERMINAL
MASSPORT MARINE TERMINAL
EXISTING AND PROPOSED MAIN SHIP CHANNEL
EXISTING MAIN SHIP CHANNEL 40 - FOOT AND 35 - FOOT LANES
PIER 5
PIER 6

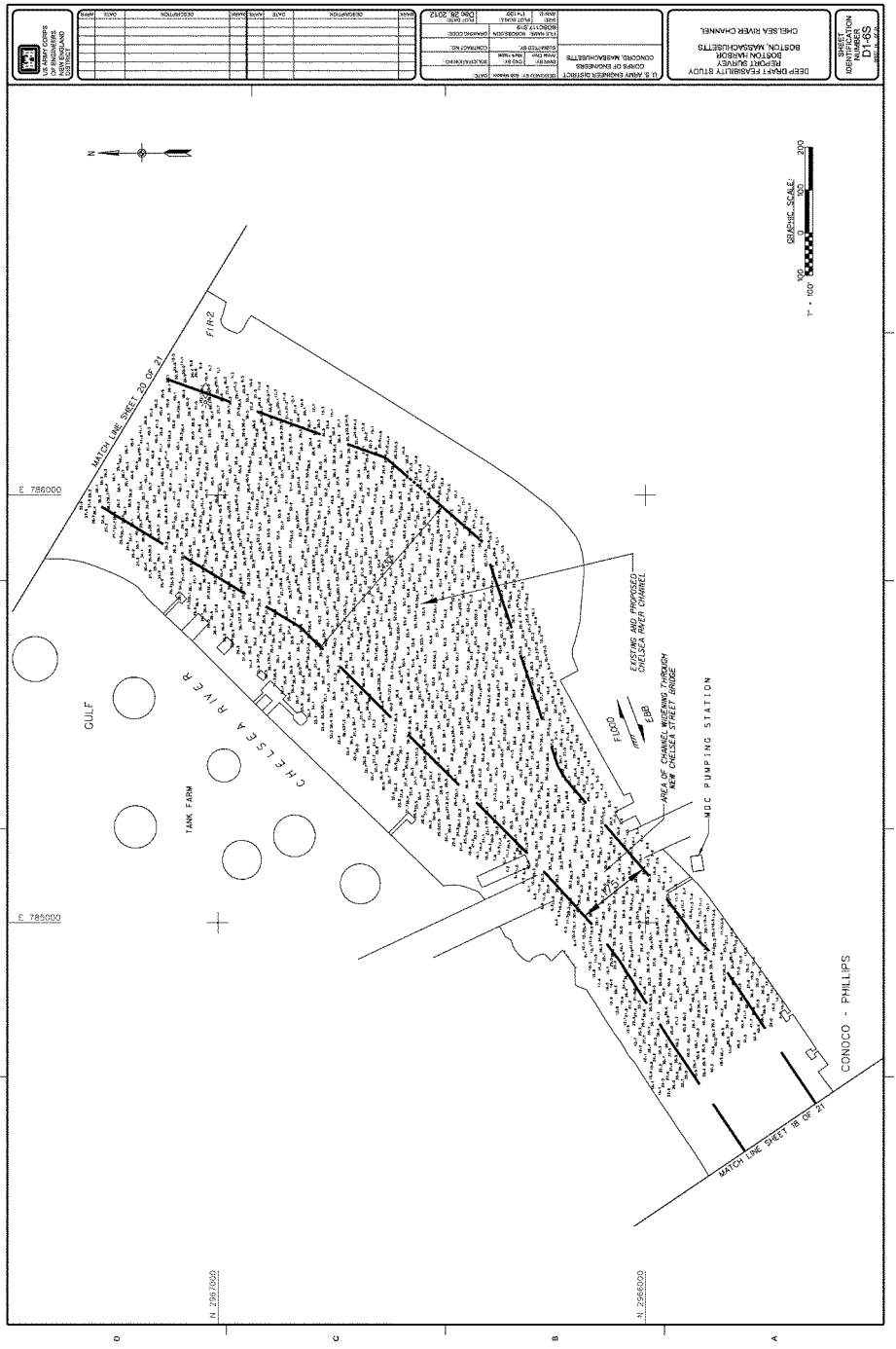

US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON, MASSACHUSETTS
MYSTIC RIVER CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6N
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
MATCH LINE SHEET 17 OF 21
MATCH LINE SHEET 15 OF 21
MYSTIC RIVER-TOBIN MEMORIAL FIXED BRIDGE VERT CL 135 FT OVER 600 FT CHANNEL
CHELSEA YACHT CLUB
EXISTING 40 - FOOT INNER CONFLUENCE
EXISTING 40 FOOT MAIN SHIP CHANNEL
EXISTING MYSTIC RIVER CHANNEL 40 - FOOT AREA
PIER S 48-50
MYSTIC RIVER
F1R-2
F1000
E88
GRAPHIC SCALE
E 778000
E 777000
N 2966000
N 2965000

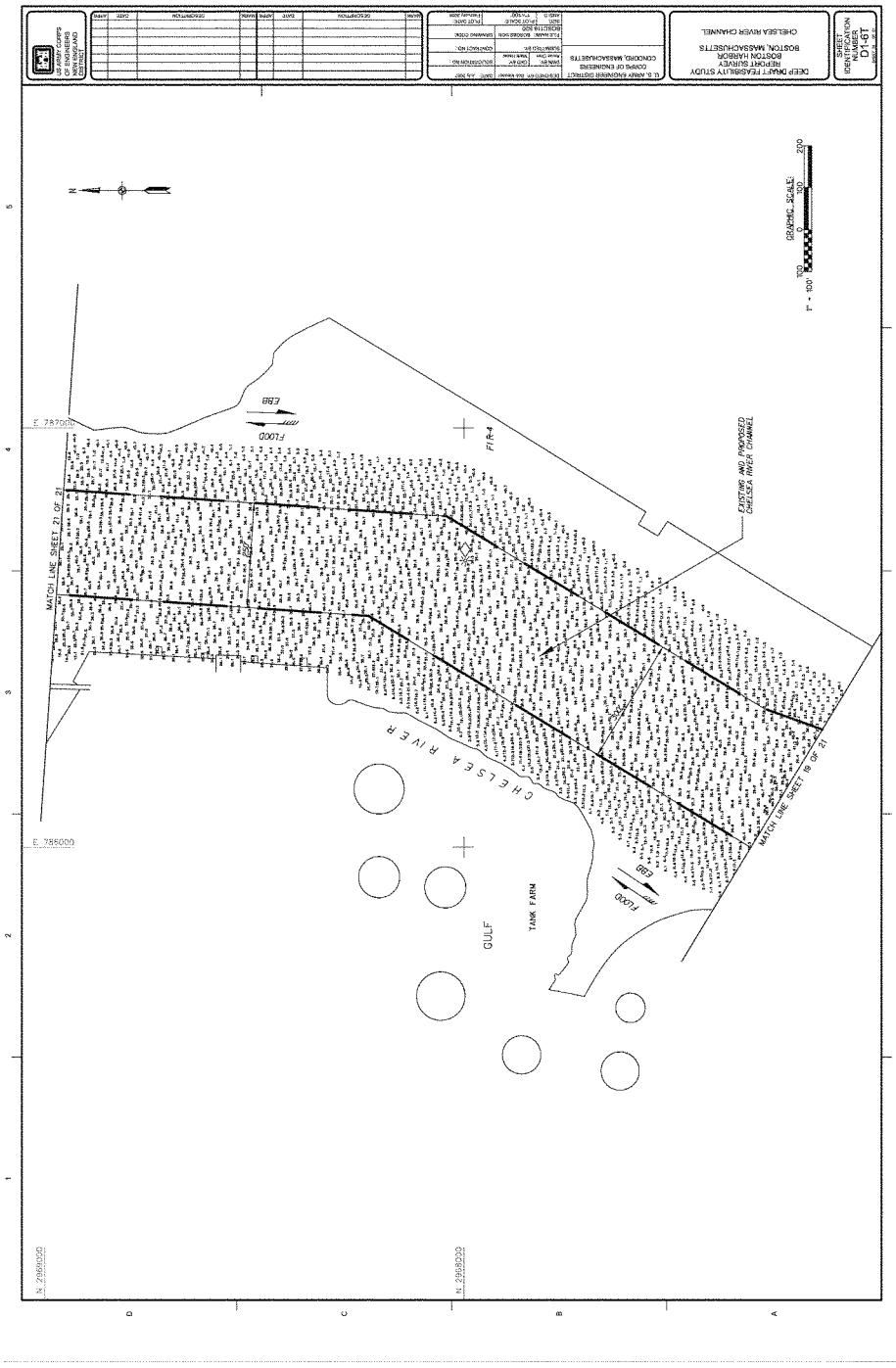

PROLERIZED
DISTRIGAS
EXXON
MYSTIC RIVER
ISLAND END RIVER
RN-4
MATCH LINE SHEET 16 OF 21
MATCH LINE SHEET 14 OF 21
N 2967000
N 2966000
E 776000
E 778000
REVERE SUGAR WHARF
MEDFORD STREET TERMINAL (MASS PORT)
BOSTON AUTO PORT (MASS PORT)
EXISTING MYSTIC RIVER CHANNEL 35 - FOOT AREA
EXISTING AND PROPOSED MYSTIC RIVER CHANNEL (AREA TO BE DEEPENED)
EXISTING MYSTIC RIVER 40 - FOOT AREA
FLOOD
EBB
GRAPHIC SCALE
100 0 100 200
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY REPORT SURVEY BOSTON HARBOR BOSTON, MASSACHUSETTS
MYSTIC RIVER CHANNEL AT MEDFORD STREET TERMINAL
SHEET IDENTIFICATION NUMBER D1-60

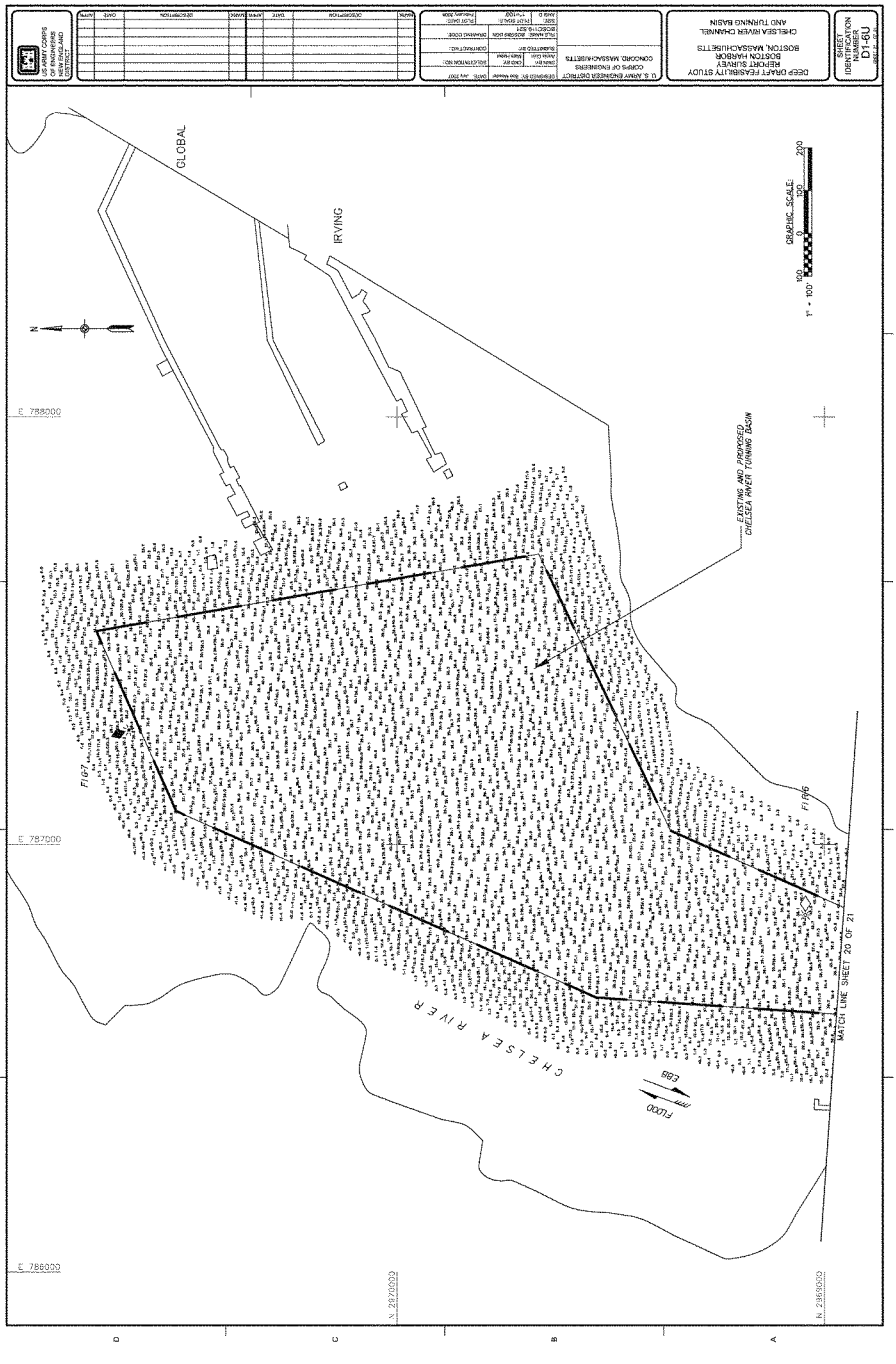
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
MYSTIC RIVER CHANNEL
SHEET NUMBER/REVISION NUMBER
D1-6P
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
BOSTON, MASSACHUSETTS
MATCH LINE SHEET 15 OF 21
E 774000
E 773000
E 772000
N 2967000
N 2965000
EVERETT
MYSTIC RIVER
PROLERIZED
EXISTING MYSTIC RIVER CHANNEL 40' - PORT AREA
EXISTING MYSTIC RIVER CHANNEL 35' - PORT AREA
BOSTON GENERATING
CHARLESTOWN
FLOOD
EBB
GRAPHIC SCALE
1" = 100'


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
CHELSEA RIVER CHANNEL
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
SHEET IDENTIFICATION NUMBER
D1-6Q
EASTERN MINERALS
MATCH LINE SHEET 18 OF 21
MATCH LINE SHEET 14 OF 21
MCARDLE
BASCULE BRIDGE
HDR CL 175 FT
VERT CL 21 FT MHW CLOSED
FLOOD
EBB
EXISTING AND PROPOSED CHELSEA RIVER CHANNEL
CHELSEA RIVER
EXISTING 40 - FOOT INNER CONFLUENCE
EXISTING 40 - FOOT MAIN SHIP CHANNEL
TANK FARM
GRAPHIC SCALE
1" = 100'
E 782000
E 781000
E 780000
N 2966000
N 2965000


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
CHELSEA RIVER CHANNEL
SHEET IDENTIFICATION NUMBER
D16R
CONOCO - PHILLIPS
CHELSEA RIVER
MATCH LINE SHEET 19 OF 21
MATCH LINE SHEET 17 OF 21
EXISTING AND PROPOSED CHELSEA RIVER CHANNEL
FLOOD
EBB
TANK FARM
GRAPHIC SCALE:
1" = 100'
E 784000
E 783000
E 782000
N 2968000
N 2965000

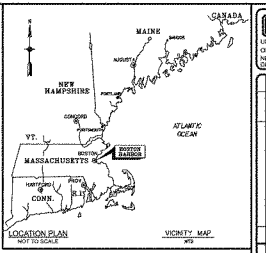

US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
CHELSEA RIVER CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6S
GRAPHIC SCALE:
1" = 100'
MATCH LINE SHEET 20 OF 21
MATCH LINE SHEET 18 OF 21
E 786000
E 785000
N 2967000
N 2966000
GULF
TANK FARM
CHELSEA RIVER
EXISTING AND PROPOSED CHELSEA RIVER CHANNEL
AREA OF CHANNEL WIDENING THROUGH NEW CHELSEA STREET BRIDGE
MDC PUMPING STATION
CONOCO - PHILLIPS
FLOOD
EBB


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
CHELSEA RIVER CHANNEL
SHEET IDENTIFICATION NUMBER
D1-6T
GRAPHIC SCALE:
1" = 100'
MATCH LINE SHEET 21 OF 21
MATCH LINE SHEET 19 OF 21
EXISTING AND PROPOSED CHELSEA RIVER CHANNEL
CHELSEA RIVER
GULF
TANK FARM
FLOOD
EBB
E. 787000
E. 786000
N. 2969000
N. 2968000



US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
CHELSEA RIVER CHANNEL
AND TURNING BASIN
SHEET IDENTIFICATION NUMBER
D1-6U
GLOBAL
IRVING
GRAPHIC SCALE
1" = 100'
EXISTING AND PROPOSED CHELSEA RIVER TURNING BASIN
FIG7
FIG6
CHELSEA RIVER
FLOOD
EBB
MATCH LINE SHEET 20 OF 21
E 788000
E 787000
E 786000
N 2970000
N 2969000

DEEP DRAFT FEASIBILITY STUDY
BOSTON HARBOR
BOSTON, MASSACHUSETTS



INDEX TO LEDGE AREA DRAWINGS			
SHEET NO.		DESIGN FILE	SHEET TITLE
1	D1-7A	BOSG001.S01	COVER SHEET
2	D1-7B	BOSG002.S02	KEY PLAN
3	D1-7C 1 OF 5	BOSC101.S03	MAIN CHANNELS PLAN - BROAD SOUND NORTH ENTRANCE CHANNEL ROCK ELEVATIONS AT 45, 47 AND 49 FEET
4	D1-7C 2 OF 5	BOSC101.S04	MAIN CHANNELS PLAN - BROAD SOUND NORTH ENTRANCE CHANNEL ROCK ELEVATIONS AT 47, 49 AND 51 FEET (PLAN A)
5	D1-7C 3 OF 5	BOSC101.S05	MAIN CHANNELS PLAN - BROAD SOUND NORTH ENTRANCE CHANNEL ROCK ELEVATIONS AT 48, 50 AND 52 FEET
6	D1-7C 4 OF 5	BOSC101.S06	MAIN CHANNELS PLAN - BROAD SOUND NORTH ENTRANCE CHANNEL ROCK ELEVATIONS AT 50, 52 AND 54 FEET (PLAN B)
7	D1-7C 5 OF 5	BOSC101.S07	MAIN CHANNELS PLAN - BROAD SOUND NORTH ENTRANCE CHANNEL ROCK ELEVATIONS AT 52, 54 AND 56 FEET (PLAN C)
8	D1-7D 1 OF 3	BOSC102.S08	MAIN CHANNELS PLAN - PRESIDENT ROADS ANCHORAGE & MAIN SHIP CHANNEL ROCK ELEVATIONS AT 45, 47 AND 49 FEET (PLAN A)
9	D1-7D 2 OF 3	BOSC102.S09	MAIN CHANNELS PLAN - PRESIDENT ROADS ANCHORAGE & MAIN SHIP CHANNEL ROCK ELEVATIONS AT 48, 50 AND 52 FEET (PLAN B)
10	D1-7D 3 OF 3	BOSC102.S10	MAIN CHANNELS PLAN - PRESIDENT ROADS ANCHORAGE & MAIN SHIP CHANNEL ROCK ELEVATIONS AT 50, 52 AND 54 FEET (PLAN C)
11	D1-7E 1 OF 3	BOSC103.S11	MAIN CHANNELS PLAN - MAIN SHIP CHANNEL, RESERVED CHANNEL AND RESERVED CHANNEL TURNING AREA - ROCK ELEVATIONS AT 45, 47 AND 49 FEET (PLAN A)
12	D1-7E 2 OF 3	BOSC103.S12	MAIN CHANNELS PLAN - MAIN SHIP CHANNEL, RESERVED CHANNEL AND RESERVED CHANNEL TURNING AREA - ROCK ELEVATIONS AT 48, 50 AND 52 FEET (PLAN B)
13	D1-7E 3 OF 3	BOSC103.S13	MAIN CHANNELS PLAN - MAIN SHIP CHANNEL, RESERVED CHANNEL AND RESERVED CHANNEL TURNING AREA - ROCK ELEVATIONS AT 50, 52 AND 54 FEET (PLAN C)
14	D1-7F	BOSC104.S14	MAIN SHIP CHANNEL DEEPENING EXTENSION TO MARINE TERMINAL ROCK ELEVATIONS AT 45, 47 AND 49 FEET (PLAN D)
15	D1-7G	BOSC105.S15	CHELSEA RIVER CHANNEL AND TURNING BASIN ROCK ELEVATIONS AT 40, 42 AND 44 FEET (PLAN F)

US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

MARK	DESCRIPTION	DATE	APPD

MARK	DESCRIPTION	DATE	APPD

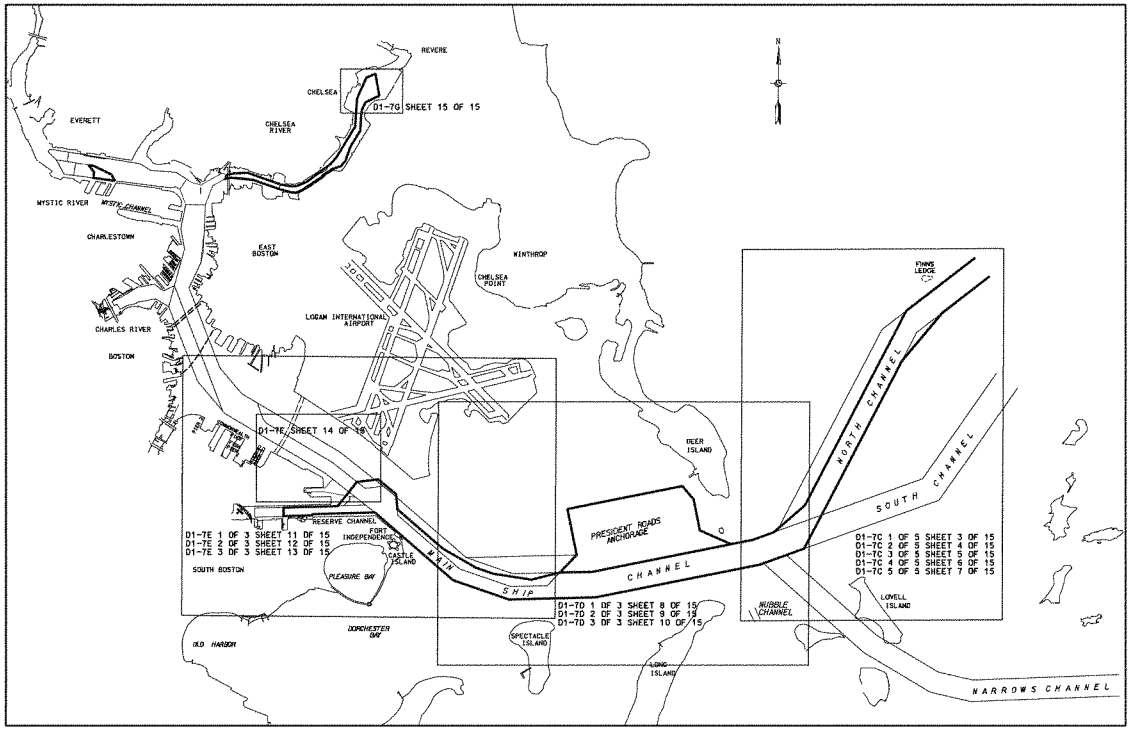
U.S. ARMY ENGINEER DISTRICT
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS

DESIGNED BY: Mark Mahan
DRAWN BY: Chris Orr
CHECKED BY: Mark Mahan
SUBMITTED BY:
FILE NAME: BOSG001.DGN
DATE: 7-Aug-2007
SPECIFICATION NO.:
CONTRACT NO.:
DRAWING CODE:
SCALE: NOT SCALE
FACILITY CODE:
PROJECT NO.:

DEEP DRAFT FEASIBILITY STUDY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
COVER SHEET

SHEET IDENTIFICATION NUMBER
D1-7A
SHT 1 OF 15

Ledge Area Plan 8/6/2007 3:19:20 PM



KEY PLAN
NOT TO SCALE

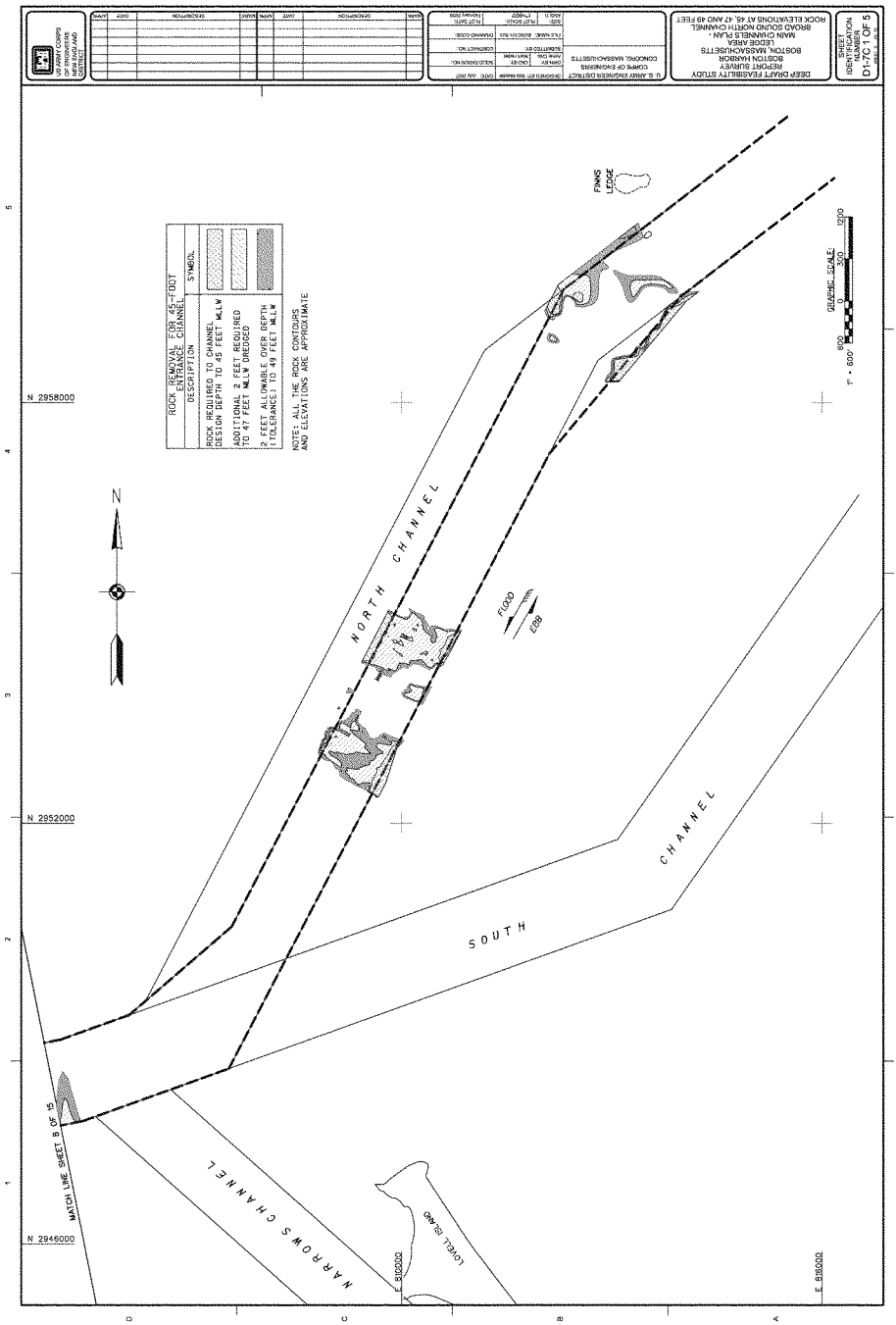
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

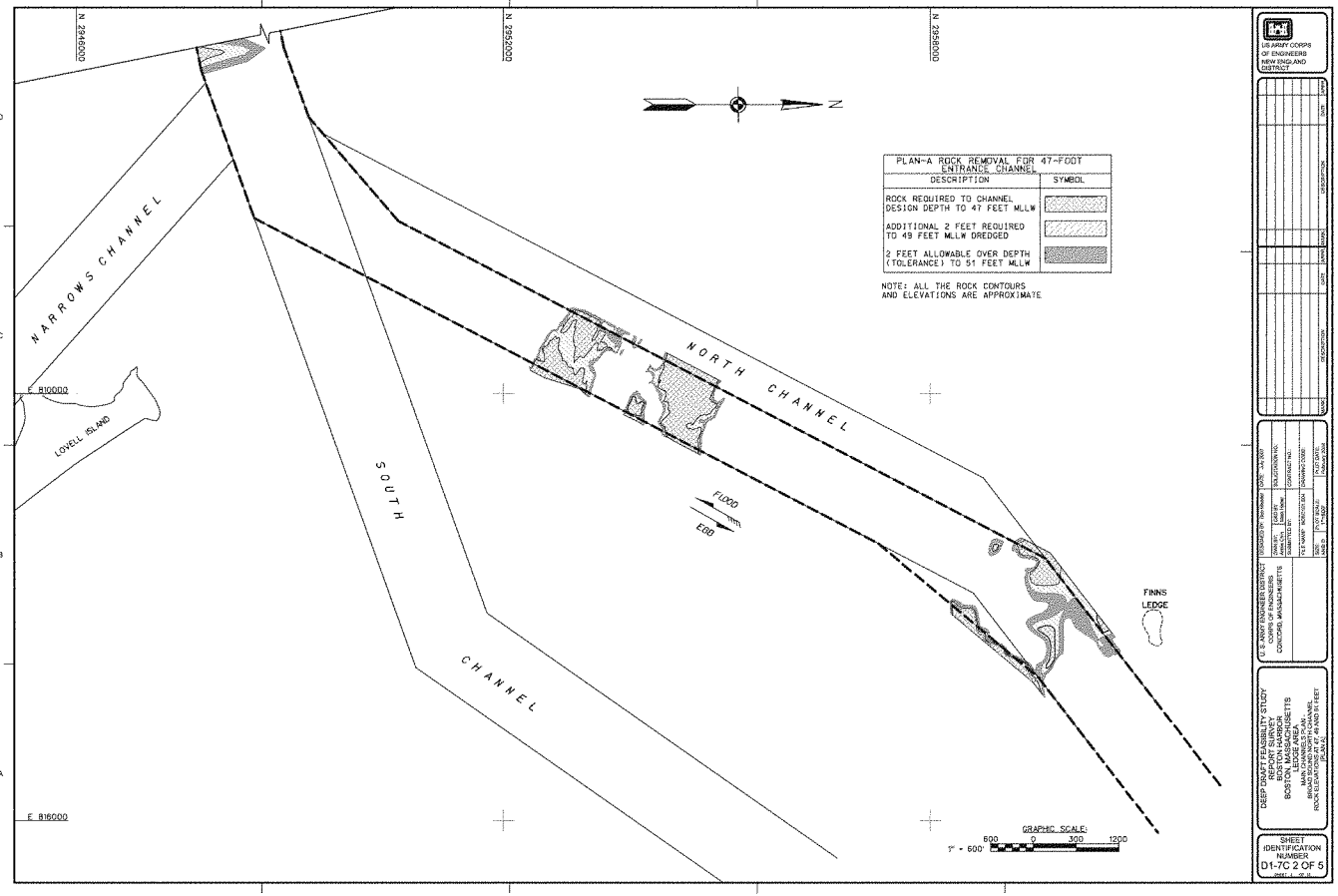
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
KEY PLAN

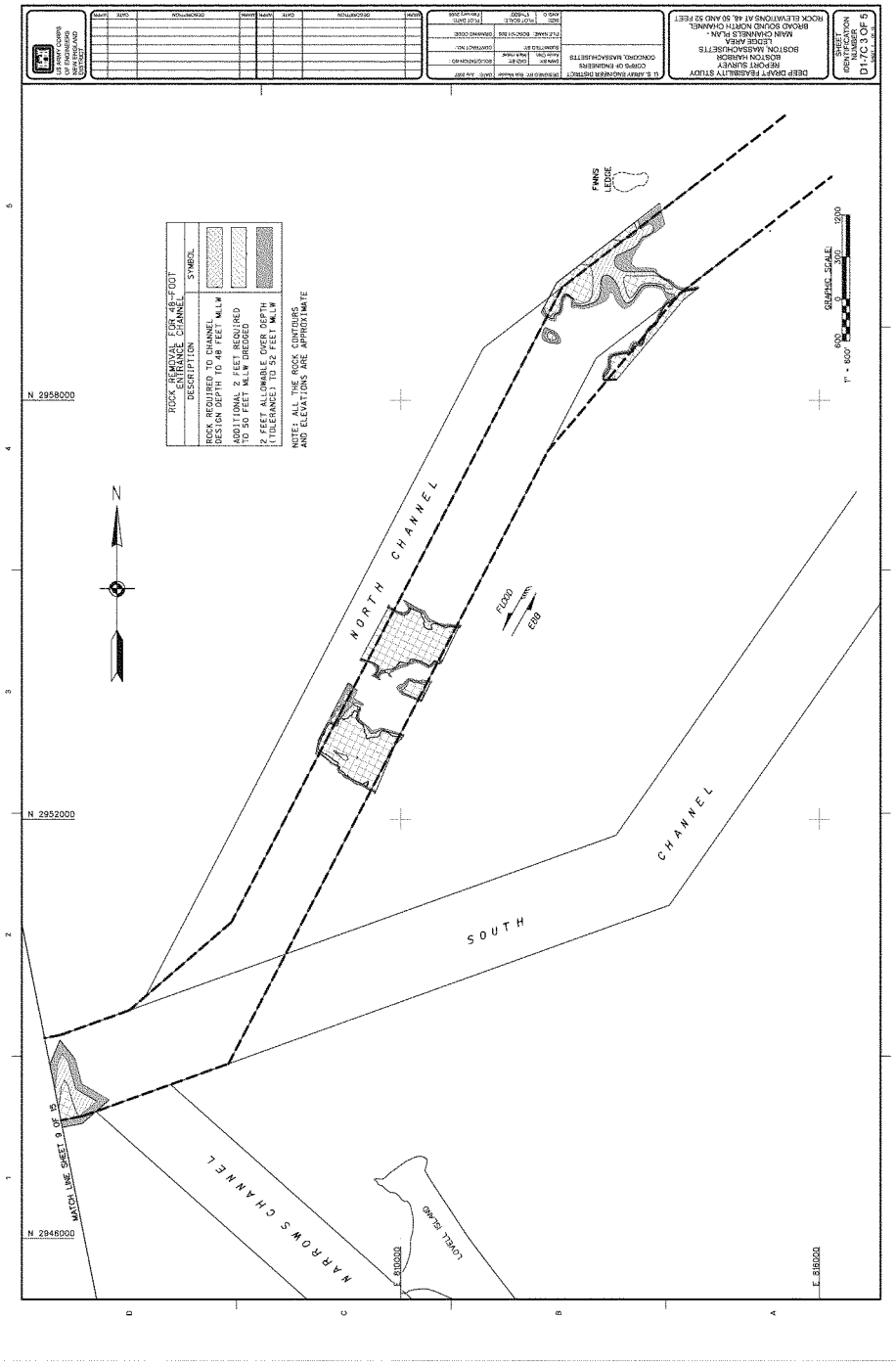
SHEET IDENTIFICATION NUMBER
D1-7B

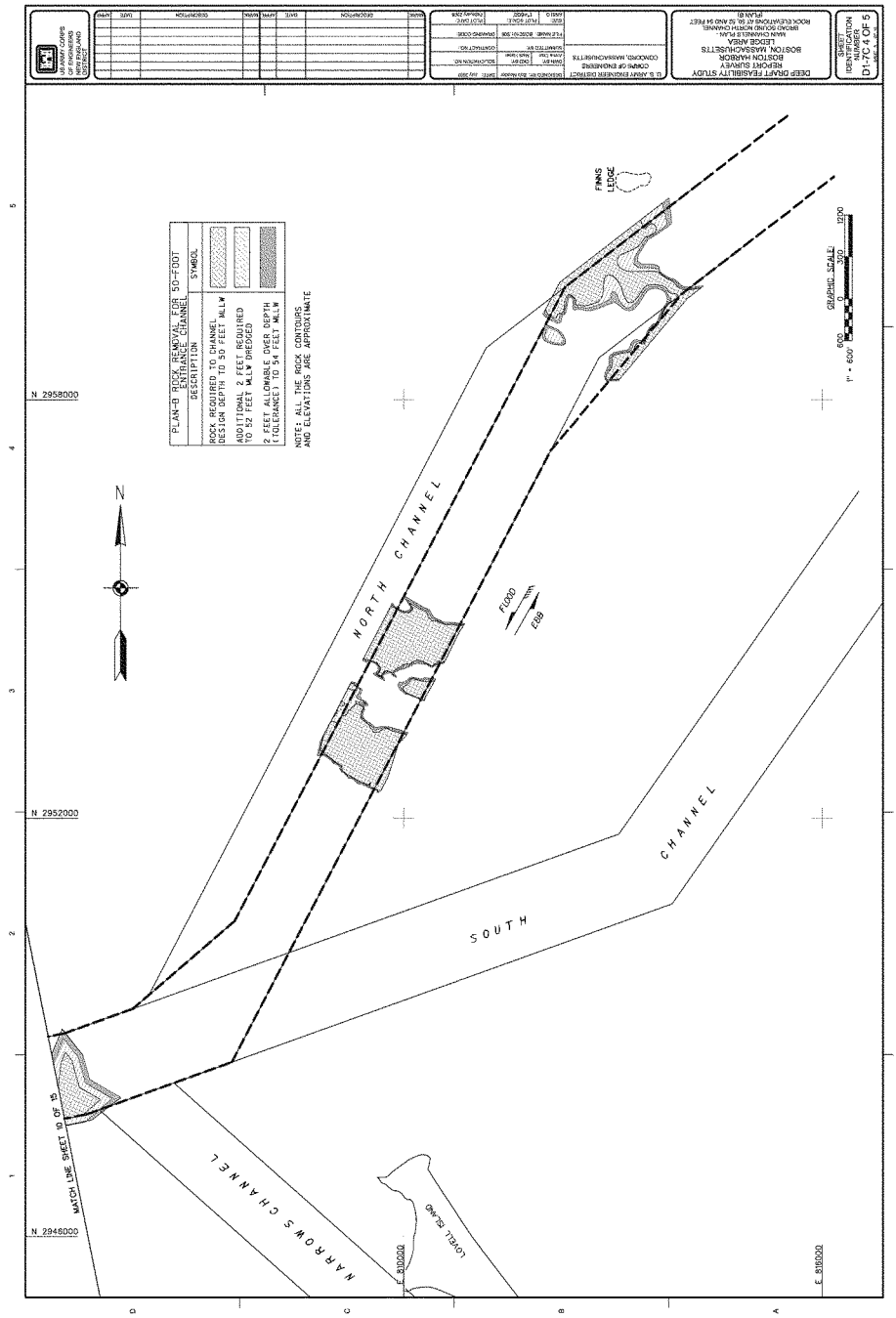
877


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
LEDGE AREA
MAIN CHANNELS PLAN
BOSTON, MASSACHUSETTS
BROAD SOUND NORTH CHANNEL
ROCK ELEVATIONS AT 45, 47 AND 49 FEET
SHEET IDENTIFICATION NUMBER
D1-7C 1 OF 5
U.S. ARMY ENGINEER DISTRICT
CONCORD, MASSACHUSETTS
US ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
ROCK REMOVAL FOR 45-FOOT ENTRANCE CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 45 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 47 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 49 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
FINNS LEDGE
NORTH CHANNEL
SOUTH CHANNEL
NARROWS CHANNEL
LOVELL ISLAND
FLOOD
EBB
GRAPHIC SCALE
1" = 600'
MATCH LINE SHEET 05 OF 15
N 2958000
N 2952000
N 2946000
E 816000
E 812000

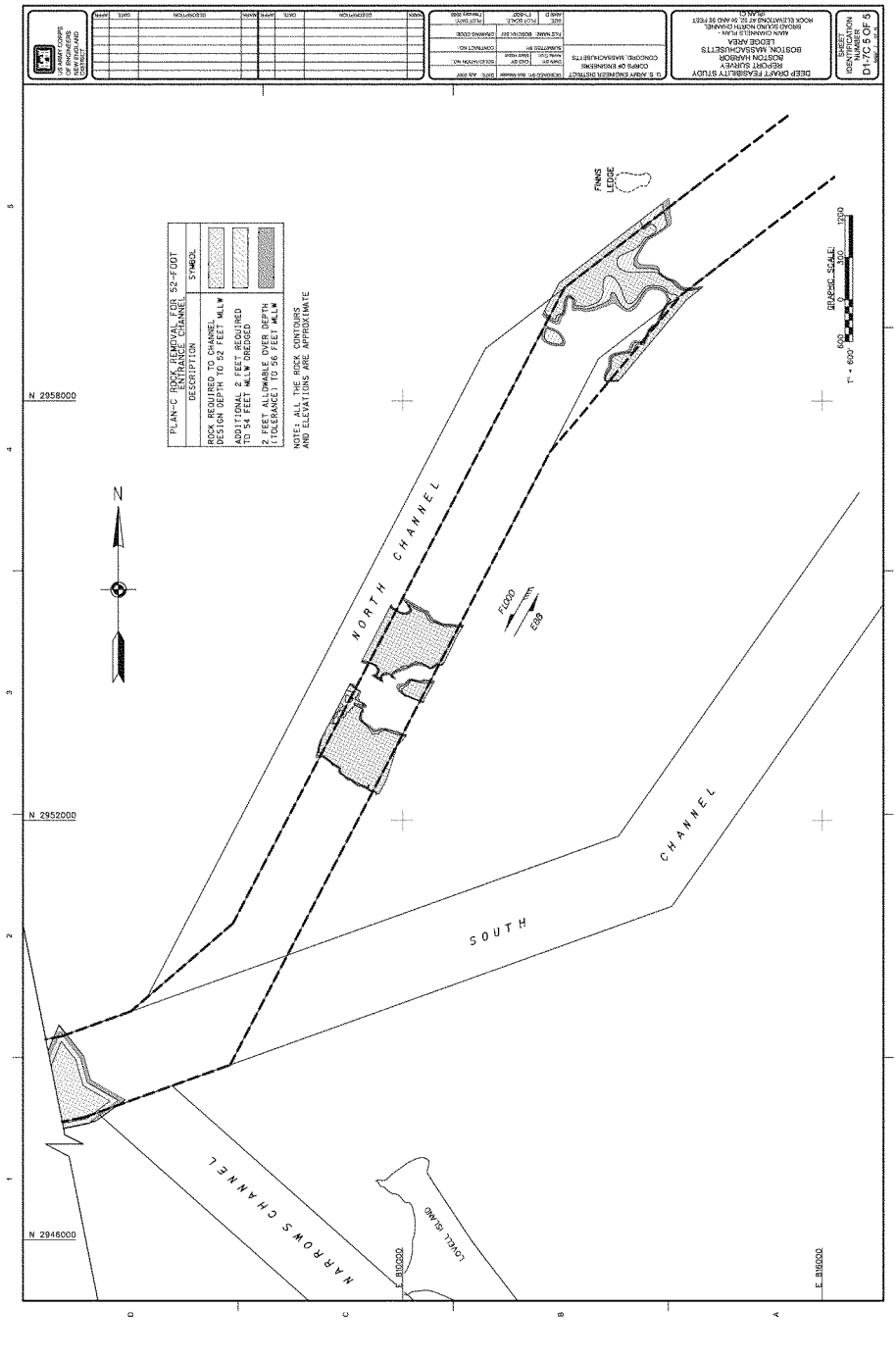


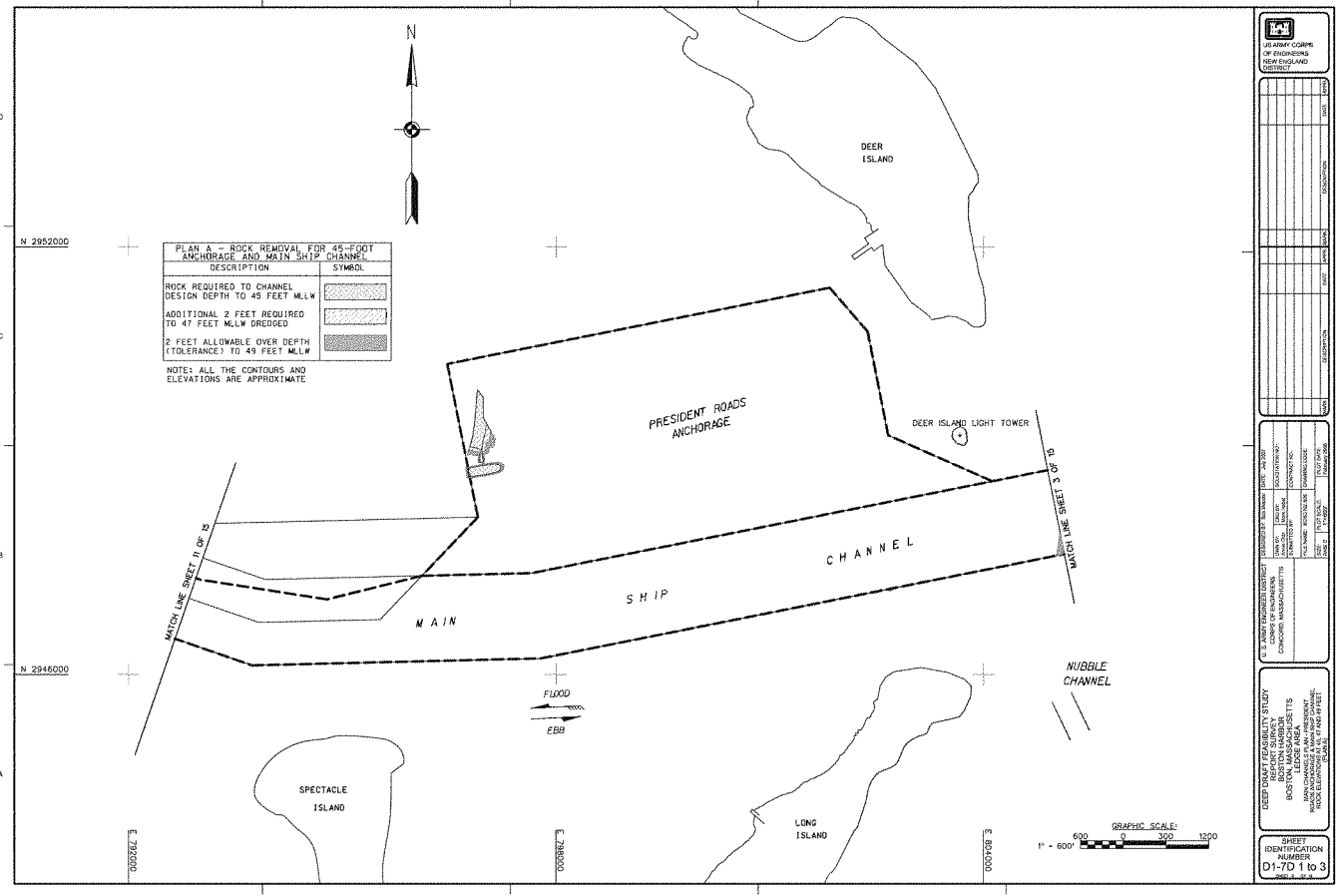
N 2946000
N 2952000
N 2958000
E 810000
E 816000
NARROWS CHANNEL
LOVELL ISLAND
SOUTH CHANNEL
NORTH CHANNEL
FLOOD
EBB
FINNS LEDGE
N
PLAN-A ROCK REMOVAL FOR 47-FOOT ENTRANCE CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 47 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 49 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 51 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
GRAPHIC SCALE:
600 0 300 1200
1" = 600'
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
MAIN CHANNELS PLAN
BROADSOUND NORTH CHANNEL
ROCK ELEVATIONS AT 47, 49 AND 51 FEET (PLAN A)
SHEET IDENTIFICATION NUMBER
D1-7C 2 OF 5


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
LEDGE AREA
MAIN CHANNELS PLAN -
BROAD SOUND NORTH CHANNEL
ROCK ELEVATIONS AT 48, 50 AND 52 FEET
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
SHEET
D1-7C 3 OF 5
ROCK REMOVAL FOR 48-FOOT ENTRANCE CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 48 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 50 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 52 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
NORTH CHANNEL
SOUTH CHANNEL
NARROWS CHANNEL
LOVELL ISLAND
FINNS LEDGE
FLOOD
EBB
GRAPHIC SCALE
1" = 600'
N 2958000
N 2952000
N 2946000
E 810000
E 816000
MATCH LINE SHEET 6 OF 15
A
B
C
D
1
2
3
4
5



U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
MAIN CHANNELS PLAN -
BROAD SOUND NORTH CHANNEL
ROCK ELEVATIONS AT 50, 52 AND 54 FEET
PLAN B1
SHEET IDENTIFICATION NUMBER
D1-7C 4 OF 5
PLAN-B ROCK REMOVAL FOR 50-FOOT ENTRANCE CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 50 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 52 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 54 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
N
FINNS LEDGE
GRAPHIC SCALE:
1" = 600'
600 0 300 1200
NORTH CHANNEL
SOUTH CHANNEL
NARROWS CHANNEL
FLOOD
EBB
LOVELL ISLAND
MATCH LINE SHEET 10 OF 15
N 2958000
N 2952000
N 2948000
E 810000
E 816000


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
MAIN CHANNEL IS PLAN - BROAD SOUND NORTH CHANNEL ROCK ELEVATIONS AT 52.5' AND 56 FEET (PLAN C)
U. S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
SHEET IDENTIFICATION NUMBER
D1-7C 5 OF 5
PLAN-C ROCK REMOVAL FOR 52-FOOT ENTRANCE CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 52 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 54 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 56 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
N
FINNS LEDGE
NORTH CHANNEL
SOUTH CHANNEL
NARROWS CHANNEL
LOVELL ISLAND
FLOOD
EBB
GRAPHIC SCALE
1" = 600'
N 2958000
N 2952000
N 2946000
E 810000
E 816000



PLAN A - ROCK REMOVAL FOR 45-FOOT ANCHORAGE AND MAIN SHIP CHANNEL

DESCRIPTION	SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 45 FEET MLLW	
ADDITIONAL 2 FEET REQUIRED TO 47 FEET MLLW DREDGED	
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 49 FEET MLLW	

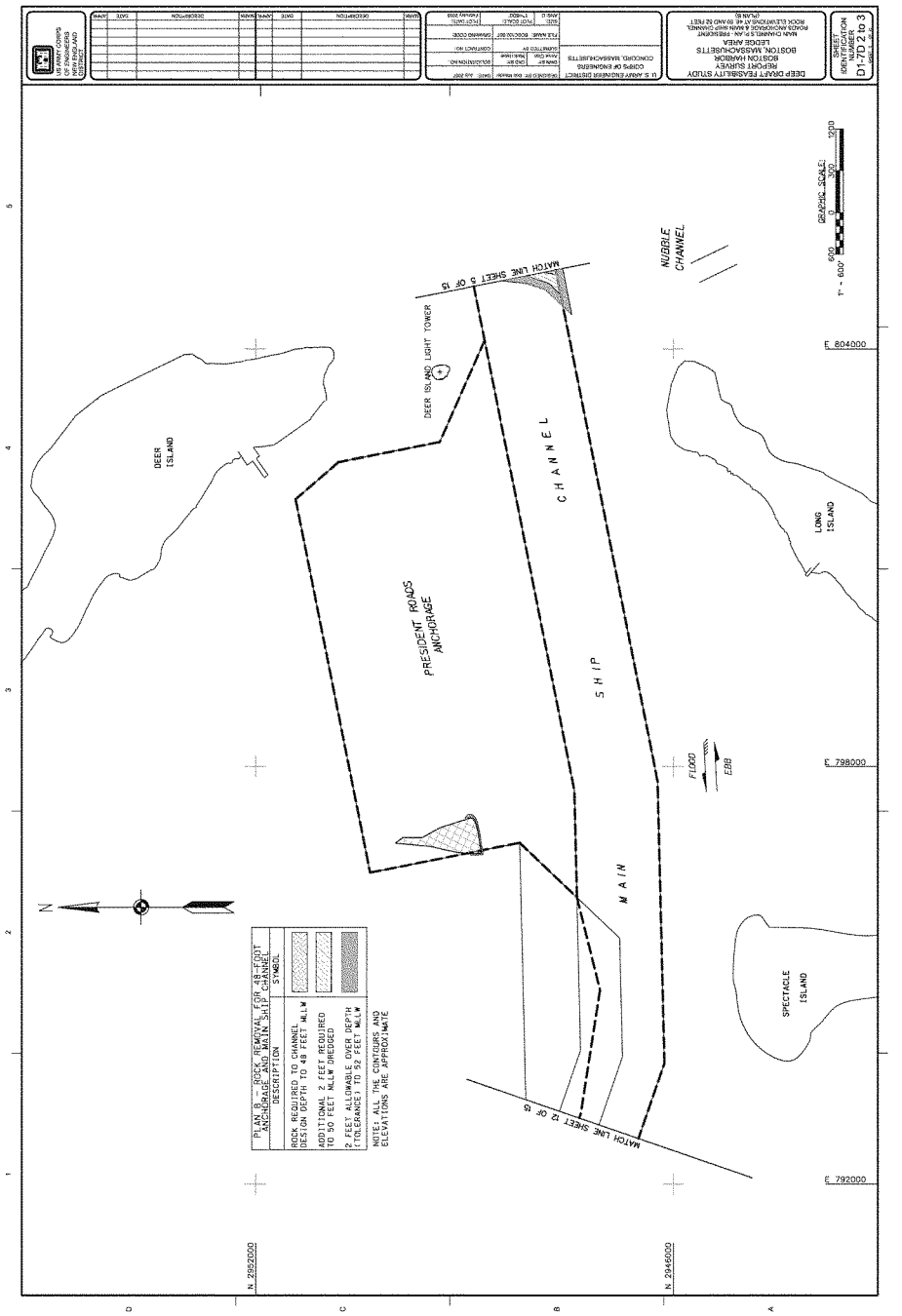
NOTE: ALL THE CONTOURS AND ELEVATIONS ARE APPROXIMATE

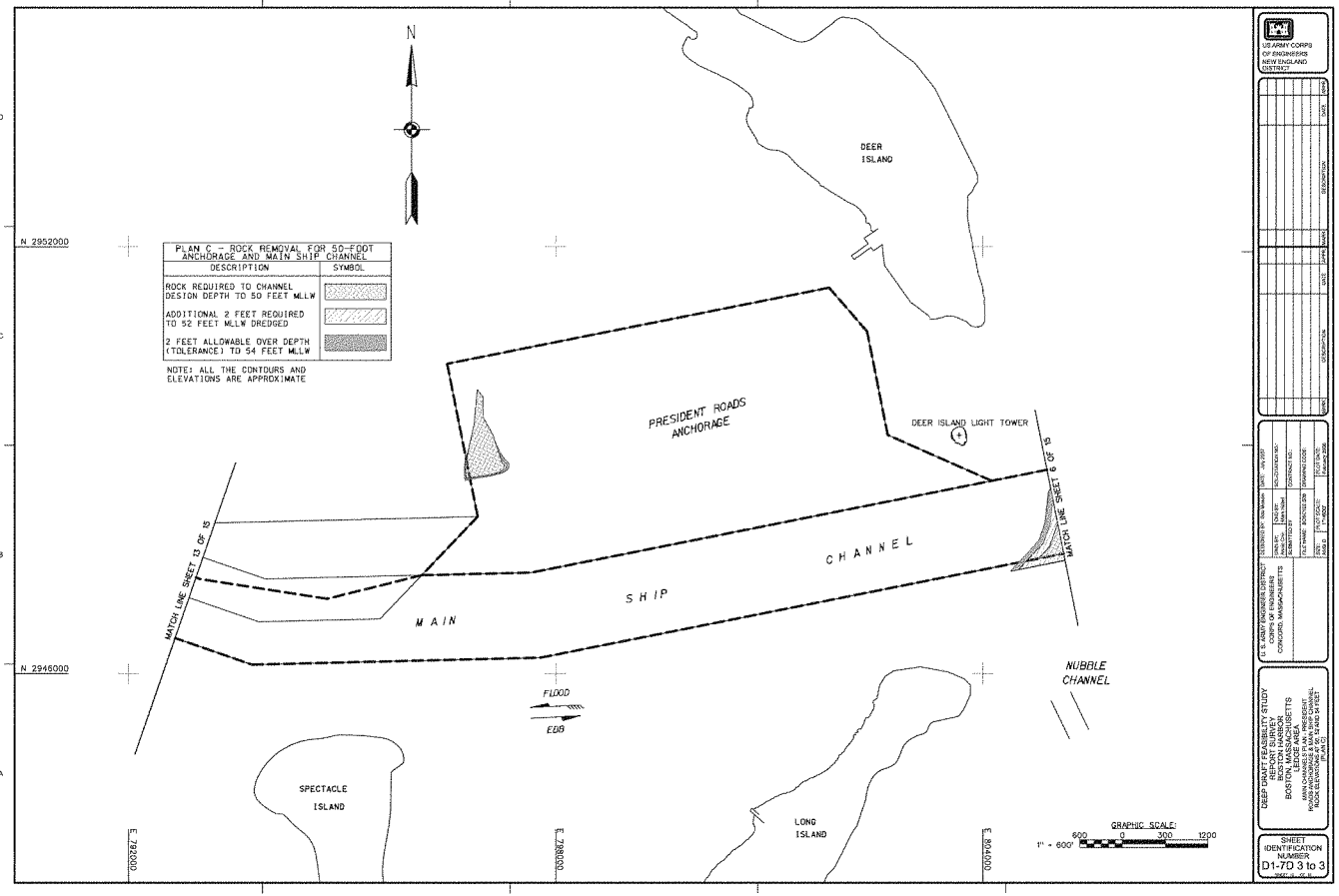
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT

U. S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS

DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
MAIN CHANNEL PLAN - PRESIDENT ROADS ANCHORAGE & MAIN SHIP CHANNEL ROCK ELEVATIONS AT 45, 47 AND 49 FEET (PLAN A)

SHEET IDENTIFICATION NUMBER
D1-7D 1 to 3


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
MAIN CHANNEL S.P. AN - PRESIDENT ROADS ANCHORAGE & MAIN SHIP CHANNEL ROCK ELEVATIONS AT 48 AND 52 FEET (PLAN B)
SHEET IDENTIFICATION NUMBER
D1-7D 2 to 3
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DESIGNED BY: DSN MAJOR
DRAWN BY: MAJOR
CHECKED BY: MAJOR
SUBMITTED BY: COMMANDER
DATE: AUG 2007
SCALE: 1"=600'
PLAN B - ROCK REMOVAL FOR 48-FOOT ANCHORAGE AND MAIN SHIP CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 48 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 50 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 52 FEET MLLW
NOTE: ALL THE CONTOURS AND ELEVATIONS ARE APPROXIMATE
DEER ISLAND
DEER ISLAND LIGHT TOWER
MATCH LINE SHEET 5 OF 15
MATCH LINE SHEET 12 OF 15
PRESIDENT ROADS ANCHORAGE
MAIN SHIP CHANNEL
NUBBLE CHANNEL
LONG ISLAND
SPECTACLE ISLAND
FLOOD
EBB
GRAPHIC SCALE:
1" = 600'
E 804000
E 798000
E 792000
N 2952000
N 2946000



PLAN C - ROCK REMOVAL FOR 50-FOOT ANCHORAGE AND MAIN SHIP CHANNEL

DESCRIPTION	SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 50 FEET MLLW	
ADDITIONAL 2 FEET REQUIRED TO 52 FEET MLLW DREDGED	
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 54 FEET MLLW	

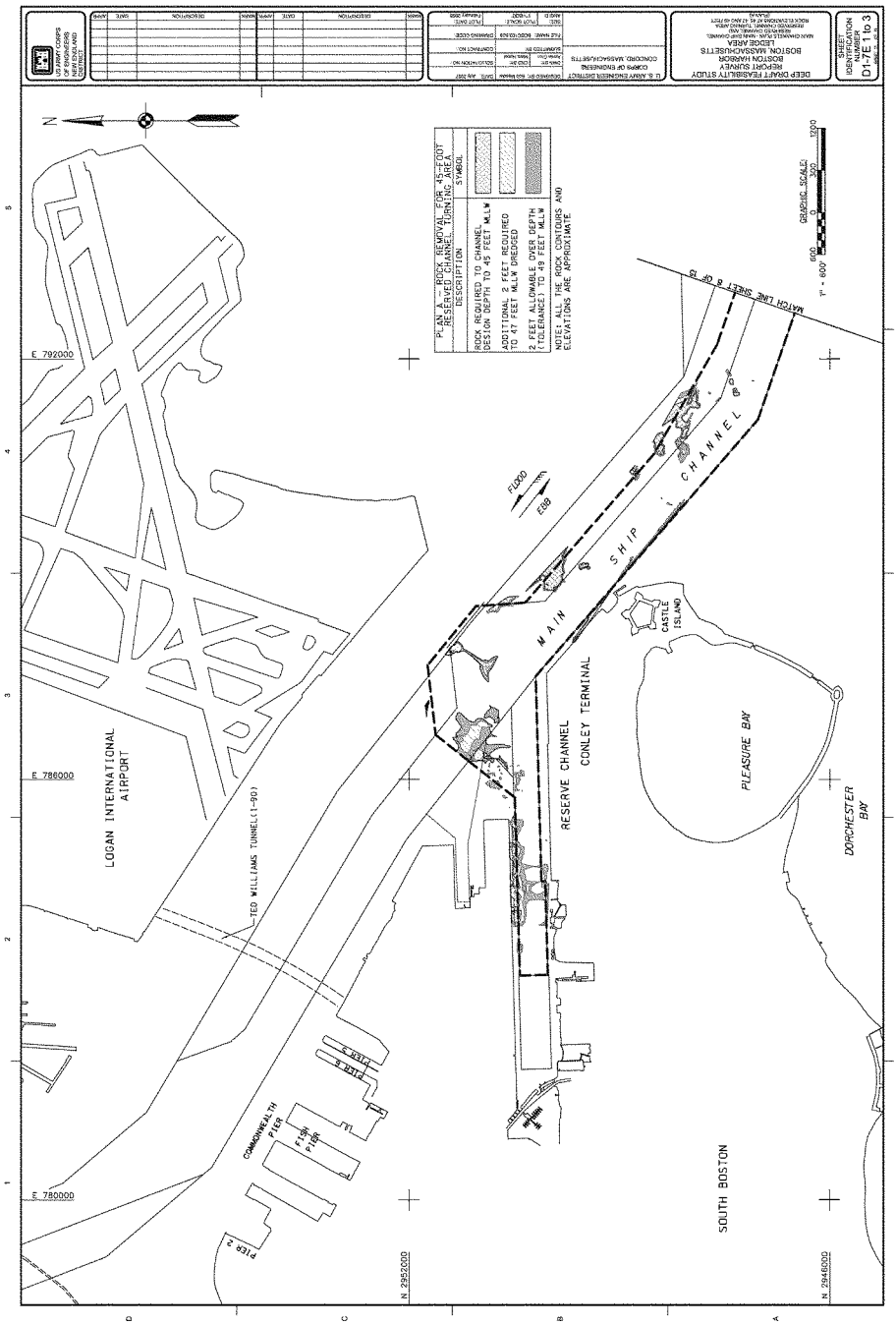
NOTE: ALL THE CONTOURS AND ELEVATIONS ARE APPROXIMATE

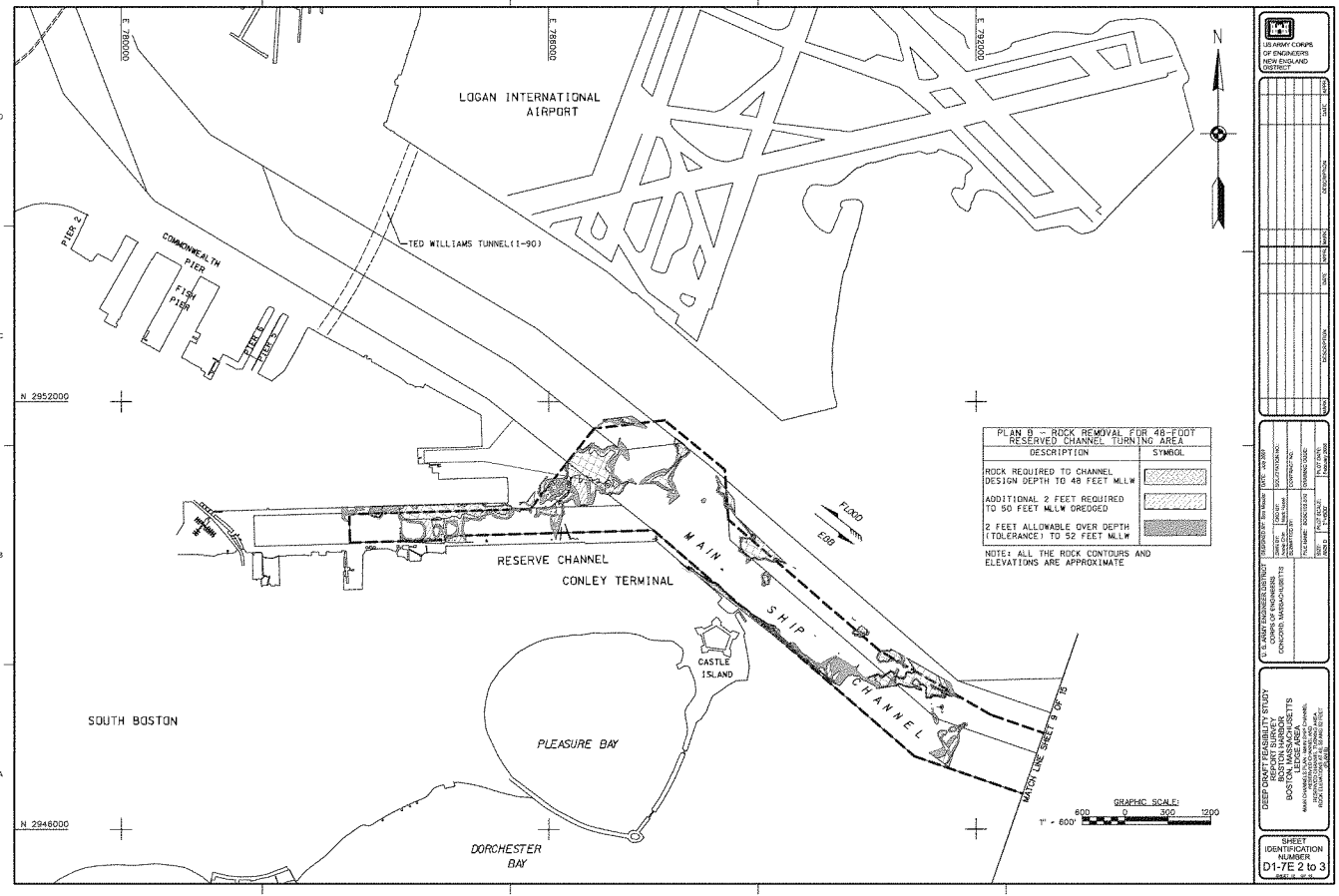
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
MAIN CHANNELS PLAN, PRESIDENT ROADS ANCHORAGE & MAIN SHIP CHANNEL ROCK ELEVATIONS AT 50, 52 AND 54 FEET (PLAN C)

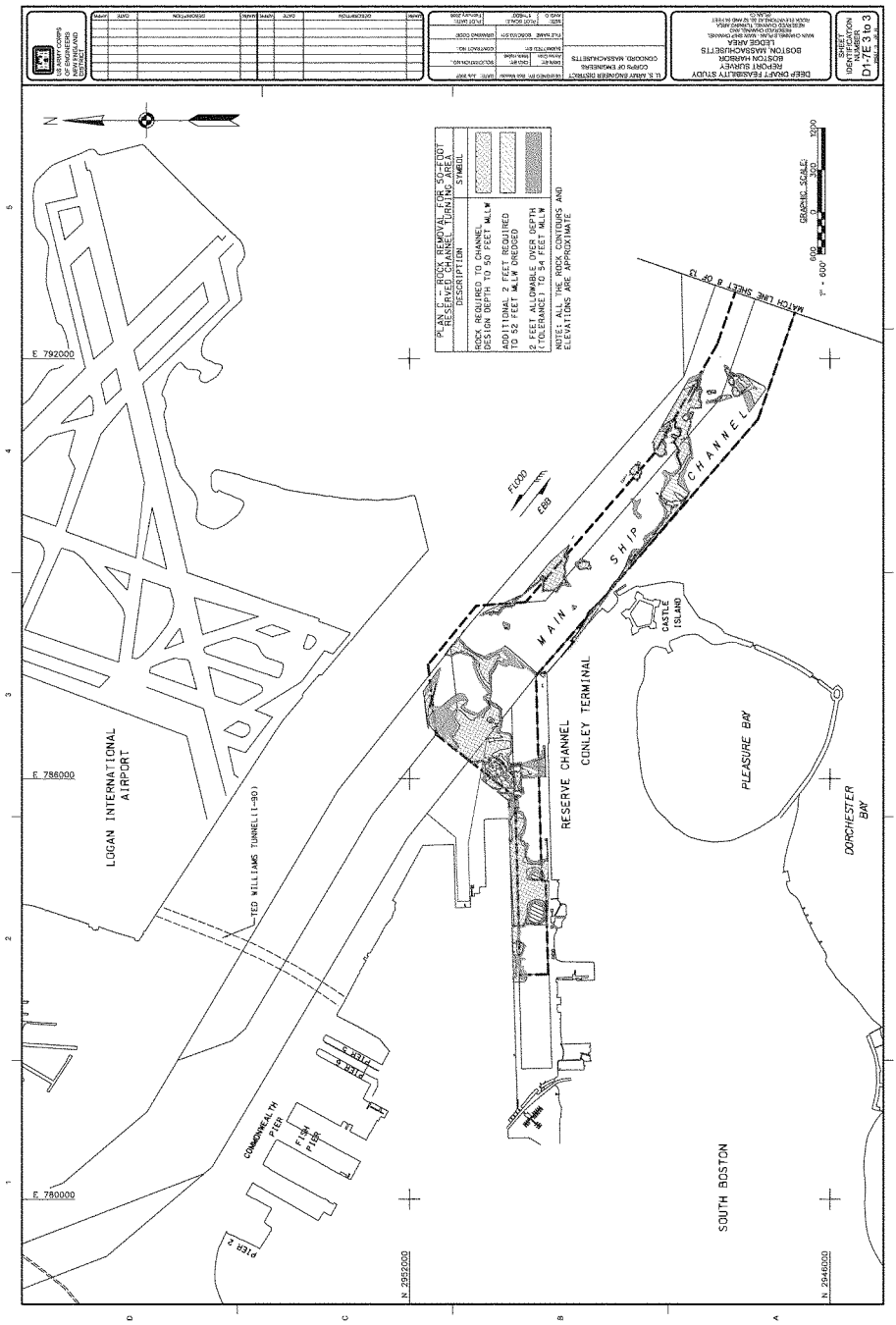
SHEET IDENTIFICATION NUMBER
D1-7D 3 to 3

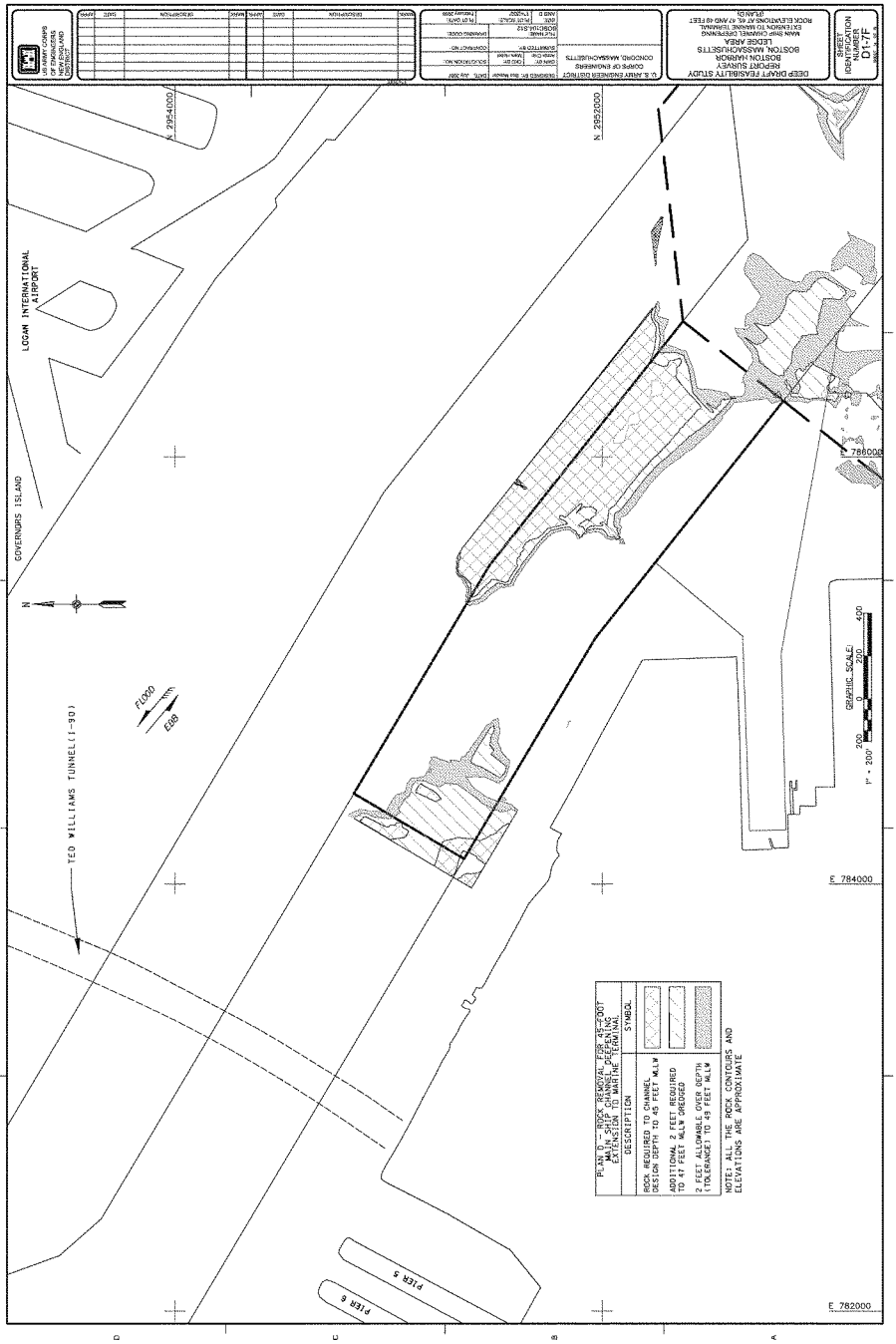
USARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT

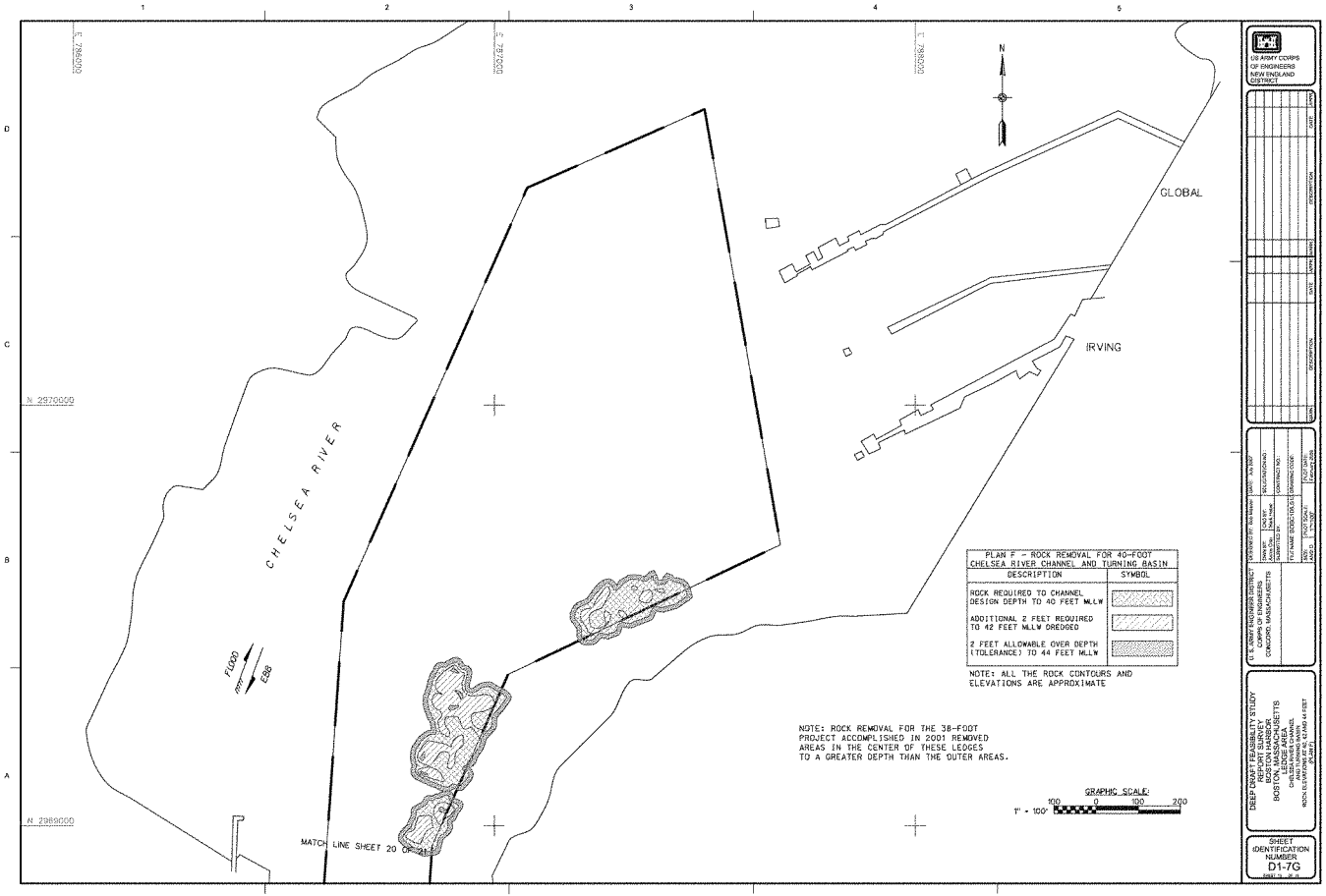

DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
LEDGE AREA
BOSTON, MASSACHUSETTS
U.S. ARMY ENGINEER DISTRICT
CONCORD, MASSACHUSETTS
CORPS OF ENGINEERS
NEW ENGLAND DIVISION
SHEET IDENTIFICATION NUMBER
D1-7E 1 to 3
PLAN
ROCK REMOVAL FOR -45 FOOT
RESERVE CHANNEL TURNING AREA
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO -45 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 47 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 49 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
MATCH LINE SHEET 6 OF 15
GRAPHIC SCALE
1" = 600'
LOGAN INTERNATIONAL AIRPORT
TED WILLIAMS TUNNEL(I-99)
MAIN SHIP CHANNEL
RESERVE CHANNEL
CONLEY TERMINAL
CASTLE ISLAND
PLEASURE BAY
DORCHESTER BAY
SOUTH BOSTON
COMMONWEALTH PIER
PIER S
PIER A
PIER B
FLOOD
EBB
E 792000
E 786000
E 780000
N 2952000
N 2946000



LOGAN INTERNATIONAL AIRPORT
TED WILLIAMS TUNNEL(I-90)
PIER 2
COMMONWEALTH PIER
FISH PIER
PIER 6
PIER 5
E 780000
E 786000
E 792000
N 2952000
N 2946000
RESERVE CHANNEL
CONLEY TERMINAL
MAIN SHIP CHANNEL
FLOOD
EBB
CASTLE ISLAND
SOUTH BOSTON
PLEASURE BAY
DORCHESTER BAY
MATCH LINE SHEET 9 OF 15
GRAPHIC SCALE:
600 0 300 1200
1" = 600'
N
PLAN B - ROCK REMOVAL FOR 48-FOOT RESERVED CHANNEL TURNING AREA
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 48 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 50 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 52 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
SHEET IDENTIFICATION NUMBER
D1-7E 2 to 3

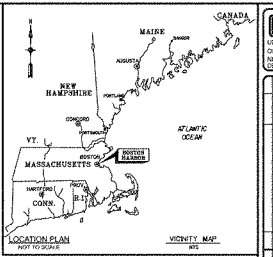

DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
SHEET DESIGNATION NUMBER
D1-7E 3 to 3
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
PLAN OF ROCK REMOVAL FOR -50 FOOT RESERVE CHANNEL AND MAIN SHIP CHANNEL
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 50 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 52 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 54 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
GRAPHIC SCALE
1" = 600'
NATION LINE SHEET B OF 13
MAIN SHIP CHANNEL
RESERVE CHANNEL
CONLEY TERMINAL
LOGAN INTERNATIONAL AIRPORT
TED WILLIAMS TUNNEL(I-90)
COMMONWEALTH PIER
PIER A
PIER B
PIER C
PIER D
PIER E
PIER F
CASTLE ISLAND
PLEASURE BAY
DORCHESTER BAY
SOUTH BOSTON
FLOOD
EBB
E 792000
E 786000
E 780000
N 2952000
N 2946000


DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
MAIN SHIP CHANNEL CROSSING
LEDGE AREA
EXTENSION TO MAINE TURNING
ROCK ELEVATIONS AT M.L.W. IN MID 48 FEET
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
SHEET IDENTIFICATION NUMBER
D1-7F
LOGAN INTERNATIONAL AIRPORT
GOVERNORS ISLAND
TED WILLIAMS TUNNEL (I-90)
FLOOD
EBB
N
GRAPHIC SCALE
1" = 200'
PIER 5
PIER 6
N. 2954000
N. 2952000
E. 784000
E. 782000
PLAN D - ROCK REMOVAL FOR 45-FOOT EXTENSION TO MAINE TURNING
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 45 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 47 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 49 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE



E 786000
E 787000
E 788000
N 2970000
N 2969000
N
GLOBAL
IRVING
CHELSEA RIVER
FLOOD
EBB
MATCH LINE SHEET 20 OF 21
PLAN F - ROCK REMOVAL FOR 40-FOOT CHELSEA RIVER CHANNEL AND TURNING BASIN
DESCRIPTION
SYMBOL
ROCK REQUIRED TO CHANNEL DESIGN DEPTH TO 40 FEET MLLW
ADDITIONAL 2 FEET REQUIRED TO 42 FEET MLLW DREDGED
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 44 FEET MLLW
NOTE: ALL THE ROCK CONTOURS AND ELEVATIONS ARE APPROXIMATE
NOTE: ROCK REMOVAL FOR THE 38-FOOT PROJECT ACCOMPLISHED IN 2001 REMOVED AREAS IN THE CENTER OF THESE LEDGES TO A GREATER DEPTH THAN THE OUTER AREAS.
GRAPHIC SCALE:
100 0 100 200
1" = 100'
US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
REPORT SURVEY
BOSTON HARBOR
BOSTON, MASSACHUSETTS
LEDGE AREA
CHELSEA RIVER CHANNEL
SHEET IDENTIFICATION NUMBER
D1-7G

DEEP DRAFT FEASIBILITY STUDY
ASSOCIATED MAINTENANCE DREDGING
BOSTON HARBOR
BOSTON, MASSACHUSETTS



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SHEET NO.		DESIGN FILE	SHEET TITLE
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2	D1-8B	BOSG002.S02	KEY PLAN
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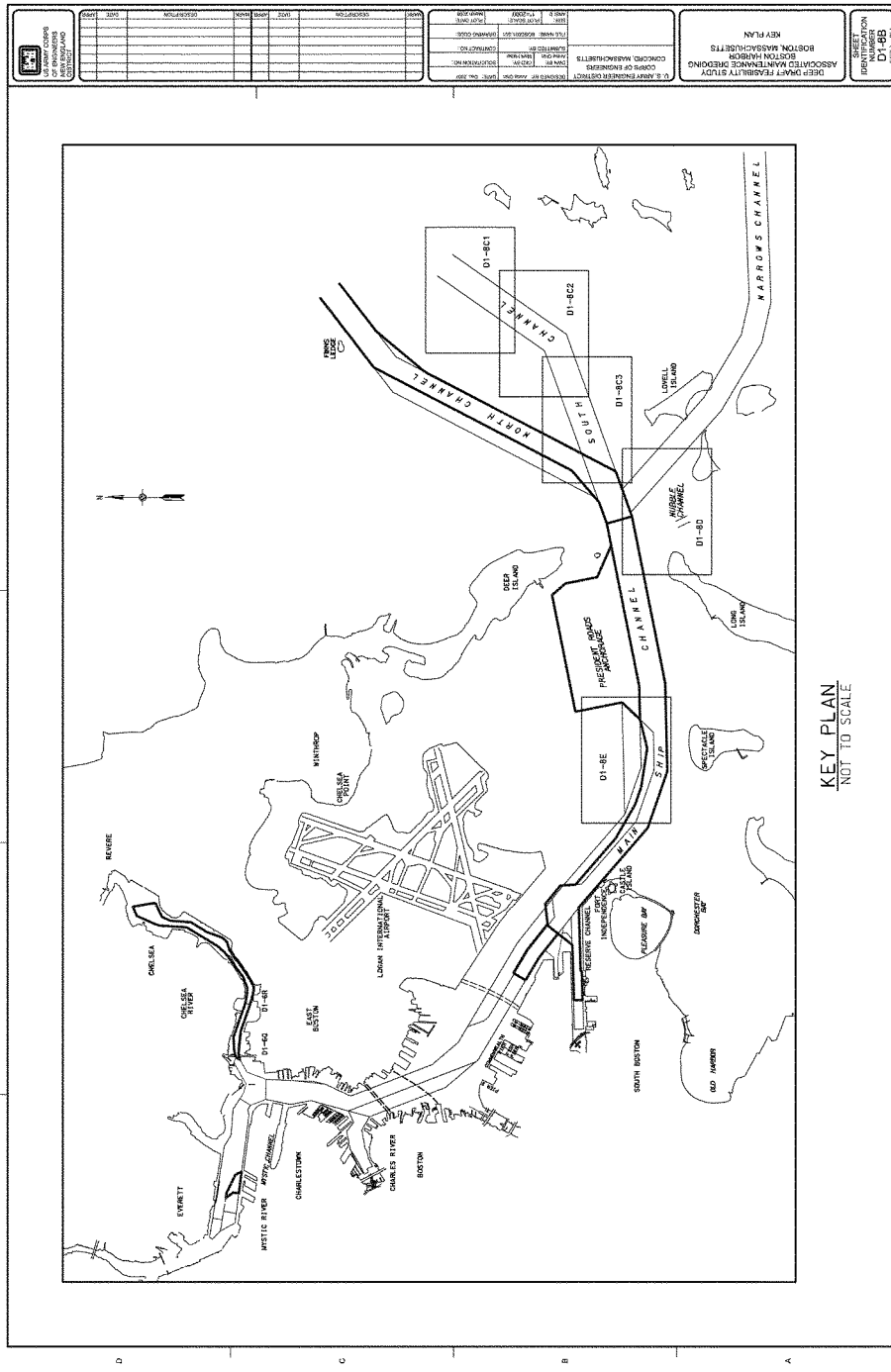
4	D1-8C2	BOSC102.S04	SOUTH CHANNEL MAINTENANCE PLAN - 2
5	D1-8C3	BOSC103.S05	SOUTH CHANNEL MAINTENANCE PLAN - 3
6	D1-8D	BOSC104.S06	NUBBLE CHANNEL MAINTENANCE
7	D1-8E	BOSC105.S07	35 - FOOT ANCHORAGE MAINTENANCE

US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT

DEEP DRAFT FEASIBILITY STUDY
ASSOCIATED MAINTENANCE DREDGING
BOSTON HARBOR
BOSTON, MASSACHUSETTS
COVER SHEET

SHEET IDENTIFICATION NUMBER
D1-8A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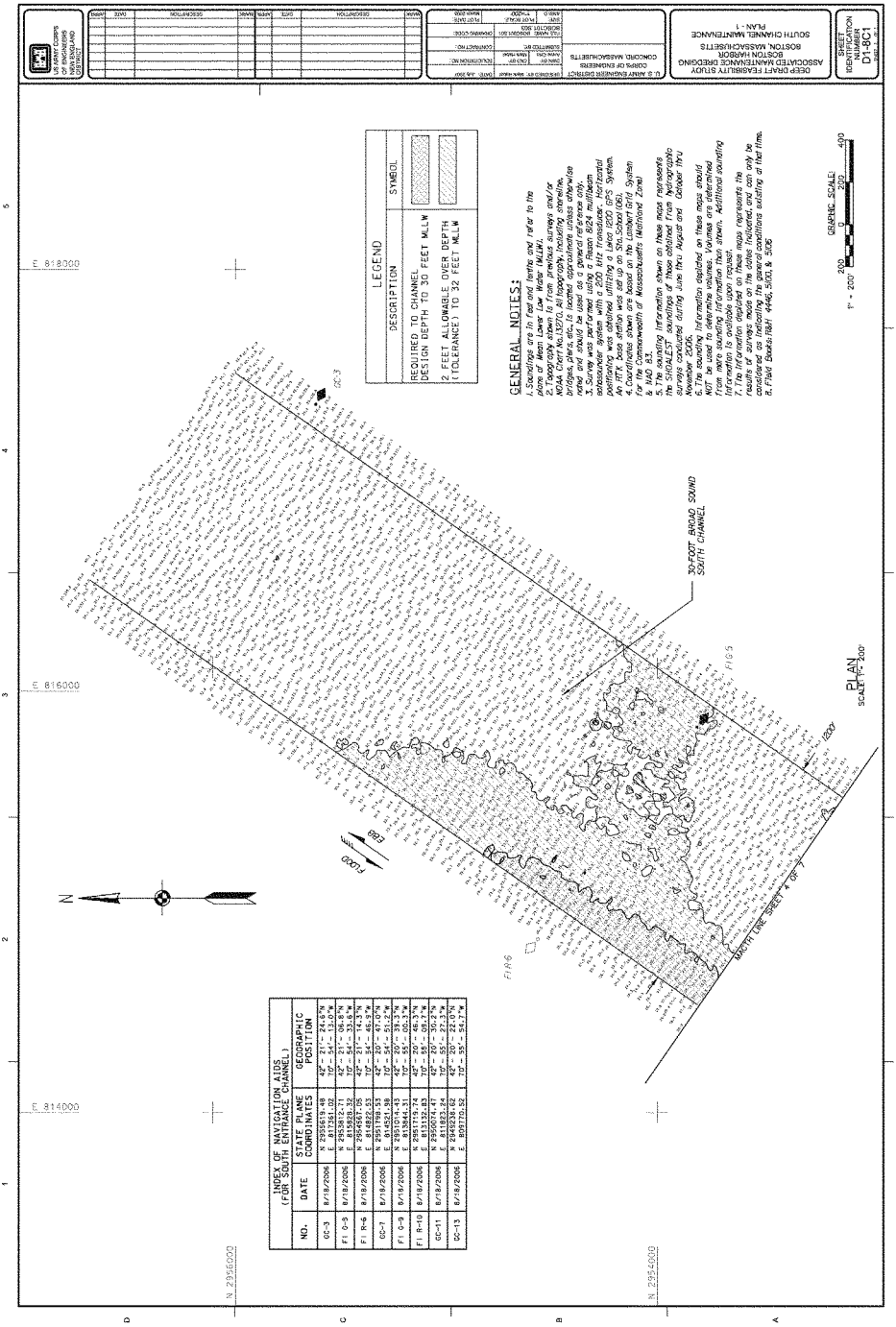
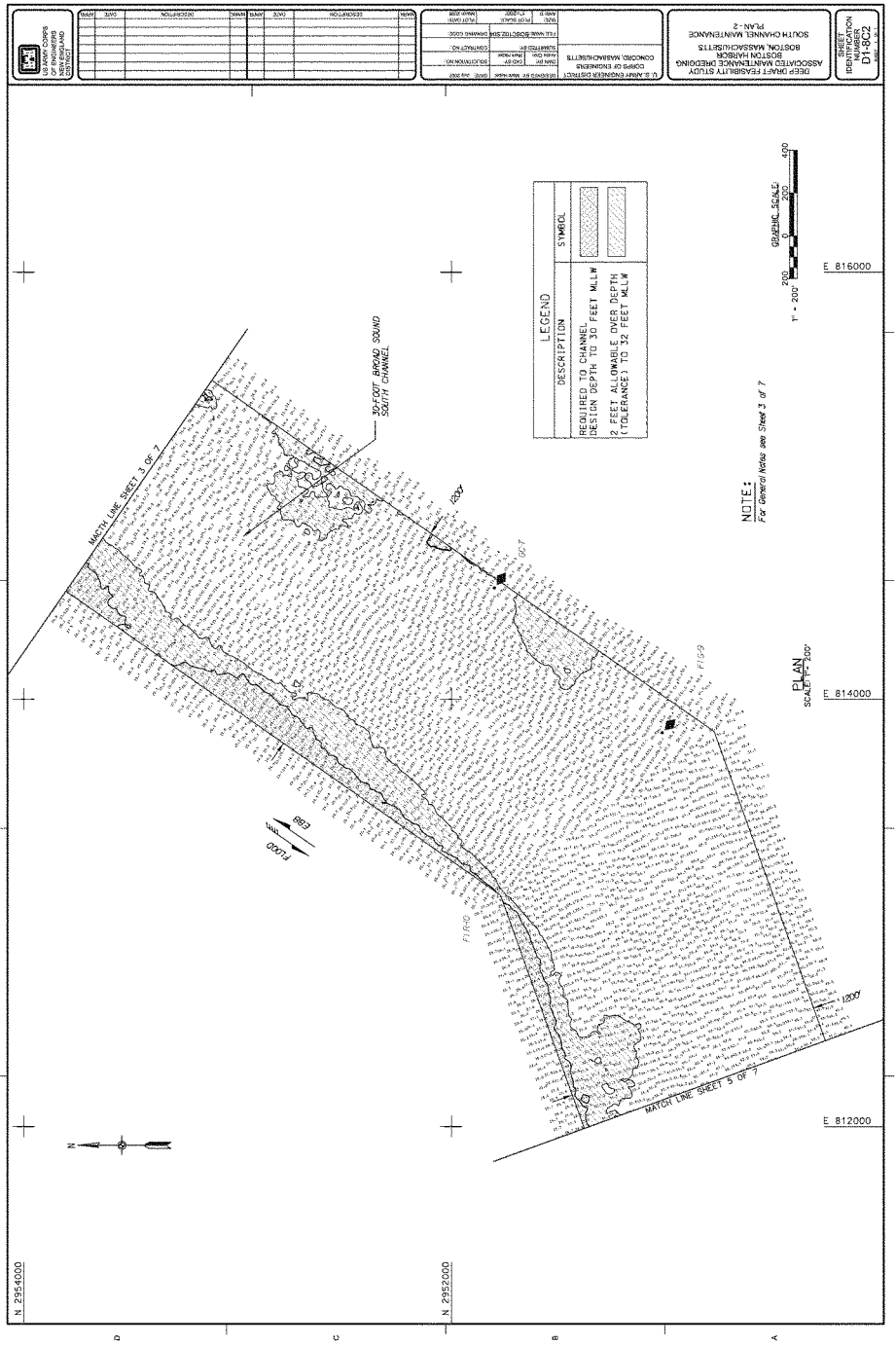
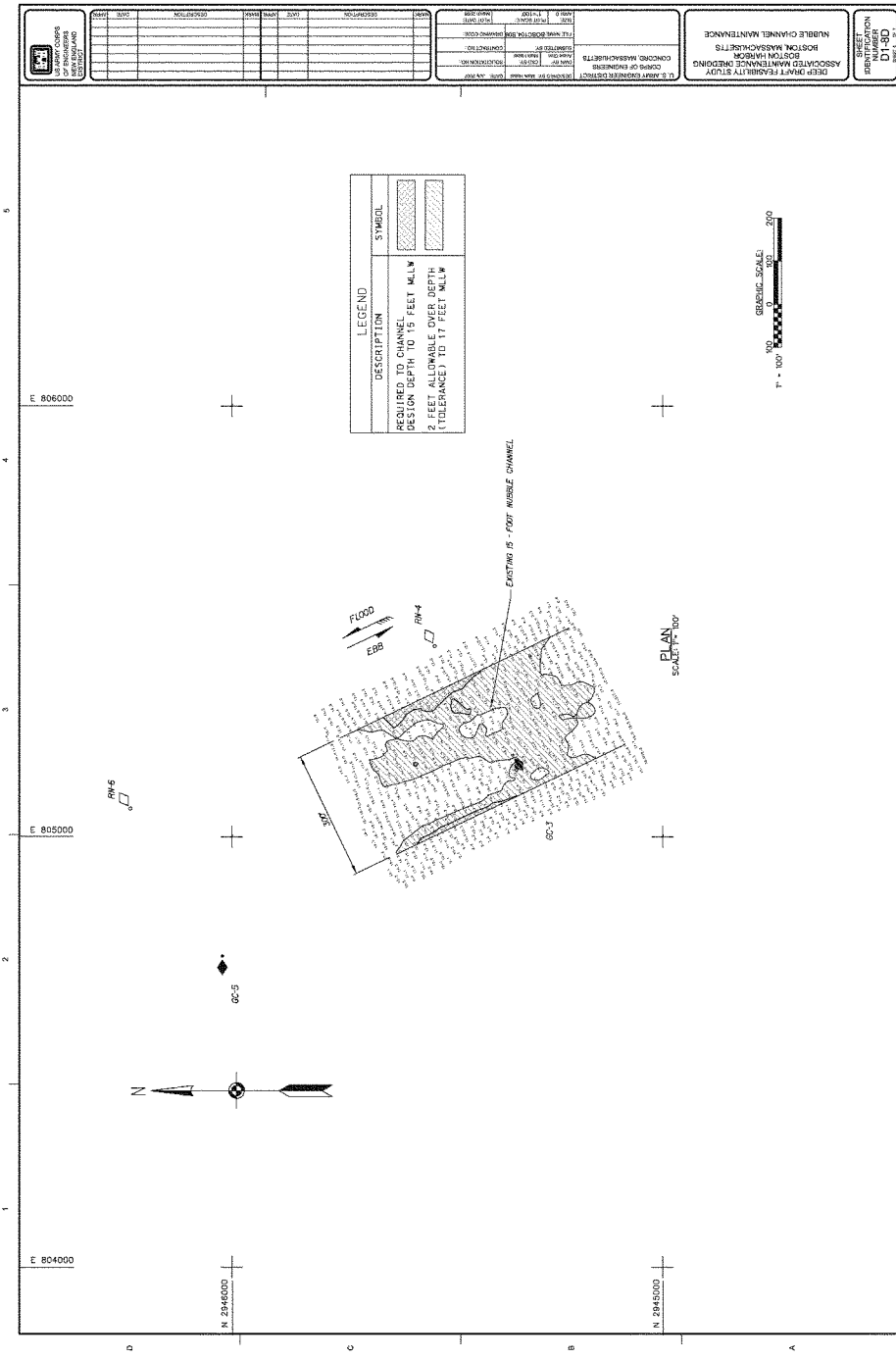
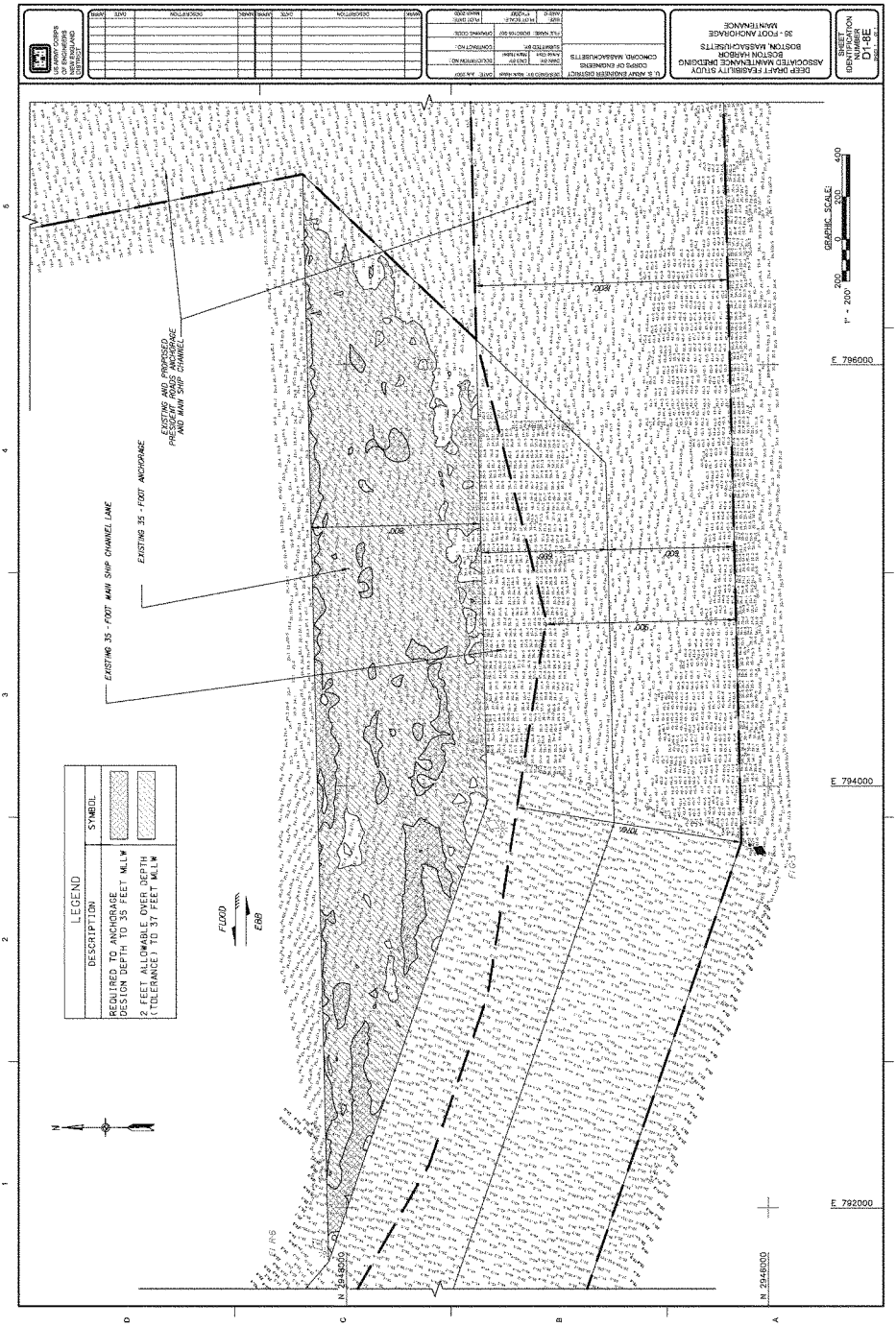
ASSOCIATED MAINTENANCE DREDGING
BOSTON HARBOR
BOSTON, MASSACHUSETTS
KEY PLAN
SHEET IDENTIFICATION NUMBER D1-8B
U.S. ARMY ENGINEER DISTRICT CONCORD, MASSACHUSETTS
KEY PLAN
NOT TO SCALE
D1-8C1
D1-8C2
D1-8C3
D1-8D
D1-8E
D1-8G
D1-8R
NORTH CHANNEL
SOUTH CHANNEL
MAIN SHIP CHANNEL
HARROWS CHANNEL
PRESIDENT ROADS ANCHORAGE
RESERVE CHANNEL
FORT INDEPENDENCE
PLEASURE BAY
DORCHESTER BAY
SOUTH BOSTON
CHARLESTOWN
CHARLES RIVER
BOSTON
EVERETT
MYSTIC RIVER
MYSTIC CHANNEL
CHELSEA
CHELSEA RIVER
EAST BOSTON
LOGAN INTERNATIONAL AIRPORT
WINTHROP
CHELSEA POINT
REVERE
DEER ISLAND
LONG ISLAND
SPECTACLE ISLAND
LOVELL ISLAND
FINNS LEDGE
N


DEEP DRAFT FEASIBILITY STUDY
ASSOCIATED MAINTENANCE DREDGING
BOSTON HARBOR
BOSTON, MASSACHUSETTS
SOUTH CHANNEL MAINTENANCE
PLAN - 1
U.S. ARMY ENGINEER DISTRICT, BOSTON
COMPILED AT THIS SCALE
DRAWN BY
DESIGNED BY
CHECKED BY
SUBMITTED BY
APPROVED BY
DATE
DRAWING CODE
DRAWING NO.
DESCRIPTION NO.
DESCRIPTION
DATE
REVISIONS
NO.
BY
APP'D
DATE
DESCRIPTION
GENERAL NOTES:
LEGEND
DESCRIPTION
SYMBOL
REQUIRED TO CHANNEL DESIGN DEPTH TO 30 FEET MLLW
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 32 FEET MLLW
INDEX OF NAVIGATION AIDS
(FROM SOUTH ENTRANCE CHANNEL)
NO.
DATE
STATE PLANE COORDINATES
GEOGRAPHIC POSITION
GC-3
8/18/2006
N 2955619.48
E 817381.02
42° - 21' - 24.5"N
70° - 54' - 13.6"W
FI G-5
8/18/2006
N 2956212.77
E 815828.32
42° - 21' - 30.3"N
70° - 54' - 53.6"W
FI R-6
8/18/2006
N 2954567.05
E 817472.53
42° - 21' - 14.3"N
70° - 54' - 46.5"W
GC-7
8/18/2006
N 2951769.53
E 814531.98
42° - 20' - 47.0"N
70° - 54' - 51.2"W
FI G-9
8/18/2006
N 2952114.49
E 813944.31
42° - 20' - 58.3"N
70° - 55' - 03.1"W
FI R-10
8/18/2006
N 2951119.74
E 815372.43
42° - 20' - 46.3"N
70° - 55' - 05.7"W
GC-11
8/18/2006
N 2950332.49
E 811823.24
42° - 20' - 38.7"N
70° - 55' - 27.5"W
GC-13
8/18/2006
N 2949236.62
E 809710.82
42° - 20' - 27.9"N
70° - 55' - 54.1"W
PLAN
SCALE 1" = 200'
GRAPHIC SCALE
1" = 200'
DEPTH USE SHEET 4 OF 7
30-FOOT ABROAD SOUND SOUTH CHANNEL
FIR6
FIG5
N 2956000
N 2954000
E 818000
E 816000
E 814000


US ARMY CORPS OF ENGINEERS NEW ENGLAND DISTRICT
U.S. ARMY ENGINEER DISTRICT CORPS OF ENGINEERS CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY ASSOCIATED MAINTENANCE DREDGING BOSTON HARBOR BOSTON, MASSACHUSETTS SOUTH CHANNEL MAINTENANCE PLAN - 2
SHEET IDENTIFICATION NUMBER D1-8C2
LEGEND
DESCRIPTION
SYMBOL
REQUIRED TO CHANNEL DESIGN DEPTH TO 30 FEET MLLW
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 32 FEET MLLW
GRAPHIC SCALE
1" = 200'
NOTE:
For General Notes see Sheet 3 of 7
PLAN
SCALE 1" = 200'
30-FOOT BROAD SOUND SOUTH CHANNEL
MATCH LINE SHEET 3 OF 7
MATCH LINE SHEET 5 OF 7
FLOOD
EBB
1200'
GC-7
F1G-9
F1R-0
E 816000
E 814000
E 812000
N 2954000
N 2952000

US ARMY CORPS
OF ENGINEERS
NEW ENGLAND
DISTRICT
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
DEEP DRAFT FEASIBILITY STUDY
ASSOCIATED MAINTENANCE DREDGING
BOSTON HARBOR
BOSTON, MASSACHUSETTS
SOUTH CHANNEL MAINTENANCE
PLAN - 3
SHEET
IDENTIFICATION
NUMBER
D1-8C3
MATCH LINE SHEET 4 OF 7
E 812000
E 810000
E 808000
N 2950000
N 2948000
LEGEND
DESCRIPTION
SYMBOL
REQUIRED TO CHANNEL
DESIGN DEPTH TO 30 FEET MLLW
2 FEET ALLOWABLE OVER DEPTH
(TOLERANCE) TO 32 FEET MLLW
GRAPHIC SCALE
1" = 200'
NOTE:
For General Notes see Sheet 3 of 7
30-FOOT BROAD SOUND
SOUTH CHANNEL
EXISTING AND PROPOSED
NORTH ENTRANCE CHANNEL
DEEP LANE
EXISTING
NORTH CHANNEL
35-FOOT LANE
FLOOD
EBB
1200'
GC-13


DEEP DRAFT FEASIBILITY STUDY
ASSOCIATED MAINTENANCE DREDGING
BOSTON HARBOR
BOSTON, MASSACHUSETTS
WUBBLE CHANNEL MAINTENANCE
SHEET IDENTIFICATION NUMBER
D1-3D
U.S. ARMY CORPS OF ENGINEERS
NEW ENGLAND DISTRICT
CONCORD, MASSACHUSETTS
LEGEND
DESCRIPTION
SYMBOL
REQUIRED TO CHANNEL DESIGN DEPTH TO 15 FEET MLLW
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 17 FEET MLLW
EXISTING 15 - FOOT WUBBLE CHANNEL
FLOOD
EBB
RW-4
RW-5
GC-3
GC-5
400'
PLAN
SCALE: 1" = 100'
GRAPHIC SCALE
1" = 100'
N
E 806000
E 805000
E 804000
N 2946000
N 2945000
A
B
C
D
1
2
3
4
5


DEEP DRAFT FEASIBILITY STUDY
ASSOCIATED MAINTENANCE DREDGING
BOSTON, MASSACHUSETTS
35 - FOOT ANCHORAGE
MAINTENANCE
U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS
LEGEND
DESCRIPTION
SYMBOL
REQUIRED TO ANCHORAGE DESIGN DEPTH TO 35 FEET MLLW
2 FEET ALLOWABLE OVER DEPTH (TOLERANCE) TO 37 FEET MLLW
FLOOD
EBB
EXISTING 35 - FOOT MAIN SHIP CHANNEL LANE
EXISTING 35 - FOOT ANCHORAGE
EXISTING AND PROPOSED PRESIDENT ROADS ANCHORAGE AND MAIN SHIP CHANNEL
GRAPHIC SCALE
1" = 200'
E 796000
E 794000
E 792000
N 2948000
N 2946000

BOSTON HARBOR
MASSACHUSETTS

NAVIGATION IMPROVEMENT STUDY

FINAL FEASIBILITY REPORT
AND FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
AND MASSACHUSETTS FINAL
ENVIRONMENTAL IMPACT REPORT

APPENDIX D-2

PROJECT COST ESTIMATES

(REVISED FEBRUARY 2013)

APPENDIX D2 – PROJECT COST ESTIMATES

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APPENDIX D-2
PROJECT COST ESTIMATES
BOSTON HARBOR NAVIGATION IMPROVEMENT STUDY

PROJECT SCOPE

The Boston Harbor Deep Draft Navigation Improvement Project involves improvements to four separate segment of the existing waterway. These are:

PLAN ABC (nine depth increments): These alternatives, referred to as the Main Channels Improvement Plan, or Plan ABC, consist of deepening access from the sea to the Conley Container Terminal in South Boston for the benefit of the larger Panamax and Post-Panamax containerships. These plans include deepening the Broad Sound North Entrance Channel, the Main Ship Channel from President Roads to the Reserved Channel, the Reserved Channel Turning Area, the lower Reserved Channel up to the Conley Terminal, and the President Roads Anchorage Area. In all plans, the entrance channel would be deepened an additional two feet to compensate for increased sea states in the bay and outer harbor.

The main channel plans differ only with respect to depth optimization. Economic optimization evaluated the range of channel depths from 42 to 50 feet in one-foot increments. Originally these were further broken down in the 2008 draft report based on specific language included with the appropriation that called for the reconnaissance study asked for an examination of a depth to the Conley Terminal of 45 feet and anticipated container vessel class increases. These were: Plan A – 45 feet, Plan B – 48 feet, and Plan C – 50 feet. Since 2008 extensive additional economic analysis has been conducted with the aim of refining depth optimization for the main channels plans that would improve containership navigation. The nine depth alternatives from 42 feet to 50 feet are now collectively referred to as Plan ABC. In three additional plans formulated after the economic analysis yielded a recommendation for a 47-foot inner channels design depth, the entrance channel would be deepened an additional three, four or five feet. Therefore the 47-foot channel plan has four entrance channel alternative depths: 49, 50, 51 and 52 feet.

The alternatives of Plan ABC include expansion of the Reserved Channel Turning Area to a 1500-Foot diameter, widened at its junctions with the Main Ship and Reserved Channels and further widened to the northeast by 100 feet, all as recommended by the ship simulation study. These three plans also include widening the deep lane of the Main Ship Channel to a width of 800 to 900 feet in the reaches above the Roads to the Reserved Channel, and widened further at the three critical bends at Finns Ledge, Spectacle Island and the Lower Middle Shoal below Castle Island.

PLAN D: This plan, referred to as the Main Ship Channel Deepening Extension, involves extending the deepening of the harbor's Main Ship Channel above the Reserved Channel Turning Area to the Massport Marine Terminal in South Boston to a depth of up to –45 feet MLLW. This plan's costs would be incremental to the main channels plans, and would benefit Massport's redevelopment of the MMT as a bulk cargo facility with 45-foot berth.

PLAN E: Deepening a small portion of the 35-foot segment of the Mystic River Channel to up to 40 feet to access Massport's Medford Street Terminal in Charlestown, and connect the existing 40-foot channel to the 40-foot berth at the terminal. This are was not deepened as part of the 1990 authorized improvement as the benefits of improving access to an undefined planned bulk cargo facility were not yet developed. Massport has now redeveloped this terminal and deepened its berth to 40 feet to accommodate smaller bulk cargo operations for which space is not available at the Marine Terminal in South Boston.

PLAN F: This plan involves deepening and minor widening of the Chelsea River Channel, including its upstream turning basin from its current depth of –38 feet to –40 feet MLLW, to improve access to most of the port's petroleum terminals and other users of that channel. This plan assumes that construction of the new Chelsea Street Bridge, now underway, will be completed by the Massachusetts Highway Department, the City of Boston and the US Coast Guard prior to any channel deepening and that the Corps will increase the channel width through the new wider bridge opening to at least 175 feet under its O&M authority. The channel widening is scheduled for either the 2011-2012 or 2012-2013 dredging seasons. The Keyspan gas siphon located under the channel immediately downstream of the Chelsea Street Bridge has been replaced since the publication of the 2008 Draft Final Feasibility Report by a deep directional bore and the old siphon was removed during the 2008-2010 major maintenance dredging operation for the inner harbor. The presence of a second MWRA water tunnel downstream of the Chelsea Street Bridge, not identified at the time of the 2008 report, required additional investigations by the Corps and State. The MWRA estimates the 2015 cost of replacement and removal of that water tunnel at about $15 million including design efforts.

Details of each of these plans will be provided in separate sections of this appendix together with the quantity and cost estimates for each.

PROJECT IMPLEMENTATION COSTS

Project cost estimates involve several assumptions. Those involving quantities and material types, dredged material disposal options, utilities, bridges and associated non-Federal facilities and berth improvements are discussed above. Cost estimates are broken down into line items for the various stages in the construction process, the types of work being accomplished (e.g. the types of material being removed), or whether efforts are accomplished under contract or through direct agency resources (e.g. labor). Contingencies were developed using risk analysis for the contract cost and are included in the construction estimates. Contingencies are also worked into non-contract costs separately. Items estimated in prior fiscal years are escalated to the current period for cost-benefit comparison purposes, and are further escalated to the anticipated construction period for budgeting purposes.

Mobilization and Demobilization Costs (Mob-Demob): Mob-Demob costs include the contractor's costs for preparing his plant and transporting it to and from the project site. Mob-demob costs for this project assume a large contractor mobilizing from an east coast port to and from Boston Harbor. Major mobilization and demobilization are included with only one feature or segment of the project and lesser costs were associated with moving

within the project from one segment to the next. A summation of Mob-Demob costs is provided in Table D2-1. Due to Air Quality concerns discussed elsewhere there are shut-down periods built into the schedules for the larger volume and longer duration plans that will require demobilizations and remobilizations every other winter to reduce air emissions. Costs for these additional activities are reflected in the estimates. If during the project's design phase, changes to EPA air attainment standards and thresholds, or lesser cost means of meeting the air quality regulations, such as purchase of credits, or implementation of offset methods are identified that would results in a cost savings to the project, then use of construction period shut-downs with their increase mob-demob costs would be reconsidered.

Unit Costs for Dredging and Disposal: Costs for removal of material to construct the deepened and widened channels are provided per cubic yard of material in-place based on hydrographic surveys performed by New England District survey crews. Separate costs are given for (1) dredging and disposal of ordinary material, (2) drilling and blasting of rock and other hard materials (consolidated tills), and (3) removal and disposal of rock and hard materials. Ordinary material dredging unit costs include dredging, transport and disposal. Rock removal costs include drilling and blasting, dredging, transport and disposal. The details of each type of work are discussed below.

Construction Sequencing for Marine Resource Impacts: It is assumed that due to the wide range of resource issues in the harbor and the larger areas covered by the several proposed improvements, that dredging could occur year-round with proper sequencing of work to avoid environmentally sensitive areas at different times of year. This has been the experience with the recent large-scale dredging operations in the harbor; the 1998-2001 maintenance and improvement dredging of the main tributary channels, and the 2004-2005 major maintenance dredging of the outer harbor features, and the 2008-2010 inner harbor major maintenance operation which was timed to minimize lobster impacts in the lower harbor. Winter flounder are found in various areas of the lower harbor at different times of year, while anadromous fish transit the harbor to and from the Mystic and Charles Rivers in the spring and late fall. Maintenance construction in 2008-2010 occurred year-round, but will shift between different areas of the harbor seasonally to minimize impacts. A similar sequencing will be developed for this deep draft improvement project, which provides more flexibility for these adaptations given its larger scope. Sequencing will be developed in consultation with the State and Federal resource agencies during the design phase, and will incorporate the air quality shutdown periods as discussed below should that aspect of the sequencing be retained.

Dredging Plant and Process: It was originally anticipated that two to three large mechanical dredges (bucket or clamshell) would be employed on the job round the clock and year-round for the period of construction. At the conclusion of the air quality analysis it was determined that use of a third dredge would increase annual emissions beyond the level that could be reasonably addressed through biannual construction shutdowns. The final plan for removal of ordinary material is based on two dredges working 24/7 except during the air quality shutdown periods which will occur every other winter as described in the air quality mitigation section below. Both dredges are anticipated to be large barge-mounted cable arm dredges using toothed buckets of 22 cubic yards or greater in size, except in the Mystic and

Chelsea River where use of smaller equipment was estimated. During the 1998-2001 construction, and subsequent maintenance operations, the contractor used the same larger-sized equipment for all project areas, including the Mystic and Chelsea Rivers.

The dredges would remove the material from the channel bottom and place the material in large split-hull scows for transport to the disposal site. Each dredge would require at least three scows of 5000 cubic yards capacity and two or more ocean-going tugs, so that one scow may be filled while the others are in transit to and from the disposal site, to minimize dredge idle time. Scows of 3000 cubic yards capacity would be used in the Mystic and Chelsea Rivers with the smaller dredge. The contractor is also expected to employ smaller harbor tugs to help position the equipment, work boats for crew and supply transfer, a fuel barge, and a survey boat.

Blasting Plant and Process: Rock removal during the 1998-2001 improvement dredging of the Reserved Channel, Turning Basin, Inner Confluence and Mystic River was accomplished by ripping the bedrock with a large toothed bucket mounted on a heavy excavator. Only the granite ledge in the upper Chelsea River required blasting for removal under that project. However, until the conclusion of the subsurface exploration program included in the design phase of this project, it cannot be determined whether the large volumes of rock required to be removed will lend itself to ripping or removal by other means such as a rock hammer. It may be that the rock cuts from the last improvement project were from zones that were more heavily weathered and fractured thus lent themselves to removal by ripping, and that the rock encountered in this improvement will be different in character. Rock cuts of more than five feet were made in all areas of the 1998-2001 work by bucket ripping without difficulty. For the feasibility level estimates it was assumed that drilling and blasting would be required for removal of all rock under this project.

Blasting and removal of rock ledge is a two-stage operation: drilling and blasting followed by dredging and disposal. It is assumed that one or two large drill barges (depending on the project segment) would be employed for fracturing the ledge areas or any very large boulders identified for removal from the several project segments. Whether one or two drilling rigs will be required is based largely on the depth increment and total volume of rock requiring removal. The drill barges would each mount three drill frame set for an average 9-foot spacing (7-foot spacing at Chelsea River). An explosives barge would be used to transfer charges from shore to the blasting sites and to store charges.

The area to be drilled and blasted for rock removal includes side slope areas outside the channel limits, additional holes around the perimeter of the target area to ensure sufficient fracturing, and an additional required removal horizon of two feet and the two-foot allowable overdepth horizon. Over-drilling of the charge holes by four to five feet below the allowable overdepth is included to ensure that the cones of rock fractured by each charge will overlap below the overdepth elevation, ensuring the ability to remove of all rock to at least the allowable grade. This requires drilling and blasting over a slightly larger area than that within the contour of the target removal elevation.

Rock removal estimates also include costs for test blasts, seismic monitoring, safety inspection, fish monitors, fish startle systems, and daylight-only operations for blasting. In developing the estimates for Boston Harbor the New England District relied on the New York District's generic drilling and blasting program developed from their extensive experience with the New York – New Jersey Harbor Kill Van Kull blasting and rock removal operation. The District also consulted with the Corps Walla Walla District (the Corps Center of Expertise for Cost Estimating) in development of the drilling and blasting estimates. Drilling costs are dependent on the square-footage of the area to be drilled, hole spacing, the depth of cut required, and the drilling efficiency (linear feet of hole drilled per day). Side slope areas were included in these estimates. To be conservative at this phase of project cost estimating, the area used to calculate the drilling and blasting plan and for rock removal area included all areas of required material, plus an area outside the required footprint equal to 20 percent of the additional footprint to the allowable overdepth elevation. This will ensure that the estimate includes sufficient area to permit fracturing of all required and allowable material within the required dredging footprint, and attainment of the required elevation by dredging all rock within the required elevation.

The estimates assume that a large barge-mounted excavator or heavy clam shell bucket of 16 cubic yards or greater would be used for removal of rock and other hard materials. As with the unconsolidated materials, the rock and hard material would be placed in split-hull scows for transport to the disposal or beneficial use site(s). The additional equipment supporting the excavator operations, including tugs, scows, work boats, survey boats, and fuel barge were also included in the rock estimates.

Disposal of Dredged Material: All disposal costs are included in the unit costs for each of the two classes of material to be removed. All improvement dredging material has been found suitable for unconfined open-water disposal at the MPRSA designated Massachusetts Bay Disposal Site, based on a Suitability Determination with US EPA concurrence dated 8 December 2006. Under the Federal Base Plan for this improvement project all dredged material would be loaded into scows and towed to the MBDS for discharge. The MBDS is located about 18 miles easterly of the harbor entrance. The actual haul distance from each dredge area to the Massachusetts Bay Disposal Site was used to compute cycle times and transit costs. Multiple scow and tug units would be assigned to each dredge or excavator to allow for uninterrupted dredging operations. Depending on which project area was being worked, any overlying maintenance material would either be dredged and disposed along with the improvement material at the MBDS, or would be removed separately and placed in scows for deposit in one or more of the existing CAD cells dredged beneath the channel in the upper harbor above the tunnels.

Haul Costs: Hauling costs are included in the unit costs for each of the two classes of material to be removed. Haul times to the disposal site are based on the actual haul distance to the Massachusetts Bay Disposal Site from each plan under consideration. For the several channel improvement plans the actual distance varied from 21 to 31 miles. The haul times were used to determine the cycle times for the scows and the number of scows and tugs needed to maintain a continuous dredging operation.

Air Quality Impacts on Project Cost: Air quality concerns with potential threshold exceedance for non-attainment pollutants during construction required stretching out the construction period. This was accomplished by adding no-work periods to limit construction to nine months per year, thus lowering the annual emissions totals for the construction plant. During design the potential to avoid shut-downs through air quality mitigation or the purchase of air quality credits will be examined. Proposed EPA changes to attainment designations as of December 2012 were not finalized or implemented through changes in regulations and therefore could not be considered in the timeline and estimates. Also at this time opportunities for mitigation and availability of credits for sale within the non-attainment area were considered speculative. Mitigation, including the purchase of emissions credits must reduce emissions of those target pollutants to zero, not merely back to the threshold level. Contingent on further investigation, construction shut-down periods, even with the additional mobilization/demobilization and escalation costs, are considered the least-cost means of compliance with the Clean Air Act. These shutdowns increased the mobilization/ demobilization costs and cost escalation factors for the affected plans. The shut-down periods were sequenced to bridge calendar years, thereby minimizing additional mobilization/ demobilization costs. The impact of air quality emission threshold shutdowns on the construction period is shown in the estimate tables for the individual main channels improvement plans. A graphic representation of the construction sequencing timeline for the recommended plan is included with the Construction Schedule at the end of this Appendix.

Contract Costs: Mob-demob costs and unit costs for material removal and disposal include contractor's plant, labor, insurance and materials costs, as well as overhead, bond and profit. The sum of these costs represents the anticipated contract cost, subject to contingencies and escalation.

Contingencies: Contingencies are applied to the construction contract estimates to account for actual variations in the nature and quantities of dredged materials, potential weather impacts, types and sizes of equipment available to potential bidders, bid competition, changes in market rates for equipment rental and operation, costs of bonds, and other factors affecting dredging production and costs. Contingency levels may be adjusted during final design based on changes in the level of certainty and risk associated with these variables.

As of August 2007, the Corps requires that all project cost estimates for large construction projects undergo a risk analysis to determine the appropriate contingency to use for each aspect of project construction. In consultation with the Walla Walla District Cost Estimating Center of Expertise, models were developed for each segment of the project including drilling and blasting, dredging, and rock removal efforts. Contingency estimates were adjusted based on the results of this analysis. Samples of the risk evaluation, the resulting contingency determinations, and detailed cost estimates for the several improvement plans are provided for the optimized depth alternative in the following sections on each project segment. As contingency risk analysis was calculated separately for the four major project segments for the main channels improvement plans, a weighted average contingency was developed for those plans and depth increments, as shown in Table D2-2. The resulting contingency values were used for these individual plans. The contingency

values for the 46-foot increment were used for all lesser increments. The contingency values for the 49-foot increment were used for the 50-foot depth increment.

Environmental Monitoring: Environmental monitoring (EM) costs are included as a separate line item in the Construction Management costs. These costs would be incurred during the period of construction and for a period of five years post-construction. These costs include field monitoring investigations and analysis, and preparation of monitoring reports for the dredging areas and the MBDS. Monitoring of CAD Cells used for maintenance material is an operations and maintenance cost and is not included in these estimates. Monitoring for any beneficial use alternatives and sites would be developed further during the design phase if it is decided to include such opportunities in the implemented project. The feasibility level estimate has drawn on the District's experience with the recent projects in Boston Harbor and requests by City, State and Federal agencies for monitoring at the dredge site, and the Corps ongoing efforts for monitoring activity at the MBDS in concert with US EPA's site management and monitoring plan. It was assumed for the purpose of developing EM costs that monitoring of turbidity at the dredge site and surveys of mound formation at the MBDS would be the focus of monitoring efforts. A plume tracking study is being conducted for the Inner Harbor maintenance dredging effort to verify SSFATE modeling of the harbor. Depending on the results of this study, further turbidity plume monitoring may be found unnecessary.

Environmental monitoring costs are largely a function of the construction duration of any particular plan (the length of time of dredging and disposal activities) and therefore relative to the construction contract cost. For this level of analysis a series of monitoring events were forecast during the construction period for each of the improvement plans. Pre and immediate post-construction monitoring events were also included in the total of events and a cost per event was assumed. These calculations are shown in Table D2-3 and are included in the cost estimate tables for the individual plans.

Planning, Engineering and Design Costs (PED): PED costs consist of costs for the design phase including development of any required design phase document and preparation of Plans and Specifications, Design phase costs for this project include final development of beneficial use plans, preparation of a final Design Document, final regulatory permitting for the project, specifications surveys, preparation of Plans and Specifications, and related costs for management and pre-construction contracting and other pre-construction phase activities. Table D2-4 contains a detailed table of itemized PED estimates for the several plans and increments under consideration. PED estimates for this project include the below listed tasks.

- Project management and advanced planning activities during design
- Hydrographic surveys of the dredging and disposal areas for refinement of quantity estimates and design of disposal activities
- Subsurface explorations (borings and probings) to define the nature and quantities of various material classes at depth, particularly rock and other hard materials
- Seismic surveys of areas of the project not surveyed during feasibility also to be used to help refine the nature and extent of various materials at depth
- Additional ship simulator runs using larger container ships if necessary

- Geotechnical investigations to establish set-backs for dredging alongside various facilities and to assist in developing the blasting plans
- Structural engineering investigations of waterfront structures to assist in set back development and to assist in developing the blasting plans
- Cultural resource investigations in areas not already covered during feasibility, including the channel widening areas along Chelsea River and the beneficial use sites
- Preparation of a supplemental NEPA document to cover design changes and the beneficial use alternatives
- Continued public involvement and participation of the Corps in the Technical Working Group during the design phase
- Preparation of a design document and reviews
- Updates to the economic evaluation
- Updates to the project design and cost estimates if necessary from the other investigations and to decision-making parameters current
- Environmental investigations of the beneficial use sites, should the State, EPA and the Sponsor support including these sites and plans in the project
- Preparation of Plans and Specifications for soliciting bids for construction

Construction Management Costs (CM): Construction Management costs include costs for contract administration; supervision and inspection of the construction contract activities, including silent inspector services; pre-dredge, progress and after-dredge surveys; and management during the construction phase. These costs are also largely relative to the construction duration and some are estimated in part as a percentage of the contract cost. Costs for Engineering During Construction (EDC) dealing with construction phase engineering investigations and design modifications are traditionally included with PED costs, but have been included in the Construction Management discussion, as they would be budgeted in this phase, not in PED. Table D2-5 contains a detailed table of itemized S&A estimates for the several plans and increments under consideration. S&A estimates for this project include the following tasks:

- Project management and advanced planning activities during construction
- Hydrographic surveys of the dredging area prior to, during and after construction of each major project segment to determine pre-dredge, progress and post-dredge quantities for purposes of assuring project acceptance and completion, and for measurement and payment
- Contracting division, safety office and other support during contract award, construction and contract close-out
- Construction contract administration costs
- Construction supervision and inspection costs, including inspectors, construction management, travel and other inspection costs
- Diving inspection and supervision costs during blasting operations
- Continued public involvement and participation of the Corps in the Technical Working Group during the construction phase
- Preparation of a construction summary document
- Engineering during construction (EDC)

Aids to Navigation: The United States Coast Guard is responsible for managing and maintaining the systems of aids to navigation in the nation's ports and harbors. As the proposed improvement plans involve deepening of existing marked Federal channels, no new aids to navigation would be required for any of the improvement plans. Relocation and resetting of some buoys may be required during construction to facilitate dredging operations, and at the conclusion of construction of each channel area to mark the new deep lane width and turns. The relocation of navigation aids is a Federal expense to be paid by the United States Coast Guard, and is included in the project cost. The number of aids that require resetting is shown below. Costs for these relocations are included in the estimates for each plan as required. Table D2-6 displays the costs for Aids to Navigation.

AIDS TO NAVIGATION REQURING RESETTING BY CHANNEL REACH			
Broad Sound North Entrance Channel	6	Reserved Channel	0
President Roads Anchorage	2	Main Ship Channel Extension to MMT	2
President Roads Reach of MSC	2	Mystic River	0
Lower Main Ship Channel	6	Chelsea River	4

Real Estate Costs: All lands required for construction and future maintenance of the project, including areas needed for disposal of dredged material and beneficial use of dredged material, are subtidal, and subject to the navigation servitude. Temporary use of a waterfront parcel to locate construction trailers, construction crew parking, shore access and berths for vessels and some equipment, during construction and future maintenance dredging operations are the only interests needed for the project. On the recent improvement and maintenance projects Massport made land at its waterfront facilities available for these uses. Massport has agreed to provide space at one of its many facilities for temporary office space, construction team parking and berth access for survey and work boats and tugs. The Sponsor's costs for temporarily providing this access, have been included in the project costs, and described in a Real Estate Plan dated 17 September 2007, included with this Feasibility Report as Appendix E. For purposes of the Feasibility analysis, these costs were considered creditable against the Sponsor's reimbursable share of project costs. Whether these real estate costs are in fact reimbursable will depend on whether the areas made available are upland or are subject to the navigation servitude. This determination will be made during negotiation of the Project Partnership Agreement with the Sponsor when actual temporary space to be used is identified.

As the berths and piers are also subject to navigation servitude no credit would be due the Sponsor for this use. However, during the 1998-2001 improvement project, the temporary office space and a parking area were located on an upland site adjacent to a Massport pier in East Boston. Massport as project sponsor for that work was given a credit against the

reimbursement amount for the project. For purposes of the feasibility level estimate, real estate costs were estimated based on the square footage of land and reimbursement rates used for the 1998-2001 work, escalated to July 2011. This cost is also largely a function of the construction duration, which was used to compute the term the temporary facilities would be needed. These calculations are shown in Table D2-7 and in the tables presenting the costs of each project segment.

Cost Escalation: Costs were estimated at July 2011 price levels. The July 2011 cost is the first cost for purposes of the benefit-cost analysis which also uses benefits discounted to spring 2011 levels. For budget purposes, costs must also be escalated to the period of construction, so that project authorization amounts will more closely reflect the actual costs that will be incurred at the time of construction. This escalated cost is referred to as the fully funded cost. Typically the mid-point of the construction period for each plan and increment is used to compute the escalation factor to be applied. A cost escalation table developed for use with each project segment and increment from factors from the current Civil Works Construction Cost Index System (CWCCIS) document is provided as Table D2-8, and shows the derivation of the factors used for each plan and increment. Separate escalation factors were developed for the design and construction phases. The fully funded cost is used solely for budget purposes and is not used for benefit-cost analysis.

Cost Estimate Summary: Project cost estimates are presented in detail in the following sections. Estimates were developed using the Corps of Engineers Dredge Estimating Program (CEDEP), and are based in part on recent bids for similar work in the New England District (in particular at Boston Harbor) and elsewhere. Rock removal estimates also relied on the experience of the New York District in the New York – New Jersey Harbor deepening project, and on assistance from the Walla Walla District, as discussed above. The tables below summarize the cost estimates for the principal plans of improvement. In order to support an economic depth optimization analysis, project costs were estimated for one-foot depth increments for the principal channels under consideration. The estimates include costs for mobilization and demobilization (including shut-downs every other winter to avoid exceeding air emissions thresholds that would otherwise trigger more costly mitigation measures), dredging, rock blasting and removal, and disposal of materials, contingencies, environmental monitoring during and after construction, supervision and administration, planning, engineering and design, and real estate costs. Facility costs are also included where required.

The estimates of quantities, dredging areas, and construction and annualized costs for the several improvement plans and incremental depths are shown in the tables accompanying the detailed sections for each of the four project segments (Main Channels Improvements, Main Ship Channel Extension, Mystic River Channel, and Chelsea River Channel). For the recommended plan (depth) for each segment, the CDEP cost estimate spreadsheet including the contingency risk assessment summary sheet, is provided. Separate estimates are made for: (1) dredging and disposal of ordinary material, (2) drilling and blasting of rock, and (3) removal and disposal of the rock. A Total Project Cost Summary (TPCS) form for the recommended plan of improvement with separate tables for each project segment is provided at the end of this appendix.

Costs for non-Federal berth deepening for each plan are included in the tables for each detailed section, except for the Mystic River Channel (Plan D) where there are no non-Federal improvements required as Massport has already deepened that berth to the maximum elevation under consideration for the channel.

ANNUAL COSTS

The costs of dredging and disposal for the Federal project improvements must be annualized to place them on an equal footing to enable comparison to evaluated project benefits. First the total improvement cost of the Federal project is increased for interest during construction, to account for the cost of construction funds over the period of construction, yielding the total investment cost. The project construction period is expected to be about four to seven years for the large 42 to 50 foot containership channel deepening plan increments. Lesser periods of three to four months would be required for the Main Ship Channel Deepening Extension to the MMT, one month for the Mystic River Channel, and two months for the Chelsea River Channel improvement. Project implementation costs are annualized using factors developed from interest rates adjusted in accordance with Federal statutes and regulations covering evaluation of civil works water resources projects. The period of economic analysis for navigation improvements is 50 years, and the capital recovery factor for the current fiscal year (2013) is 3-3/4 percent amortized over that period. This factor (0.04457) is applied to the investment costs for each plan to determine the annual cost for interest and amortization of the investment cost. Regulations also require that annual costs for recommended improvements be displayed using a 7 percent interest rate for the 50-year period of analysis for the purpose of budget prioritization. Annual costs using this factor (0.07245) are also provided in the tables.

Annual costs also include an annualized estimate of the cost of maintaining the project over the period of analysis. Since the General Navigation Features of the proposed project are limited to dredging to deepen existing Federal channels, the only annual maintenance cost applicable to this improvement project is the increase in periodic maintenance dredging of the improved areas to their new recommended depth. This requires an analysis of current maintenance dredging frequency and volume for each channel segment and an estimate of any increase in shoaling rate and volume that would result from a deeper channel.

Maintenance dredging of the main channels and anchorage at Boston is typically required every 16 to 40 years, depending on the project segment. The last two maintenance cycles and volumes for each channel segment were examined to determine a representative annual shoaling rate. Channel deepening would not change the sediment discharge loads of the harbor tributaries (all of which are controlled by dams), longshore sediment transport (not a large factor at Boston), or the resulting channel shoaling rates. It is therefore not expected that channel deepening would increase the frequency or volume of maintenance required for the project. However, for purposes of this analysis it was decided to allocate an increase to the current maintenance requirements for the various plans relative to the increase in depth.

Table D2-9 displays the calculation used to compute increased maintenance volume. The total volume removed from each channel segment during its last maintenance dredging was divided by the years between the last two maintenance operations to yield an annual shoaling volume for each channel or segment. For the main channels improvements (ABC) the resulting annual volumes were aggregated into a single number. For Plan D, the MSC extension, the annual volume for the lower main ship channel was divided by 4, representing that segments length relative to the total length of the lower Main Ship Channel, as a separate volume for that segment could not be calculated from the historical record. For the Mystic River the area under consideration in Plan E for deepening was compared to the total area of that channel last dredged and a factor was used (13 percent) to calculate the annual volume solely for that area's footprint. For the Chelsea River a single number for the entire channel and basin area was used.

To arrive at a volume representing the increase in maintenance requirements attributable to the channel deepening, a percentage was selected based on the magnitude of the depth increase. For all areas a base increase of 10 percent was used for the first depth increment. That percentage was increased two percent for each additional depth increment. For the main channels improvement (the nine ABC increments) 10 percent was used for the 42-foot improvement, 12 percent for 43 feet, up to 26 percent for 50 feet. Plan D, the MSC extension, used 10 percent at 42 feet, up to 16 percent at 45 feet. The Mystic River calculation used 10 percent at 37 feet, up to 16 percent at 40 feet. The Chelsea River calculation used 10 percent at 39 feet and 12 percent at 40 feet. The resulting annual increase in shoaling volume was multiplied by the unit cost for each plan and increment's first cost for dredging ordinary material, as adjusted to the total first cost of that plan (i.e. increased to account for mobilization-demobilization, contingencies, and non-contract costs) to arrive at an annual increased maintenance cost. Table 40 shows a sample computation for the 49-foot main channels (Conley) improvement plan, and the greatest depth increments of the other three plans. Annual increases in maintenance costs were also calculated for the non-Federal berth deepening for the Conley Terminal (the nine depth increments Plan ABC, and other main channels increments), the Massport Marine Terminal (MMT), and the four petroleum terminals on the Chelsea River.

The annual costs for the alternative plans and incremental depths, including Federal GNF and non-Federal improvements, are shown the following Tables. Table 41 shows the annual costs for the nine depth increments of Plan ABC for the main channels plan for access to the Conley Terminal. Tables 42, 43 and 44, show the annual costs for the Main Ship Channel Deepening Extension to the MMT, the Mystic River Channel at the MST, and the Chelsea River Channel, respectively.

ASSOCIATED MAINTENANCE DREDGING

Maintenance dredging of existing Federal navigation features would be carried out concurrent with the deep draft improvement project in two ways. First, while major maintenance dredging of the outer and inner harbor areas was and will be accomplished in the 2004-2005 and 2008-2012 timeframes, respectively, minor amounts of maintenance material may remain at the time of the improvement dredging. Second, additional channel areas not maintained in the past two operations may be maintained at the time of the improvement dredging.

Maintenance of Project Features Deepened by the Improvement Project

Removal of any remaining maintenance material from the project areas being deepened under the deep draft improvement project would be accomplished concurrent with removal of the improvement materials. Given the recentness of the two major maintenance operations and the low shoaling rate in Boston Harbor these amounts are expected to be minimal.

In project areas where the maintenance material was tested and determined suitable for ocean disposal under the 2004 and 2008-2013 projects, any remaining maintenance materials would be removed, transported, and disposed along with the improvement materials, in accordance with existing suitability determinations, at the Massachusetts Bay Disposal Site. These areas include the Broad Sound North Entrance Channel (deep lane), the President Roads Anchorage, the lower Reserved Channel and its Turning Area, and the Main Ship Channel from President Roads to Spectacle Island, and from Castle Island to the Massport Marine Terminal.

In channel areas where the maintenance material was determined unsuitable for ocean disposal, the Corps will either place that material in CAD Cells constructed at previously identified locations in the upper harbor, or the Corps will re-test those materials and dispose of them in accordance with any revised suitability determination. Any re-testing and any new suitability determinations will be fully coordinated with Federal, State and local agencies. These areas include the reach of the Main Ship Channel between Spectacle and Castle Islands, the Mystic River, and the Chelsea River, including the area of the Chelsea River where the existing 38-foot channel will be widened to conform to the new Chelsea Street Bridge opening. Quantities and footprint areas for the Chelsea Street Bridge widening and maintenance of the existing channel limits are shown with the estimate tables for Plan F.

Maintenance of Other Federal Project Features

Maintenance of the Boston Harbor Federal Navigation Project in existing channel areas outside of those proposed for deepening may also be carried out concurrent with the deep draft improvement project. This would occur because some areas not dredged in the 2004 to 2012 maintenance operations would require maintenance by the 2014-2017 improvement project timeframe, or because maintenance to improve the controlling depths of those project features was needed to assist in harbor traffic management during the

construction of the improvement project. Areas under consideration include the 30-foot Broad Sound South Entrance Channel, the 35-foot northern lane of the Broad Sound North Entrance Channel, the 15-foot Nubble Channel, and the 35-foot West Anchorage at President Roads (the barge anchorage). Minimizing navigation traffic disruptions of the drilling, blasting and dredging operations for the deep draft improvement project can be accomplished by providing alternative routes for shallow-draft traffic not needing the 40-foot channels that would be deepened. Routing of shallower-draft vessels, consistent with tidal navigation, through the South Entrance Channel with its 30-foot authorized depth, and later also through the 35-foot north lane of the North Entrance Channel, would allow deepening of the deep lane of the North Entrance Channel to progress with minimal shut-downs for large vessel passage, thereby shortening the construction duration for deepening that project feature. Similarly, encouraging a greater volume of smaller ferry and small craft traffic to use the Nubble Channel rather than transiting the Outer Confluence would aid in deepening that area of the project with minimal navigation disruption. Maintenance of the 35-foot anchorage would enable more barge and smaller cargo vessels to use that area instead of the 40-foot President Roads Anchorage while the latter area is being deepened.

Maintenance materials from these project areas would need to be tested during the design phase of the improvement project, and suitability determinations made for their disposal. At this time, given the suitable determinations issued for maintenance of adjacent areas, and the location of these project features in the Outer Harbor, it is assumed that the materials would be found suitable for ocean disposal and would be disposed at the Massachusetts Bay Disposal Site. An estimate of the dredging volumes and dredging footprints for these areas is provided in the Feasibility Report.

TABLE D2-1
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
MOBILIZATION & DEMOBILIZATION COSTS

MAIN CHANNELS DEEPENING PLANS TO CONLEY TERMINAL - INNER CHANNEL DEPTH / ENTRANCE CHANNEL DEPTH

PLAN ABC July/Aug 2011 Price Levels	42 Feet 44 Feet	43 Feet 45 Feet	44 Feet 46 Feet	45 Feet 47 Feet	45 Feet 49 Feet	46 Feet 48 Feet	46 Feet 50 Feet	47 Feet 49 Feet	47 Feet 50 Feet	47 Feet 51 Feet	47 Feet 52 Feet	48 Feet 50 Feet	48 Feet 52 Feet	49 Feet 51 Feet	50 Feet 52 Feet
Dredging and Disposal Plant															
BSN Entrance Channel	$487,000	$487,000	$593,000	$593,000	$687,000	$699,000	$690,000	$687,000	$690,000	$703,000	$794,000	$690,000	$794,000	$703,000	$794,000
Main Ship Chan Incl PRR	$93,000	$93,000	$93,000	$100,000	$100,000	$100,000	$100,000	$106,000	$106,000	$106,000	$106,000	$106,000	$106,000	$106,000	$106,000
Res Chan & Res Turn Area	$466,000	$466,000	$466,000	$573,000	$573,000	$573,000	$573,000	$681,000	$681,000	$681,000	$681,000	$681,000	$681,000	$681,000	$788,000
Pres Roads Anchorage	$87,000	$93,000	$93,000	$100,000	$100,000	$100,000	$100,000	$106,000	$106,000	$106,000	$106,000	$113,000	$113,000	$113,000	$113,000
Total Dredging	$1,133,000	$1,139,000	$1,245,000	$1,366,000	$1,460,000	$1,472,000	$1,463,000	$1,580,000	$1,583,000	$1,596,000	$1,687,000	$1,590,000	$1,694,000	$1,603,000	$1,801,000
Drilling and Blasting Plant															
BSN Entrance Channel	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000	$1,226,000
Main Ship Chan Incl PRR	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000	$189,000
Res Chan & Res Turn Area	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000	$1,038,000
Pres Roads Anchorage	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000	$163,000
Total Drill & Blast	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000	$2,616,000
Rock Removal and Disposal Plant															
BSN Entrance Channel	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000	$659,000
Main Ship Chan Incl PRR	$80,000	$80,000	$80,000	$80,000	$80,000	$87,000	$87,000	$87,000	$87,000	$87,000	$87,000	$87,000	$87,000	$87,000	$87,000
Res Chan & Res Turn Area	$271,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$378,000	$484,000	$484,000
Pres Roads Anchorage	$78,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000
Total Rock Removal	$1,088,000	$1,197,000	$1,197,000	$1,197,000	$1,197,000	$1,204,000	$1,204,000	$1,204,000	$1,204,000	$1,204,000	$1,204,000	$1,204,000	$1,204,000	$1,310,000	$1,310,000
Total All Mob & Demob	$4,837,000	$4,952,000	$5,058,000	$5,179,000	$5,273,000	$5,292,000	$5,283,000	$5,400,000	$5,403,000	$5,416,000	$5,507,000	$5,410,000	$5,514,000	$5,529,000	$5,727,000
AQ Remobilization-Demobilization	$4,147,000	$4,254,000	$4,360,000	$4,467,000	$4,561,000	$4,573,000	$4,564,000	$4,669,000	$4,672,000	$4,685,000	$4,776,000	$4,672,000	$4,776,000	$4,791,000	$4,989,000
Number of Air Quality Shutdowns	0	0	1	1	1	1	1	1	1	1	1	1	1	1	2
AQ Remobilization-Demob Cost	$0	$0	$4,360,000	$4,467,000	$4,561,000	$4,573,000	$4,564,000	$4,669,000	$4,672,000	$4,685,000	$4,776,000	$4,672,000	$4,776,000	$4,791,000	$9,978,000
Miscellaneous Costs															
BSN Entrance Channel	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000
Main Ship Chan Incl PRR	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000
Res Chan & Res Turn Area	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000
Pres Roads Anchorage	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000	$71,000
Rounding Adjustment for TPCS															
Total Miscellaneous	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000	$284,000

TABLE D2-2
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
CONSTRUCTION CONTINGENCY COSTS - WEIGHTED AVERAGE - FROM CONTINGENCY RISK ANALYSIS

ORIGINAL PLANS FROM 2008 DRAFT REPORT AND MAY 2012 INTERNAL REVIEW DRAFT WITH 2-FOOT INCREASED ENTRANCE CHANNEL DEPTH

MAIN CHANNELS IMPROVEMENT PLANS December 2012 Contingency Risk Analysis	Contingency Percentage 46/48	Contingency Percentage 47/49	Contingency Percentage 48/50	Contingency Percentage 49/51	Item Cost 46/48-Foot	Item Cost 47/49-Foot	Item Cost 48/50-Foot	Item Cost 49/51-Foot	Contingency Cost 46/48-Foot	Contingency Cost 47/49-Foot	Contingency Cost 48/50-Foot	Contingency Cost 49/51-Foot
Broad Sound North Entrance Channel	14.3%	14.3%	14.3%	14.3%	$70,029,000	$80,835,000	$92,311,000	$105,106,000	$10,014,000	$11,559,000	$13,200,000	$15,030,000
Main Ship Chan Including President Roads Reach	20.8%	20.8%	20.8%	20.8%	$32,262,000	$38,032,000	$42,785,000	$49,609,000	$6,710,000	$7,911,000	$8,899,000	$10,319,000
Reserved Channel & Turning Area	20.6%	20.6%	20.6%	20.6%	$22,381,000	$27,576,000	$33,971,000	$40,138,000	$4,610,000	$5,681,000	$6,998,000	$8,268,000
President Roads Anchorage	16.3%	16.3%	16.3%	16.3%	$34,719,000	$38,162,000	$42,468,000	$45,752,000	$5,659,000	$6,220,000	$6,922,000	$7,458,000
Weighted Average Contingency	16.9%	17.0%	17.0%	17.1%	$159,391,000	$184,605,000	$211,535,000	$240,605,000	$26,993,000	$31,371,000	$36,019,000	$41,075,000
Air Quality Shutdowns	16.9%	17.0%	17.0%	17.1%	$4,573,000	$4,669,000	$4,672,000	$4,791,000	$774,000	$793,000	$796,000	$816,000
Total Dredging	17.0%				$163,964,000	$189,274,000	$216,207,000	$245,396,000	$27,767,000	$32,164,000	$36,815,000	$41,893,000

REVISED PLANS FROM NOVEMBER 2012 WITH 4-FOOT INCREASED ENTRANCE CHANNEL DEPTH

MAIN CHANNELS IMPROVEMENT PLANS December 2012 Contingency Risk Analysis	Contingency Percentage 45/49	Contingency Percentage 46/50	Contingency Percentage 47/51	Contingency Percentage 48/52	Item Cost 45/49-Foot	Item Cost 46/50-Foot	Item Cost 47/51-Foot	Item Cost 48/52-Foot	Contingency Cost 45/49-Foot	Contingency Cost 46/50-Foot	Contingency Cost 47/51-Foot	Contingency Cost 48/52-Foot
Broad Sound North Entrance Channel	14.3%	14.3%	14.3%	14.3%	$80,835,000	$105,286,000	$105,299,000	$118,032,000	$11,559,000	$15,056,000	$15,058,000	$16,879,000
Main Ship Chan Including President Roads Reach	20.8%	20.8%	20.8%	20.8%	$28,076,000	$32,262,000	$38,032,000	$42,785,000	$5,840,000	$6,710,000	$7,911,000	$8,899,000
Reserved Channel & Turning Area	20.6%	20.6%	20.6%	20.6%	$17,500,000	$22,381,000	$27,576,000	$33,971,000	$3,605,000	$4,610,000	$5,681,000	$6,998,000
President Roads Anchorage	16.3%	16.3%	16.3%	16.3%	$30,866,000	$34,719,000	$38,162,000	$42,468,000	$5,031,000	$5,659,000	$6,220,000	$6,922,000
Weighted Average Contingency	16.6%	16.5%	16.7%	16.7%	$157,277,000	$194,648,000	$209,069,000	$237,256,000	$26,035,000	$32,035,000	$34,870,000	$39,698,000
Air Quality Shutdowns	16.6%	16.5%	16.7%	16.7%	$4,561,000	$4,564,000	$4,685,000	$4,776,000	$755,000	$751,000	$781,000	$799,000
Total Dredging	16.7%				$161,838,000	$199,212,000	$213,754,000	$242,032,000	$26,790,000	$32,786,000	$35,651,000	$40,497,000

TABLE D2-3
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ENVIRONMENTAL MONITORING COSTS

ENVIRONMENTAL MONITORING COSTS FOR MONITORING DURING THE CONSTRUCTION PERIOD AND POST-CONSTRUCTION PERIOD MONITORING FOR A FIVE-YEAR PERIOD

MAIN CHANNELS DEEPENING PLANS TO CONLEY TERMINAL

PLAN ABC **Twelve Depth Increments**	**42 Feet** **44 Feet**	**43 Feet** **45 Feet**	**44 Feet** **46 Feet**	**45 Feet** **47 Feet**	**45 Feet** **49 Feet**	**46 Feet** **48 Feet**	**46 Feet** **50 Feet**	**47 Feet** **49 Feet**	**47 Feet** **50 Feet**	**51 Feet** **50 Feet**	**52 Feet** **50 Feet**	**48 Feet** **50 Feet**	**48 Feet** **52 Feet**	**49 Feet** **51 Feet**	**50 Feet** **52 Feet**
Monitoring During Construction															
Construction Duration - Months	16	18	26	27	0	28	31	29	30	34	35	31	34	40	51
Monitoring Events	8	9	13	14	0	14	16	15	15	17	18	16	17	20	26
Pre & Post Dredge Events	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Total Monitoring Events During Construction Period	10	11	15	16	2	16	18	17	17	19	20	18	19	22	28
Cost per Event	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000
Monitoring Cost During Construction	$70,000	$77,000	$105,000	$109,000	$14,000	$112,000	$123,000	$116,000	$119,000	$133,000	$137,000	$123,000	$133,000	$154,000	$193,000
Monitoring After Construction Quarterly Monitoring for 5 Years															
Harbor Monitoring Events	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Rock Site Monitoring Events	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Cost per Event	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000	$14,000
Monitoring Cost After Construction	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000	$420,000
Total Monitoring Costs	$490,000	$497,000	$525,000	$529,000	$434,000	$532,000	$543,000	$536,000	$539,000	$553,000	$557,000	$543,000	$553,000	$574,000	$613,000

TABLE D2-3 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ENVIRONMENTAL MONITORING COSTS

ENVIRONMENTAL MONITORING COSTS FOR MONITORING DURING THE CONSTRUCTION PERIOD AND POST-CONSTRUCTION PERIOD MONITORING FOR A FIVE-YEAR PERIOD

	PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENDED TO MASSPORT MARINE TERMINAL				PLAN E - MYSTIC RIVER CHANNEL DEEPENING TO MASSPORT MEDFORD STREET TERMINAL				PLAN F - CHELSEA RIVER CHANNEL	
	42 Feet	**43 Feet**	**44 Feet**	**45 Feet**	**37 Feet**	**38 Feet**	**39 Feet**	**40 Feet**	**39 Feet**	**40 Feet**
Monitoring During Construction										
Construction Duration - Months	3	3	4	4	1	1	1	1	4	5
Monitoring Events	2	2	2	2	1	1	1	1	2	3
Pre & Post Dredge Events	2	2	2	2	2	2	2	2	2	2
Total Monitoring Events During Construction Period	4	4	4	4	3	3	3	3	4	5
Cost per Event	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000
Monitoring Cost During Construction	$25,000	$25,000	$28,000	$28,000	$18,000	$18,000	$18,000	$18,000	$28,000	$32,000
Monitoring After Construction										
Annual Monitoring for 5 Years										
Monitoring Events	5	5	5	5	5	5	5	5	5	5
Cost per Event	$4,000	$4,000	$4,000	$4,000	$2,000	$2,000	$2,000	$2,000	$4,000	$4,000
Monitoring Cost After Construction	$20,000	$20,000	$20,000	$20,000	$10,000	$10,000	$10,000	$10,000	$20,000	$20,000
Total Monitoring Costs	$45,000	$45,000	$48,000	$48,000	$28,000	$28,000	$28,000	$28,000	$48,000	$52,000

TABLE D2-4
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ENGINEERING AND DESIGN COSTS - PLAN ABC - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

ENGINEERING AND DESIGN COSTS - IMPROVEMENT			42/44 Feet	43/45 Feet	44/46 Feet	45/47 Feet	45/49 Feet	46/48 Feet	48/50 Feet	47/49 Feet	47/50 Feet	47/51 Feet	47/52 Feet	48/50 Feet	48/52 Feet	49/51 Feet	50/52 Feet
ORIGINAL PERCENTAGE ESTIMATES FOR IMPROVEMENT PROJECT																	
Construction Subtotal			$80,871,000	$111,832,000	$140,371,000	$164,384,000	$188,628,000	$191,731,000	$231,998,000	$221,436,000	$234,868,000	$249,405,000	$265,284,000	$253,022,000	$282,529,000	$287,289,000	$332,395,000
First Cost - July-August 2011			$89,598,000	$121,407,000	$151,653,000	$176,057,000	$200,710,000	$204,045,000	$245,015,000	$234,427,000	$248,281,000	$263,648,000	$279,920,000	$266,870,000	$297,717,000	$303,142,000	$350,563,000
Construction Duration	10000		16	18	26	27	28	28	29	29	30	34	35	31	37	40	51
Planning, Engineering & Design	0.0200		$4,044,000	$4,273,000	$4,522,000	$4,710,000	$4,830,000	$4,916,000	$5,039,000	$5,130,000	$5,267,000	$5,361,000	$5,442,000	$5,362,000	$5,533,000	$5,802,000	$6,146,000
DETAILED ESTIMATES FOR IMPROVEMENT PROJECT																	
Design Phase Costs																	
Project Management		0.0015	$301,000	$356,000	$441,000	$482,000	$523,000	$528,000	$593,000	$577,000	$602,000	$644,000	$673,000	$635,000	$709,000	$731,000	$854,000
Public Involvement			$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
Advanced Planning		0.0010	$141,000	$172,000	$200,000	$224,000	$249,000	$252,000	$292,000	$281,000	$295,000	$309,000	$325,000	$313,000	$343,000	$347,000	$392,000
Cultural Resource Investigations			$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000	$7,000
SEIS Document		0.0005	$85,000	$101,000	$115,000	$127,000	$139,000	$141,000	$161,000	$156,000	$162,000	$170,000	$178,000	$172,000	$186,000	$189,000	$211,000
Economic Updates		0.0005	$115,000	$131,000	$145,000	$157,000	$169,000	$171,000	$191,000	$186,000	$192,000	$200,000	$208,000	$202,000	$216,000	$219,000	$241,000
Environmental Investigations	Fish		$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Environmental Investigations	Lobster		$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
Hydrographic Surveys	Harbor		$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
Hydrographic Surveys	MBDS		$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000	$96,000
Subsurface Explorations			$1,020,000	$1,080,000	$1,140,000	$1,200,000	$1,200,000	$1,260,000	$1,200,000	$1,320,000	$1,380,000	$1,380,000	$1,380,000	$1,380,000	$1,380,000	$1,440,000	$1,500,000
Seismic Surveys - New Areas	PRA		$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000
Geotechnical Investigations			$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000	$104,000
Structural Investigations			$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000	$59,000
Additional Ship Simulation Efforts			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$135,000	$135,000
Design Updates			$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000
Cost Estimate Updates			$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000
Rock Site - Beneficial Use																	
Beneficial Use Investigations	Rock		$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000	$140,000
Cultural Resource Investigations	Rock Site		$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000
Hydrographic Surveys	Rock Site		$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000
Industrial Waste Site - Beneficial Use																	
Beneficial Use Investigations	IWS		$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Cultural Resource Investigations	IWS		$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000	$60,000
Hydrographic Surveys	IWS		$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000
Design Document Preparation & Review			$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000	$170,000
Contracting and Contract Documents Prep, ITR & Production			$100,000	$116,000	$130,000	$142,000	$154,000	$156,000	$176,000	$171,000	$177,000	$185,000	$193,000	$187,000	$201,000	$204,000	$226,000
Subtotal Design Phase Costs			$3,456,000	$3,652,000	$3,865,000	$4,026,000	$4,128,000	$4,202,000	$4,307,000	$4,385,000	$4,502,000	$4,582,000	$4,651,000	$4,583,000	$4,729,000	$4,959,000	$5,253,000
Contingencies		17.0%	$588,000	$621,000	$657,000	$684,000	$702,000	$714,000	$732,000	$745,000	$765,000	$779,000	$791,000	$779,000	$804,000	$843,000	$893,000
Total PED (Design Phase) Costs			$4,044,000	$4,273,000	$4,522,000	$4,710,000	$4,830,000	$4,916,000	$5,039,000	$5,130,000	$5,267,000	$5,361,000	$5,442,000	$5,362,000	$5,533,000	$5,802,000	$6,146,000

TABLE D2-4 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ENGINEERING AND DESIGN COSTS - PLANS D, E & F - MAIN SHIP CHANNEL EXTENSION, MYSTIC RIVER, AND CHELSEA RIVER IMPROVEMENTS

ENGINEERING AND DESIGN COSTS - IMPROVEMENT			MAIN SHIP CHANNEL EXTENSION TO MMT				MYSTIC RIVER				CHELSEA RIVER	
			42 Feet	43 Feet	44 Feet	45 Feet	37 Feet	38 Feet	39 Feet	40 Feet	39 Feet	40 Feet
ORIGINAL PERCENTAGE ESTIMATES FOR IMPROVEMENT PROJECT												
Construction Subtotal			$6,684,000	$10,191,000	$13,138,000	$15,481,000	$1,207,000	$1,435,000	$1,623,000	$1,894,000	$7,353,000	$9,980,000
First Cost - January 2008			$7,858,000	$11,217,000	$14,349,000	$16,730,000	$1,841,000	$1,871,000	$2,060,000	$2,337,000	$8,601,000	$11,380,000
Construction Duration			3	3	4	4	1	1	1	1	4	5
Planning, Engineering & Design	0.0200		$313,000	$332,000	$353,000	$367,000	$168,000	$168,000	$168,000	$170,000	$384,000	$394,000
DETAILED ESTIMATES FOR IMPROVEMENT PROJECT												
Design Phase Costs												
Project Management		0.0015	$32,000	$37,000	$42,000	$45,000	$22,000	$22,000	$22,000	$23,000	$31,000	$35,000
Public Involvement			$0	$0	$0	$0	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Advanced Planning		0.0015	$30,000	$35,000	$40,000	$43,000	$12,000	$12,000	$12,000	$13,000	$21,000	$25,000
Cultural Resource Investigations	Chelsea		$0	$0	$0	$0	$0	$0	$0	$0	$80,000	$80,000
SEIS Document			$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Economic Updates			$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Environmental Investigations	Fish		$10,000	$10,000	$10,000	$10,000	$3,000	$3,000	$3,000	$3,000	$2,000	$2,000
Environmental Investigations	Lobster		$12,000	$12,000	$12,000	$12,000	$0	$0	$0	$0	$0	$0
Hydrographic Surveys	Harbor		$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$36,000	$36,000
Hydrographic Surveys	MBDS		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subsurface Explorations			$94,000	$99,000	$105,000	$110,000	$40,000	$40,000	$40,000	$40,000	$40,000	$40,000
Seismic Surveys - New Areas			$0	$0	$0	$0	$0	$0	$0	$0	$20,000	$20,000
Geotechnical Investigations			$5,000	$5,000	$5,000	$5,000	$0	$0	$0	$0	$32,000	$32,000
Structural Investigations			$5,000	$5,000	$5,000	$5,000	$0	$0	$0	$0	$8,000	$8,000
Additional Ship Simulation Efforts			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Design Updates			$12,000	$12,000	$12,000	$12,000	$4,000	$4,000	$4,000	$4,000	$8,000	$8,000
Cost Estimate Updates			$8,000	$8,000	$8,000	$8,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
Rock Site - Beneficial Use												
Beneficial Use Investigations	Rock		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cultural Resource Investigations	Rock Site		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hydrographic Surveys	Rock Site		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Industrial Waste Site - Beneficial Use												
Beneficial Use Investigations	IWS		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Cultural Resource Investigations	IWS		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Hydrographic Surveys	IWS		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Design Document Preparation & Review			$14,000	$14,000	$14,000	$14,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
Contracting and Contract Documents Prep, ITR & Production			$23,000	$25,000	$27,000	$28,000	$21,000	$21,000	$21,000	$21,000	$24,000	$25,000
Subtotal Design Phase Costs			$272,000	$289,000	$307,000	$319,000	$146,000	$146,000	$146,000	$148,000	$334,000	$343,000
Contingencies		15.0%	$41,000	$43,000	$46,000	$48,000	$22,000	$22,000	$22,000	$22,000	$50,000	$51,000
Total Design Phase Costs			$313,000	$332,000	$353,000	$367,000	$168,000	$168,000	$168,000	$170,000	$384,000	$394,000

TABLE D2-5
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
CONSTRUCTION MANAGEMENT COSTS - PLAN ABC - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

CONSTRUCTION MANAGEMENT COSTS - IMPROVEMENT			42/44 Feet	43/45 Feet	44/46 Feet	45/47 Feet	45/49 Feet	46/48 Feet	46/50 Feet	47/49 Feet	47/50 Feet	47/51 Feet	47/52 Feet	48/50 Feet	48/52 Feet	49/51 Feet	50/52 Feet
ORIGINAL PERCENTAGE ESTIMATES FOR IMPROVEMENT PROJECT																	
Construction Subtotal			$80,871,000	$111,832,000	$140,371,000	$164,384,000	$188,628,000	$191,731,000	$231,998,000	$221,438,000	$234,888,000	$249,405,000	$265,284,000	$263,022,000	$282,529,000	$287,289,000	$332,395,000
First Cost - January 2008			$89,598,000	$121,407,000	$151,853,000	$176,057,000	$200,710,000	$204,045,000	$245,015,000	$234,427,000	$248,281,000	$263,648,000	$279,920,000	$266,870,000	$297,717,000	$303,142,000	$350,563,000
Supervision & Administration	0.0800		$4,432,000	$5,044,000	$6,473,000	$6,672,000	$6,957,000	$7,103,000	$7,680,000	$7,561,000	$7,844,000	$8,565,000	$8,874,000	$8,180,000	$9,327,000	$9,712,000	$11,643,000
Construction Duration - Total	Months		16	18	26	27	28	28	29	29	30	34	35	31	37	40	51
Construction Duration - Work Only	Months		16	18	26	21	22	22	23	23	24	28	29	25	31	31	39
DETAILED SUPERVISION & ADMINISTRATION COSTS ESTIMATES FOR IMPROVEMENT PROJECT																	
Supervision & Administration	Base	0.0005	$128,000	$155,000	$213,000	$231,000	$248,000	$250,000	$275,000	$270,000	$282,000	$312,000	$325,000	$297,000	$345,000	$364,000	$447,000
Project Management During Construction		0.0025	$302,000	$380,000	$451,000	$511,000	$572,000	$579,000	$680,000	$654,000	$687,000	$724,000	$763,000	$733,000	$806,000	$818,000	$931,000
Public Involvement			$13,000	$15,000	$22,000	$23,000	$23,000	$23,000	$24,000	$24,000	$25,000	$28,000	$29,000	$26,000	$31,000	$33,000	$43,000
Construction Summary Document Prep			$27,000	$30,000	$43,000	$45,000	$47,000	$47,000	$48,000	$48,000	$50,000	$57,000	$58,000	$52,000	$62,000	$57,000	$85,000
Planning During Construction		0.0015	$153,000	$245,000	$308,000	$347,000	$386,000	$390,000	$453,000	$438,000	$460,000	$483,000	$518,000	$490,000	$556,000	$585,000	$661,000
Pre-Dredge Hydrographic Surveys	Harbor		$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
Progress Hydrographic Surveys	Harbor		$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
After Dredge Hydrographic Surveys	Harbor	& MBDS	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000	$120,000
Contracting Support			$32,000	$36,000	$52,000	$54,000	$56,000	$56,000	$68,000	$68,000	$69,000	$68,000	$70,000	$62,000	$74,000	$80,000	$102,000
Contract Administration			$48,000	$54,000	$78,000	$63,000	$66,000	$66,000	$69,000	$69,000	$72,000	$84,000	$87,000	$75,000	$93,000	$93,000	$117,000
Supervision and Inspection			$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000	$80,000
2 Inspectors			$992,000	$1,116,000	$1,612,000	$1,674,000	$1,736,000	$1,736,000	$1,798,000	$1,798,000	$1,860,000	$2,108,000	$2,170,000	$1,922,000	$2,294,000	$2,480,000	$3,162,000
Construction Management			$243,000	$273,000	$394,000	$410,000	$425,000	$425,000	$440,000	$440,000	$455,000	$516,000	$531,000	$470,000	$561,000	$607,000	$774,000
Travel and Miscellaneous			$16,000	$18,000	$26,000	$21,000	$22,000	$22,000	$23,000	$23,000	$24,000	$28,000	$29,000	$25,000	$31,000	$31,000	$39,000
Silent Inspector System (Corps)			$160,000	$180,000	$260,000	$210,000	$220,000	$220,000	$230,000	$230,000	$240,000	$280,000	$290,000	$250,000	$310,000	$310,000	$390,000
Diving Inspection - Blasting			$243,000	$273,000	$394,000	$319,000	$334,000	$334,000	$349,000	$349,000	$364,000	$425,000	$440,000	$379,000	$470,000	$470,000	$592,000
Rock Site - Beneficial Use																	
After-Dredge Hydrographic Surveys	Rock Site		$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000	$48,000
Industrial Waste Site - Beneficial Use																	
After-Dredge Hydrographic Surveys	IWS		$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000	$72,000
Sub-Total Construction Management Costs			$2,957,000	$3,335,000	$4,413,000	$4,466,000	$4,695,000	$4,708,000	$5,007,000	$4,961,000	$5,139,000	$5,683,000	$5,871,000	$5,341,000	$6,187,000	$6,478,000	$7,903,000
Contingency	15%		$444,000	$500,000	$662,000	$670,000	$704,000	$706,000	$751,000	$744,000	$771,000	$852,000	$881,000	$801,000	$928,000	$972,000	$1,185,000
Total Construction Management Costs			$3,401,000	$3,835,000	$5,075,000	$5,136,000	$5,399,000	$5,414,000	$5,758,000	$5,705,000	$5,910,000	$6,535,000	$6,752,000	$6,142,000	$7,115,000	$7,450,000	$9,088,000
Environmental Monitoring Costs	16.0%	0.0050	$664,000	$572,000	$804,000	$808,000	$499,000	$612,000	$624,000	$616,000	$620,000	$636,000	$641,000	$624,000	$636,000	$660,000	$705,000
Engineering During Construction	10.0%	0.0050	$467,000	$637,000	$794,000	$926,000	$1,059,000	$1,077,000	$1,296,000	$1,240,000	$1,314,000	$1,394,000	$1,481,000	$1,414,000	$1,576,000	$1,602,000	$1,850,000
Total Construction Phase			$4,432,000	$5,044,000	$6,473,000	$6,672,000	$6,957,000	$7,103,000	$7,680,000	$7,561,000	$7,844,000	$8,565,000	$8,874,000	$8,180,000	$9,327,000	$9,712,000	$11,643,000

TABLE D2-5 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
CONSTRUCTION MANAGEMENT COSTS - PLANS D, E & F - MAIN SHIP CHANNEL EXTENSION, MYSTIC RIVER, AND CHELSEA RIVER IMPROVEMENTS

CONSTRUCTION MANAGEMENT COSTS - IMPROVEMENT			MAIN SHIP CHANNEL EXTENSION TO MMT				MYSTIC RIVER				CHELSEA RIVER	
			42 Feet	43 Feet	44 Feet	45 Feet	37 Feet	38 Feet	39 Feet	40 Feet	39 Feet	40 Feet
ORIGINAL PERCENTAGE ESTIMATES FOR IMPROVEMENT PROJECT												
Construction Subtotal			$6,884,000	$10,191,000	$13,138,000	$15,481,000	$1,207,000	$1,435,000	$1,623,000	$1,894,000	$7,353,000	$9,960,000
First Cost - January 2008			$7,858,000	$11,217,000	$14,349,000	$16,730,000	$1,641,000	$1,871,000	$2,060,000	$2,337,000	$8,601,000	$11,380,000
Planning, Engineering & Design	0.0200		$313,000	$332,000	$353,000	$367,000	$168,000	$168,000	$168,000	$170,000	$384,000	$394,000
Construction Duration - Total	Months		3	3	4	4	1	1	1	1	4	5
Construction Duration - Work Only	Months		3	3	4	4	1	1	1	1	4	5
DETAILED SUPERVISION & ADMINISTRATION COSTS ESTIMATES FOR IMPROVEMENT PROJECT												
Supervision & Administration												
Project Management		0.0025	$39,000	$47,000	$55,000	$61,000	$23,000	$24,000	$24,000	$25,000	$38,000	$45,000
Public Involvement			$3,000	$3,000	$3,000	$3,000	$1,000	$1,000	$1,000	$1,000	$3,000	$4,000
Design Document Prep & Review			$5,000	$5,000	$7,000	$7,000	$2,000	$2,000	$2,000	$2,000	$7,000	$8,000
Advanced Planning		0.0015	$30,000	$35,000	$40,000	$43,000	$12,000	$12,000	$12,000	$13,000	$21,000	$25,000
Pre-Dredge Hydrographic Surveys	Harbor		$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$36,000	$36,000
Progress Hydrographic Surveys			$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
After Dredge Hydrographic Surveys	MBDS		$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$36,000	$36,000
Contracting Support			$6,000	$6,000	$8,000	$8,000	$2,000	$2,000	$2,000	$2,000	$8,000	$10,000
Contract Administration			$9,000	$9,000	$12,000	$12,000	$3,000	$3,000	$3,000	$3,000	$12,000	$15,000
Supervision and Inspection			$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000	$20,000
2 Inspectors			$186,000	$186,000	$248,000	$248,000	$62,000	$62,000	$62,000	$62,000	$248,000	$310,000
Construction Management			$46,000	$46,000	$61,000	$61,000	$15,000	$15,000	$15,000	$15,000	$61,000	$76,000
Travel and Miscellaneous			$3,000	$3,000	$4,000	$4,000	$1,000	$1,000	$1,000	$1,000	$4,000	$5,000
Silent Inspector System (Corps)			$30,000	$30,000	$40,000	$40,000	$10,000	$10,000	$10,000	$10,000	$40,000	$50,000
Diving Inspection - Blasting			$46,000	$46,000	$61,000	$61,000	$0	$0	$0	$0	$61,000	$76,000
Rock Site - Beneficial Use												
Hydrographic Surveys	Rock Site		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Industrial Waste Site - Beneficial Use												
Hydrographic Surveys	IWS		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Sub-Total S&A Costs			$447,000	$460,000	$583,000	$592,000	$175,000	$176,000	$176,000	$178,000	$595,000	$716,000
Contingency	15%		$67,000	$69,000	$87,000	$89,000	$26,000	$26,000	$26,000	$27,000	$89,000	$107,000
Total Construction Management Costs			$514,000	$529,000	$670,000	$681,000	$201,000	$202,000	$202,000	$205,000	$684,000	$823,000
Environmental Monitoring Costs	15.0%	0.0050	$52,000	$52,000	$55,000	$55,000	$32,000	$32,000	$32,000	$32,000	$55,000	$60,000
Engineering During Construction	10.0%	0.0050	$60,000	$78,000	$94,000	$107,000	$29,000	$30,000	$31,000	$32,000	$62,000	$77,000
Total Construction Management			$626,000	$659,000	$819,000	$843,000	$262,000	$264,000	$265,000	$269,000	$801,000	$960,000

TABLE D2-6
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
AIDS TO NAVIGATION COSTS (USCG ATON)

COSTS FOR RELOCATING ATONS IN ADVANCE OF DREDGING AND BLASTING OPERATIONS AND RESETTING AIDS AFTER COMPLETION OF IMPROVEMENT WORK (JULY 2011)

PLANS	Number of Aids Requiring Movement	Cost Per Movement	Initial Relocation	Final Setting	Total ATON Cost
PLAN ABC - MAIN CHANNELS DEEPENING PLANS TO CONLEY TERMINAL					
42/44-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
43/45-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
44/46-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
45/47-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
46/48-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
47/49-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
47/50-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
47/51-Foot Channel Depth - PLAN ABC	16	$6,000	$96,000	$96,000	$192,000
47/52-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
48/50-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
48/52-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
49/51-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
50/52-Foot Channel Depth	16	$6,000	$96,000	$96,000	$192,000
PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENSION TO MASSPORT MARINE TERMINAL TERMINAL					
42-Foot Channel Depth	2	$6,000	$12,000	$12,000	$24,000
43-Foot Channel Depth	2	$6,000	$12,000	$12,000	$24,000
44-Foot Channel Depth	2	$6,000	$12,000	$12,000	$24,000
45-Foot Channel Depth - PLAN D	2	$6,000	$12,000	$12,000	$24,000
PLAN E - MYSTIC RIVER CHANNEL DEEPENING TO MASSPORT MEDFORD STREET TERMINAL					
37-Foot Channel Depth	None	$6,000	$0	$0	$0
38-Foot Channel Depth	None	$6,000	$0	$0	$0
39-Foot Channel Depth	None	$6,000	$0	$0	$0
40-Foot Channel Depth - PLAN E	None	$6,000	$0	$0	$0
PLAN F - CHELSEA RIVER CHANNEL DEEPENING					
39-Foot Channel Depth	4	$6,000	$24,000	$24,000	$48,000
40-Foot Channel Depth - PLAN F	4	$6,000	$24,000	$24,000	$48,000

TABLE D2-7
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
REAL ESTATE COSTS

SOLE REAL ESTATE REQUIREMENT IS FOR TEMPORARY CONSTRUCTION OFFICE SPACE AND SMALL BOAT WHARF ACCESS AT MASSPORT-OWNED WATERFRONT LOCATION

SAME PLAN AS FOR 1998-2001 CONSTRUCTION - 22,500 SQUARE FEET FOR TRAILERS AND PARKING MONTHLY RATE OF $1.78 PER SQUARE FOOT (JULY 2011)

MAIN CHANNELS DEEPENING PLANS TO CONLEY TERMINAL - INNER CHANNEL DEPTH / ENTRANCE CHANNEL DEPTH

PLANS A-B-C	42/44 Feet	43/45 Feet	44/46 Feet	45/47 Feet	45/49 Feet	46/48 Feet	46/50 Feet	47/49 Feet	47/50 Feet	47/51 Feet	47/52 Feet	48/50 Feet	48/52 Feet	49/51 Feet	50/52 Feet
Area of Office Site - SF	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500	22,500
Annual Rate per Square Foot	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78	$1.78
Annual Rental Rate	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050	$40,050
Monthly Rental Rate	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338	$3,338
Construction Duration - Months	16	18	26	27	28	28	29	29	30	34	35	31	37	40	51
Real Estate Cost	$53,400	$60,075	$86,775	$90,113	$93,450	$93,450	$96,788	$96,788	$100,125	$113,475	$116,813	$103,463	$123,488	$133,500	$170,213
Plus Contingency - 10%	$58,740	$66,083	$95,453	$99,124	$102,795	$102,795	$106,466	$106,466	$110,138	$124,823	$128,494	$113,809	$135,836	$146,850	$187,234
Rounded	$59,000	$66,000	$95,000	$99,000	$103,000	$103,000	$106,000	$106,000	$110,000	$125,000	$128,000	$114,000	$136,000	$147,000	$187,000

PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENSION TO MASSPORT MARINE TERMINAL TERMINAL

PLAN D	42 Feet	43 Feet	44 Feet	45 Feet
Construction Duration - Months	3	3	4	4
Real Estate Cost	$10,013	$10,013	$13,350	$13,350
Plus Contingency - 10%	$11,014	$11,014	$14,685	$14,685
Rounded	$11,000	$11,000	$15,000	$15,000

PLAN E - MYSTIC RIVER CHANNEL DEEPENING TO MASSPORT MEDFORD STREET TERMINAL

PLAN E	37 Feet	38 Feet	39 Feet	40 Feet
Construction Duration - Months	1	1	1	1
Real Estate Cost	$3,338	$3,338	$3,338	$3,338
Plus Contingency - 10%	$3,671	$3,671	$3,671	$3,671
Rounded	$4,000	$4,000	$4,000	$4,000

PLAN F - CHELSEA RIVER CHANNEL DEEPENING

PLAN F	39 Feet	40 Feet
Construction Duration - Months	4	5
Real Estate Cost	$13,350	$16,688
Plus Contingency - 10%	$14,685	$18,356
Rounded	$15,000	$18,000

TABLE D2-8
COST ESCALATION FOR JANUARY 2008 FEASIBILITY REPORT PRICE LEVELS
TO PERIOD OF DESIGN AND CONSTRUCTION
CWBS-12 NAVIGATION PORTS AND HARBORS

Date of Index Factors: 31 March 2012

Design Phase Cost Escalation

Design Phase Escalation	July 2011 #	Begin June 2013 - End April 2014 Mid-Point = Dec 2013 #	Escalation Factor
	813.49	846.66	1.04077

Project First Cost Escalation - July/August 2011 Price Levels to the Program Year

Program Year 2013 Escalation	July 2011	813.49	FY2013	Sept 2013	843.52	Factor	1.03692
PED Escalation Factors	Initial Estimate	1.0055	Program Year	1.0435	PED Fully Funded Mid-Point	1.0523	

Construction Phase Cost Escalation - Program Year Price Levels to the Period of Construction

Plan & Increment	Construct Duration (Months)	Initiate Construct	End Construct	Mid Point Date	Mid Point #	July 2013 #	Escalation Factor	CM Escalation Factor
Main Channels 42 Feet (44 Entrance)	16	Apr 2014	July 2015	Dec 2014	861.25	843.52	1.02102	1.093
Main Channels 43 Feet (45 Entrance)	18	Apr 2014	Sept 2015	Jan 2015	865.15	843.52	1.02564	1.103
Main Channels 44 Feet (46 Entrance)	26	Apr 2014	May 2016	May 2015	869.05	843.52	1.03027	1.114
Main Channels 45 Feet (47 Entrance)	27	Apr 2014	June 2016	May 2015	869.05	843.52	1.03027	1.114
Main Channels 45 Feet (49 Entrance)	28	Apr 2014	July 2016	June 2015	869.05	843.52	1.03027	1.114
Main Channels 46 Feet (48 Entrance)	28	Apr 2014	July 2016	June 2015	869.05	843.52	1.03027	1.114
Main Channels 46 Feet (50 Entrance)	29	Apr 2014	Aug 2016	June 2015	869.05	843.52	1.03027	1.114
Main Channels 47 Feet (49 Entrance)	29	Apr 2014	Aug 2016	June 2015	869.05	843.52	1.03027	1.114
Main Channels 47 Feet (50 Entrance)	30	Apr 2014	Sept 2016	June 2015	869.05	843.52	1.03027	1.114
Main Channels 47 Feet (51 Entrance)	34	Apr 2014	Jan 2017	Aug 2015	872.95	843.52	1.03489	1.125
Main Channels 47 Feet (52 Entrance)	35	Apr 2014	Feb 2017	Oct 2015	876.75	843.52	1.03939	1.135
Main Channels 48 Feet (50 Entrance)	31	Apr 2014	Oct 2016	July 2015	872.95	843.52	1.03489	1.125
Main Channels 48 Feet (52 Entrance)	37	Apr 2014	Apr 2017	Oct 2015	876.75	843.52	1.03939	1.135
Main Channels 49 Feet (51 Entrance)	40	Apr 2014	July 2017	Dec 2015	876.75	843.52	1.03939	1.135
Main Channels 50 Feet (52 Entrance)	51	Apr 2014	June 2018	May 2016	884.69	843.52	1.04881	1.157
Main Channels 47 Feet (50 Entrance)	30	Apr 2014	Sept 2016	July 2015	872.95	843.52	1.03489	1.125
MSC Extension to MMT - 42 Feet	3	Sept 2016	Nov 2016	Oct 2016	892.53	843.52	1.05810	1.178
MSC Extension to MMT - 43 Feet	3	Sept 2016	Nov 2016	Oct 2016	892.53	843.52	1.05810	1.178
MSC Extension to MMT - 44 Feet	4	Sept 2016	Dec 2016	Nov 2016	892.53	843.52	1.05810	1.178
MSC Extension to MMT - 45 Feet	4	Sept 2016	Dec 2016	Nov 2016	892.53	843.52	1.05810	1.178
Mystic River - MST - 37, 38, 39, 40 Ft	1	Sept 2014	Sept 2014	Sept 2014	856.88	843.52	1.01584	1.082
Chelsea River Channel - 39 Feet	4	Apr 2014	Aug 2014	June 2014	853.47	843.52	1.01180	1.072
Chelsea River Channel - 40 Feet	5	Apr 2014	Sept 2014	July 2014	856.88	843.52	1.01584	1.082

TABLE D2-9
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ANNUAL MAINTENANCE DREDGING INCREASE CALCULATIONS FOR ALTERANTIVE PLANS AND DEPTHS

EXISTING MAINTENANCE FREQUENCY AND VOLUMES BY PROJECT SEGMENT

Channel Segment	Ocean Disposal Suitability	Last Prior Maintenance Actions	Years of Last Maintenance Actions	O&M Interval (Years)	CY Dredged in Last Operation	Annual Cubic Yards
BSN Entrance Channel	Suitable	1969	2005	36	72,192	2,005
President Roads Anchorage	Suitable	1982	2004	22	1,166,447	53,020
Lower Main Ship Channel	Suitable	1967	2005	38	177,132	4,661
Lower Main Ship Channel	Unsuitable	1967	2008	41	672,804	16,410
Reserved Channel	Both	1960	1999	39	214,000	5,487
Mystic River (13% of Area)	Both	1982	1998	16	270,000	2,194
Chelsea River	Both	1983	1999	16	218,000	13,625
TOTAL ALL AREAS				MSC Total	849,936	21,071

MAIN CHANNELS IMPROVEMENT TO CONLEY TERMINAL - INNER CHANNEL DEPTH / ENTRANCE CHANNEL DEPTH

Improvement Dredge Depth - MSC	Annual CY	42 Feet 44 Feet	43 Feet 45 Feet	44 Feet 46 Feet	45 Feet 47 Feet	45 Feet 49 Feet	46 Feet 48 Feet	46 Feet 50 Feet	47 Feet 49 Feet	47 Feet 50 Feet	47 Feet 51 Feet	47 Feet 52 Feet	48 Feet 50 Feet	48 Feet 52 Feet	49 Feet 51 Feet	50 Feet 52 Feet
Percent Increase over Current O&M		10	12	14	16	17	18	19	20	21	22	23	22	23	24	26
Annnual Cubic Yards	81,584	8,158	9,790	11,422	13,053	13,869	14,685	15,501	16,317	17,133	17,948	18,764	17,948	18,764	19,580	21,212
Unit Cost (Incl Cont., E&D, S&A, etc)		$27.31	$22.12	$17.97	$15.65	$14.85	$14.11	$12.97	$13.03	$12.62	$12.36	$12.57	$12.01	$12.00	$11.31	$11.42
Annual O&M Increase over Existing		$223,000	$217,000	$205,000	$204,000	$206,000	$207,000	$201,000	$213,000	$216,000	$222,000	$236,000	$216,000	$225,000	$222,000	$242,000

MAIN SHIP CHANNEL DEEPENING EXTENSION ABOVE RESEREVD CHANNEL TO MASSPORT MARINE TERMINAL

Improvement Dredge Depth - MSC	Annual CY	42 Feet	43 Feet	44 Feet	45 Feet
Percent Increase over Current O&M		10	12	14	16
Annnual Cubic Yards	5,268	527	632	737	843
Unit Cost (Incl Cont., E&D, S&A, etc)		$31.13	$24.50	$20.88	$18.15
Annual O&M Increase over Existing		$16,000	$15,000	$15,000	$15,000

MYSTIC RIVER CHANNEL DEEPENING TO MASSPORT MEDFORD STREET TERMINAL

Improvement Dredge Depth	Annual CY	37 Feet	38 Feet	39 Feet	40 Feet
Percent Increase over Current O&M		10	12	14	16
Annnual Cubic Yards	2,194	219	263	307	351
Unit Cost (Incl Cont., E&D, S&A, etc)		$53.86	$40.87	$33.29	$30.00
Annual O&M Increase over Existing		$12,000	$11,000	$10,000	$11,000

CHELSEA RIVER CHANNEL DEEPENING WITH WIDENED BEND AND BRIDGE APPROACHES

Improvement Dredge Depth	Annual CY	39 Feet	40 Feet
Percent Increase over Current O&M		10	12
Annnual Cubic Yards	13,625	1,363	1,635
Unit Cost (Incl Cont., E&D, S&A, etc)		$41.90	$31.32
Annual O&M Increase over Existing		$57,000	$51,000

DETAILED ESTMATES

MAIN CHANNELS IMPROVEMENT PLANS – PLAN ABC

Project Description

The Main Channels Improvement Plans consist of improvements to deepen access from the sea to the Conley Container Terminal in South Boston. This requires deepening the Broad Sound North Entrance Channel from Massachusetts Bay into the harbor, the Main Ship Channel from the Outer Confluence of the entrance channels through President Roads and up-harbor to the Reserved Channel, the Reserved Channel Turning Area at the confluence of that channel with the Main Ship Channel, the lower Reserved Channel up to the Conley Terminal, and the President Roads Anchorage Area. These project segments are shown in Figure D2-1.

These main channels improvements for container shipping were evaluated by one-foot increments from 42 feet to 50 feet (MLLW) to enable economic optimization of the proposed improvements. The main channels improvement plans underwent hydrodynamic and ship simulation analyses that further modified the proposed channel layout and widths.

All plans include the following features. The Broad Sound North Entrance Channel would be deepened only within its existing 40-foot deep lane, with a width of 1100 feet in its entrance reach from the Bay seaward of Finns Ledge and 900 feet thereafter up-harbor to the upstream end of the Inner Confluence opposite Deer Island Light. The channel bend opposite Finns Ledge would be widened to ease the turn for larger vessels.

In the 2008 draft feasibility report, design guidance for additional depth in entrance channels to account for increased vessel motion from winds, waves and other factors followed PIANC guidance as discussed in Appendix D-1. In 2012 more site and vessel specific Corps guidance was used to re-analyze the entrance channel depth requirements. Based on the new analysis, the entrance channel would be deepened to a depth of four feet greater that the remaining project features inside the harbor to allow for greater sea states and vessel motion in the less protected entrance.

The Main Ship Channel from the Outer Confluence through President Roads would retain its existing 1200-foot width to enable, as at present, the turning of vessels into and out of the President Roads Anchorage and to allow for transition between the confluence of the entrance channels and the bends of the Main Ship Channel up-harbor from the Roads. Above the Roads, the existing channel layout of two parallel 600-foot wide lanes at 40 feet (south) and 35 feet (north) would be modified by incorporating various widths of the shallower 35-foot lane into the deepened and widened southerly lane. The new deepened channel lane would have a width of 900 feet between the roads and Castle Island, widened further in the two bends to 1050 feet, and a width of 800 feet above Castle Island to the Reserved Channel Turning Area.

The Reserved Channel Turning Area was expanded from its current 1200-foot diameter to 1500 feet, with eased transitions between the basin and the adjacent channels. As recommended by the Ship Simulation Study, the transition in the northwest angle between the channels east of the former Army Base Pier was expanded further and the basin limit widened a further 100 feet to the northeast, to compensate for the effects of currents on vessels turning in the basin.

The Reserved Channel's existing width to 400 feet along the Conley Terminal was retained. Only the existing 40-foot reach of the channel, comprising about two-thirds of its total length, is proposed for deepening, as this is the extent of the Conley Terminal's with-project length. The upper reach of the channel will remain at 35 feet. Details of the improvements to the Reserved Channel and its Turning Area are shown in Figure D2-2.

All material would be removed by bucket dredge and transported by scows. Disposal of all dredged material would be at the Massachusetts Bay Disposal Site (MBDS), located seaward of the territorial sea about 20 miles seaward of the harbor.

The following tables provide detail estimates for the main channels improvements.

Table D2-10 shows the quantity estimates by project segment by one-foot increments.

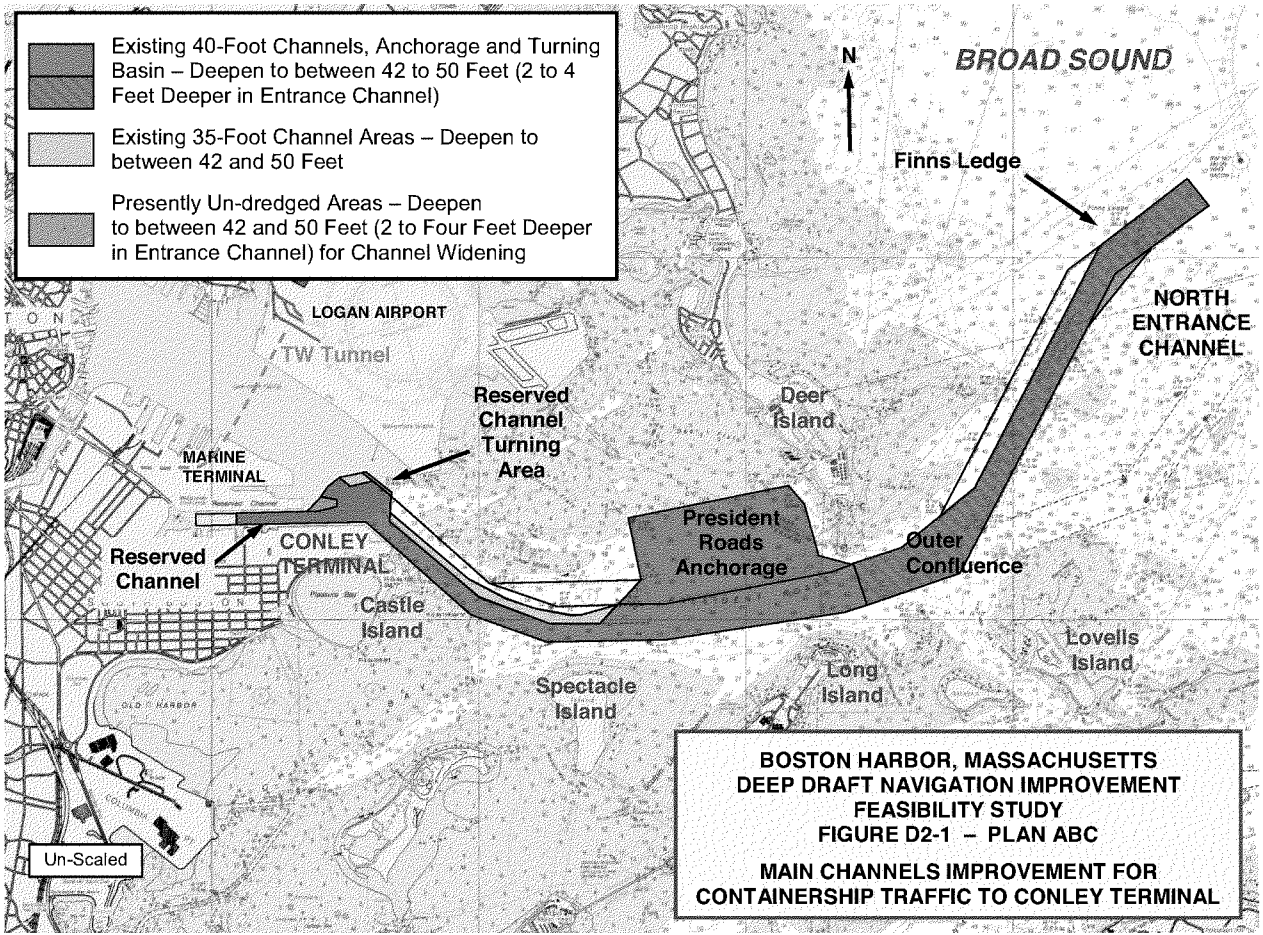
Table D2-11 shows the project footprint area estimates by segment in one-foot increments for ordinary material dredging and rock removal.

Table D2-12 shows the cost estimates for the 9 incremental depths for the main channels improvement plan (Plans ABC).

Table D2-13 shows the costs for the deepening of Massport's berths at the Conley Terminal; the Non-Federal Local Service Facilities (LSF).

Table D2-14 shows the annual costs of the 9 incremental depths.

Following these tables are the summary sheets from the contingency risk analyses for the recommended plan for the main channels improvements; the 47-foot project plan with a 51-foot entrance channel, as divided in its four major segments.


Existing 40-Foot Channels, Anchorage and Turning Basin – Deepen to between 42 to 50 Feet (2 to 4 Feet Deeper in Entrance Channel)
Existing 35-Foot Channel Areas – Deepen to between 42 and 50 Feet
Presently Un-dredged Areas – Deepen to between 42 and 50 Feet (2 to Four Feet Deeper in Entrance Channel) for Channel Widening
N
BROAD SOUND
Finns Ledge
NORTH ENTRANCE CHANNEL
LOGAN AIRPORT
TW Tunnel
Reserved Channel Turning Area
Deer Island
MARINE TERMINAL
Reserved Channel
CONLEY TERMINAL
President Roads Anchorage
Outer Confluence
Castle Island
Lovells Island
Long Island
Spectacle Island
Un-Scaled
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
FIGURE D2-1 – PLAN ABC
MAIN CHANNELS IMPROVEMENT FOR
CONTAINERSHIP TRAFFIC TO CONLEY TERMINAL

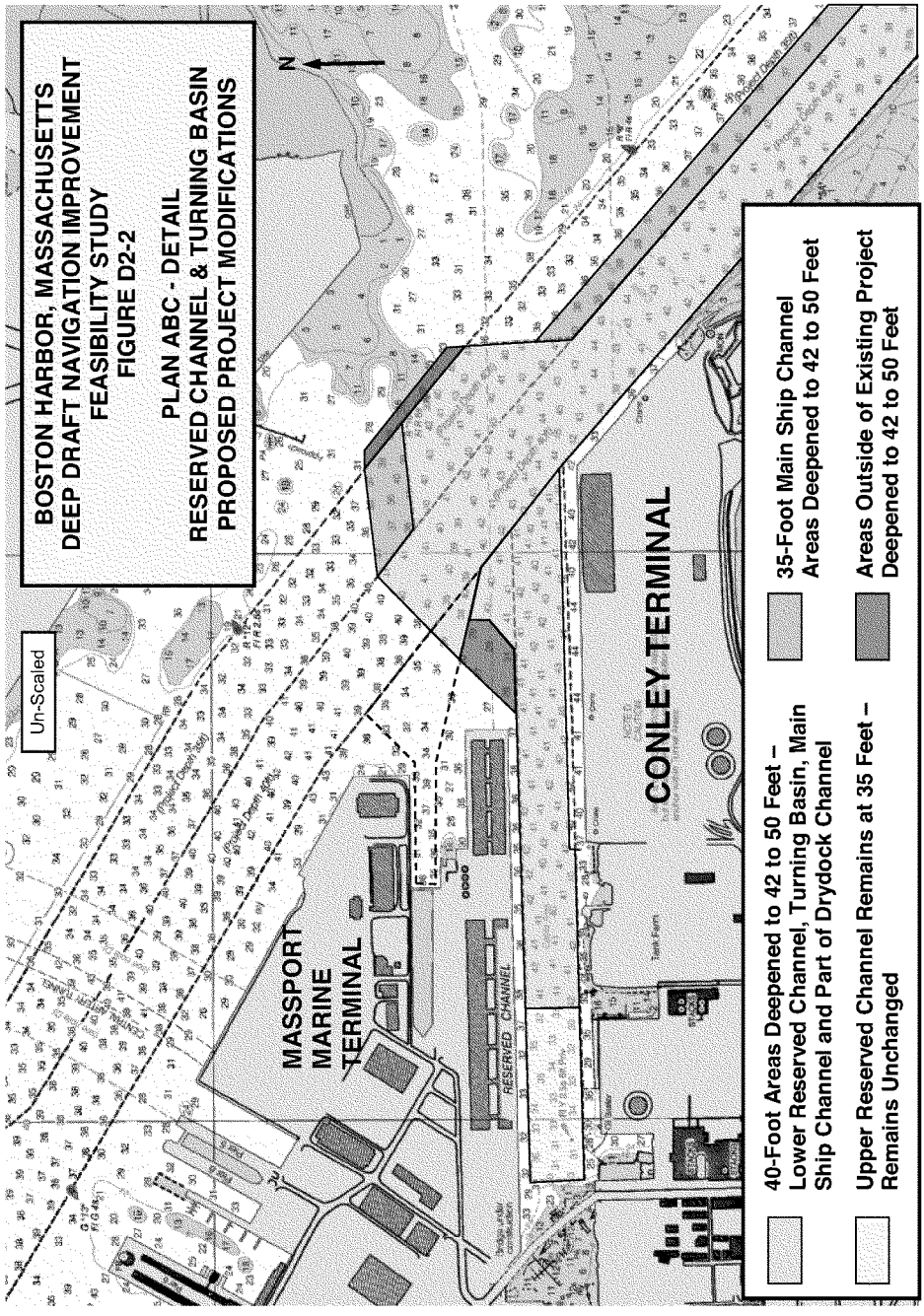

BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
FIGURE D2-2
PLAN ABC - DETAIL
RESERVED CHANNEL & TURNING BASIN
PROPOSED PROJECT MODIFICATIONS
Un-Scaled
N
MASSPORT
MARINE
TERMINAL
RESERVED CHANNEL
CONLEY TERMINAL
40-Foot Areas Deepened to 42 to 50 Feet –
Lower Reserved Channel, Turning Basin, Main
Ship Channel and Part of Drydock Channel
Upper Reserved Channel Remains at 35 Feet –
Remains Unchanged
35-Foot Main Ship Channel
Areas Deepened to 42 to 50 Feet
Areas Outside of Existing Project
Deepened to 42 to 50 Feet

TABLE D2-10
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 42-FOOT PROJECT DEPTH (44 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -42 Feet	2-Foot Overdepth to -44 Feet	Total CY Ordinary Material	Cut to Depth -42/-44 Feet	2-Foot Additional Required	2-Foot Overdepth to -46/-48 Feet	Total Rock CY	All Required Material	All Overdepth	Total All Material
BSNEC (44 Ft)	269,500	523,600	793,100	7,000	14,700	48,700	70,400	291,200	572,300	863,500
MSC-PR Reach	0	50,800	50,800	0	0	0	0	0	50,800	50,800
MSC-PR to RC	210,500	401,100	611,600	6,300	7,200	9,100	22,600	224,000	410,200	634,200
Expanded RCTA	107,200	134,800	242,000	200	400	600	1,200	107,800	135,400	243,200
Reserved Channel	8,700	90,400	99,100	0	10	250	260	8,700	90,700	99,360
Pres. Roads Anch	0	479,100	479,100	0	5,000	9,300	14,300	5,000	488,400	493,400
TOTAL	595,900	1,679,800	2,275,700	13,500	27,310	67,950	108,760	636,710	1,747,750	2,384,460

MAIN CHANNELS DEEPENING PLAN - 43-FOOT PROJECT DEPTH (45 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -43 Feet	2-Foot Overdepth to -45 Feet	Total CY Ordinary Material	Cut to Depth -43/-45 Feet	2-Foot Additional Required	2-Foot Overdepth to -47/-49 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (45 Ft)	503,000	606,300	1,109,300	11,400	41,400	102,000	154,800	555,800	708,300	1,264,100
MSC-PR Reach	13,500	105,200	118,700	0	0	0	0	13,500	105,200	118,700
MSC-PR to RC	388,300	472,800	861,100	9,300	9,300	11,800	30,400	406,900	484,600	891,500
Expanded RCTA	164,000	166,800	330,800	300	700	1,800	2,800	165,000	168,600	333,600
Reserved Channel	44,300	119,900	164,200	0	200	1,800	2,000	44,500	121,700	166,200
Pres. Roads Anch	136,800	817,600	954,400	1,800	8,900	12,700	23,400	147,500	830,300	977,800
TOTAL	1,249,900	2,288,600	3,538,500	22,800	60,500	130,100	213,400	1,333,200	2,418,700	3,751,900

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 44-FOOT PROJECT DEPTH (46 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -44 Feet	2-Foot Overdepth to -46 Feet	Total CY Ordinary Material	Cut to Depth -44/-46 Feet	2-Foot Additional Required	2-Foot Overdepth to -48/-50 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (46 Ft)	793,100	645,900	1,439,000	21,700	86,800	134,000	242,500	901,600	779,900	1,681,500
MSC-PR Reach	50,800	168,200	219,000	0	0	0	0	50,800	168,200	219,000
MSC-PR to RC	611,700	514,800	1,126,500	13,500	11,300	13,900	38,700	636,500	528,700	1,165,200
Expanded RCTA	242,000	185,400	427,400	600	1,500	4,700	6,800	244,100	190,100	434,200
Reserved Channel	99,200	132,900	232,100	0	1,700	5,100	6,800	100,900	138,000	238,900
Pres. Roads Anch	479,100	1,001,400	1,480,500	5,000	12,200	15,400	32,600	496,300	1,016,800	1,513,100
TOTAL	2,275,900	2,648,600	4,924,500	40,800	113,500	173,100	327,400	2,430,200	2,821,700	5,251,900

MAIN CHANNELS DEEPENING PLAN - 45-FOOT PROJECT DEPTH (47 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -45 Feet or -47 Feet	2-Foot Overdepth to -47 Feet or -49 Feet	Total CY Ordinary Material	Cut to Depth -45/-47 Feet	2-Foot Additional Required	2-Foot Overdepth to -49/-51 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (47 ft)	1,109,400	673,200	1,782,600	52,800	122,800	152,100	327,700	1,285,000	825,300	2,110,300
MSC-PR Reach	118,700	232,700	351,400	0	0	0	0	118,700	232,700	351,400
MSC-PR to RC	861,000	541,500	1,402,500	18,700	13,400	17,000	49,100	893,100	558,500	1,451,600
Expanded RCTA	330,800	198,000	528,800	1,000	4,100	12,400	17,500	335,900	210,400	546,300
Reserved Channel	164,200	136,200	300,400	200	4,500	8,900	13,600	168,900	145,100	314,000
Pres. Roads Anch	954,400	1,073,400	2,027,800	10,700	13,800	14,300	38,800	978,900	1,087,700	2,066,600
TOTAL	3,538,500	2,855,000	6,393,500	83,400	158,600	204,700	446,700	3,780,500	3,059,700	6,840,200

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 46-FOOT PROJECT DEPTH (48 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -46 Feet	2-Foot Overdepth to -48 Feet	Total CY Ordinary Material	Cut to Depth -46/-48 Feet	2-Foot Additional Required	2-Foot Overdepth to -50/-52 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (48 Ft)	1,439,000	690,800	2,129,800	108,500	145,600	174,500	428,600	1,693,100	865,300	2,558,400
MSC-PR Reach	219,000	296,400	515,400	0	0	10	10	219,000	296,400	515,400
MSC-PR to RC	1,126,500	562,200	1,688,700	24,800	16,300	20,800	61,900	1,167,600	583,000	1,750,600
Expanded RCTA	427,400	199,800	627,200	2,100	10,800	21,200	34,100	440,300	221,000	661,300
Reserved Channel	232,000	136,400	368,400	1,700	7,800	14,400	23,900	241,500	150,800	392,300
Pres. Roads Anch	1,480,600	1,107,300	2,587,900	17,200	15,400	15,900	48,500	1,513,200	1,123,200	2,636,400
TOTAL	4,924,500	2,992,900	7,917,400	154,300	195,900	246,800	597,000	5,274,700	3,239,700	8,514,400

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (49 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -47 Feet	2-Foot Overdepth to -49 Feet	Total CY Ordinary Material	Cut to Depth -47/-49 Feet	2-Foot Additional Required	2-Foot Overdepth to -51/-53 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (49 Ft)	1,782,600	700,200	2,482,800	175,600	167,400	192,400	535,400	2,125,600	892,600	3,018,200
MSC-PR Reach	351,500	361,300	712,800	0	10	40	50	351,500	361,300	712,900
MSC-PR to RC	1,402,400	574,900	1,977,300	32,100	20,100	25,500	77,700	1,454,600	600,400	2,055,000
Expanded RCTA	528,800	193,800	722,600	5,100	19,200	26,300	50,600	553,100	220,100	773,200
Reserved Channel	300,500	133,100	433,600	4,600	13,500	24,000	42,100	318,600	157,100	475,700
Pres. Roads Anch	2,027,800	1,128,000	3,155,800	24,500	16,900	17,400	58,800	2,069,200	1,145,400	3,214,600
TOTAL	6,393,600	3,091,300	9,484,900	241,900	237,100	285,600	764,700	6,872,600	3,376,900	10,249,600

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 48-FOOT PROJECT DEPTH (50 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -48 Feet	2-Foot Overdepth to -50 Feet	Total CY Ordinary Material	Cut to Depth -48/-50 Feet	2-Foot Additional Required	2-Foot Overdepth to -52/-54 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (50 Ft)	2,129,800	715,000	2,844,800	254,100	186,300	207,400	647,800	2,570,200	922,400	3,492,600
MSC-PR Reach	515,400	429,200	944,600	0	20	110	130	515,400	429,300	944,700
MSC-PR to RC	1,688,600	576,900	2,265,500	41,100	24,900	32,200	98,200	1,754,600	609,100	2,363,700
Expanded RCTA	627,200	189,100	816,300	12,900	25,200	30,800	68,900	665,300	219,900	885,200
Reserved Channel	368,400	125,800	494,200	9,500	22,700	36,300	68,500	400,600	162,100	562,700
Pres. Roads Anch	2,588,000	1,143,000	3,731,000	32,500	18,400	18,900	69,800	2,638,900	1,161,900	3,800,800
TOTAL	7,917,400	3,179,000	11,096,400	350,100	277,500	325,700	953,300	8,545,000	3,504,700	12,049,700

MAIN CHANNELS DEEPENING PLAN - 49-FOOT PROJECT DEPTH (51 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -49 Feet	2-Foot Overdepth to -51 Feet	Total CY Ordinary Material	Cut to Depth -49/-51 Feet	2-Foot Additional Required	2-Foot Overdepth to -53/-55 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (51 Ft)	2,482,800	736,000	3,218,800	343,000	201,900	218,800	763,700	3,027,700	954,800	3,982,500
MSC-PR Reach	712,800	488,100	1,200,900	10	60	200	270	712,900	488,300	1,201,200
MSC-PR to RC	1,977,300	575,100	2,552,400	52,200	31,000	41,300	124,500	2,060,500	616,400	2,676,900
Expanded RCTA	722,600	185,500	908,100	24,300	30,100	35,800	90,200	777,000	221,300	998,300
Reserved Channel	433,600	116,500	550,100	18,100	33,700	45,900	97,700	485,400	162,400	647,800
Pres. Roads Anch	3,155,800	1,157,200	4,313,000	41,400	19,900	20,400	81,700	3,217,100	1,177,600	4,394,700
TOTAL	9,484,900	3,258,400	12,743,300	479,000	316,700	362,400	1,158,100	10,280,600	3,620,800	13,901,400

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 OR 3 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 50-FOOT PROJECT DEPTH (52 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -50 Feet or -52 Feet	2-Foot Overdepth to -52 Feet or -54 Feet	Total CY Ordinary Material	Cut to Depth -50/-52 Feet	2-Foot Additional Required	2-Foot Overdepth to -54/-56 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (52 Feet)	2,844,700	763,100	3,607,800	440,500	214,400	228,200	883,100	3,499,600	991,300	4,490,900
MSC-PR Reach	944,600	532,900	1,477,500	20	150	320	490	944,800	533,200	1,478,000
MSC-PR to RC	2,265,600	571,300	2,836,900	66,000	39,000	51,400	156,400	2,370,600	622,700	2,993,300
Expanded RCTA	816,200	181,400	997,600	38,200	35,400	42,600	116,200	889,800	224,000	1,113,800
Reserved Channel	494,200	108,300	602,500	32,200	43,500	53,100	128,800	569,900	161,400	731,300
Pres. Roads Anch	3,730,900	1,173,000	4,903,900	51,000	21,400	23,500	95,900	3,803,300	1,196,500	4,999,800
TOTAL	11,096,200	3,330,000	14,426,200	627,900	353,900	399,100	1,380,900	12,078,000	3,729,100	15,807,100

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (50 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -47 Feet or -50 Feet	2-Foot Overdepth to -49 Feet or -52 Feet	Total CY Ordinary Material	Cut to Depth -47/-50 Feet	2-Foot Additional Required	2-Foot Overdepth to -51/-54 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (50 Feet)	2,129,800	715,000	2,844,800	254,100	186,300	207,400	647,800	2,570,200	922,400	3,492,600
MSC-PR Reach	351,500	361,300	712,800	0	10	40	50	351,500	361,300	712,900
MSC-PR to RC	1,402,400	574,900	1,977,300	32,100	20,100	25,500	77,700	1,454,600	600,400	2,055,000
Expanded RCTA	528,800	193,800	722,600	5,100	19,200	26,300	50,600	553,100	220,100	773,200
Reserved Channel	300,500	133,100	433,600	4,600	13,500	24,000	42,100	318,600	157,100	475,700
Pres. Roads Anch	2,027,800	1,128,000	3,155,800	24,500	16,900	17,400	58,800	2,069,200	1,145,400	3,214,600
TOTAL	6,740,800	3,106,100	9,846,900	320,400	256,000	300,600	877,100	7,317,200	3,406,700	10,724,000

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 4 OR 5 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (51 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -47 Feet or -51 Feet	2-Foot Overdepth to -49 Feet or -53 Feet	Total CY Ordinary Material	Cut to Depth -47/-51 Feet	2-Foot Additional Required	2-Foot Overdepth to -51/-55 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (51 Feet)	2,482,800	736,000	3,218,800	343,000	201,900	218,800	763,700	3,027,700	954,800	3,982,500
MSC-PR Reach	351,500	361,300	712,800	0	10	40	50	351,500	361,300	712,900
MSC-PR to RC	1,402,400	574,900	1,977,300	32,100	20,100	25,500	77,700	1,454,600	600,400	2,055,000
Expanded RCTA	528,800	193,800	722,600	5,100	19,200	26,300	50,600	553,100	220,100	773,200
Reserved Channel	300,500	133,100	433,600	4,600	13,500	24,000	42,100	318,600	157,100	475,700
Pres. Roads Anch	2,027,800	1,128,000	3,155,800	24,500	16,900	17,400	58,800	2,069,200	1,145,400	3,214,600
TOTAL	7,093,800	3,127,100	10,220,900	409,300	271,600	312,000	993,000	7,774,700	3,439,100	11,213,900

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (52 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -47 Feet or -52 Feet	2-Foot Overdepth to -49 Feet or -54 Feet	Total CY Ordinary Material	Cut to Depth -47/-52 Feet	2-Foot Additional Required	2-Foot Overdepth to -51/-56 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (52 Feet)	2,844,700	763,100	3,607,800	440,500	214,400	228,200	883,100	3,499,600	991,300	4,490,900
MSC-PR Reach	351,500	361,300	712,800	10	60	200	270	351,600	361,500	713,100
MSC-PR to RC	1,402,400	574,900	1,977,300	52,200	31,000	41,300	124,500	1,485,600	616,200	2,101,800
Expanded RCTA	528,800	193,800	722,600	24,300	30,100	35,800	90,200	583,200	229,600	812,800
Reserved Channel	300,500	133,100	433,600	18,100	33,700	45,900	97,700	352,300	179,000	531,300
Pres. Roads Anch	2,027,800	1,128,000	3,155,800	41,400	19,900	20,400	81,700	2,089,100	1,148,400	3,237,500
TOTAL	7,455,700	3,154,200	10,609,900	576,510	329,200	371,800	1,277,500	8,361,410	3,526,000	11,887,400

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 4 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 45-FOOT PROJECT DEPTH (49 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -45 Feet or -49 Feet	2-Foot Overdepth to -47 Feet or -51 Feet	Total CY Ordinary Material	Cut to Depth -45/-49 Feet	2-Foot Additional Required	2-Foot Overdepth to -49/-53 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (49 Feet)	1,782,600	700,200	2,482,800	175,600	167,400	192,400	535,400	2,125,600	892,600	3,018,200
MSC-PR Reach	118,700	232,700	351,400	0	0	0	0	118,700	232,700	351,400
MSC-PR to RC	861,000	541,500	1,402,500	18,700	13,400	17,000	49,100	893,100	558,500	1,451,600
Expanded RCTA	330,800	198,000	528,800	1,000	4,100	12,400	17,500	335,900	210,400	546,300
Reserved Channel	164,200	136,200	300,400	200	4,500	8,900	13,600	168,900	145,100	314,000
Pres. Roads Anch	954,400	1,073,400	2,027,800	10,700	13,800	14,300	38,800	978,900	1,087,700	2,066,600
TOTAL	4,211,700	2,882,000	7,093,700	206,200	203,200	245,000	654,400	4,621,100	3,127,000	7,748,100

MAIN CHANNELS DEEPENING PLAN - 46-FOOT PROJECT DEPTH (50 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -46 Feet or -50 Feet	2-Foot Overdepth to -48 Feet or -52 Feet	Total CY Ordinary Material	Cut to Depth -46/-50 Feet	2-Foot Additional Required	2-Foot Overdepth to -50/-54 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (50 Feet)	2,129,800	715,000	2,844,800	254,100	186,300	207,400	647,800	2,570,200	922,400	3,492,600
MSC-PR Reach	219,000	296,400	515,400	0	0	10	10	219,000	296,400	515,400
MSC-PR to RC	1,126,500	562,200	1,688,700	24,800	16,300	20,800	61,900	1,167,600	583,000	1,750,600
Expanded RCTA	427,400	199,800	627,200	2,100	10,800	21,200	34,100	440,300	221,000	661,300
Reserved Channel	232,000	136,400	368,400	1,700	7,800	14,400	23,900	241,500	150,800	392,300
Pres. Roads Anch	1,480,600	1,107,300	2,587,900	17,200	15,400	15,900	48,500	1,513,200	1,123,200	2,636,400
TOTAL	5,615,300	3,017,100	8,632,400	299,900	236,600	279,700	816,200	6,151,800	3,296,800	9,448,600

TABLE D2-10 (CONTINUED)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 4 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

MAIN CHANNELS DEEPENING PLAN - 48-FOOT PROJECT DEPTH (52 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Depth -48 Feet or -52 Feet	2-Foot Overdepth to -50 Feet or -54 Feet	Total CY Ordinary Material	Cut to Depth -48/-52 Feet	2-Foot Additional Required	2-Foot Overdepth to -52/-56 Feet	Total Rock CY	Cut to Depth	All Overdepth	Total All Material
BSNEC (52 Ft)	2,844,700	763,100	3,607,800	440,500	214,400	228,200	883,100	3,499,600	991,300	4,490,900
MSC-PR Reach	515,400	429,200	944,600	0	20	110	130	515,400	429,300	944,700
MSC-PR to RC	1,688,600	576,900	2,265,500	41,100	24,900	32,200	98,200	1,754,600	609,100	2,363,700
Expanded RCTA	627,200	189,100	816,300	12,900	25,200	30,800	68,900	665,300	219,900	885,200
Reserved Channel	368,400	125,800	494,200	9,500	22,700	36,300	68,500	400,600	162,100	562,700
Pres. Roads Anch	2,588,000	1,143,000	3,731,000	32,500	18,400	18,900	69,800	2,638,900	1,161,900	3,800,800
TOTAL	8,632,300	3,227,100	11,859,400	536,500	305,600	346,500	1,188,600	9,474,400	3,573,600	13,048,000

TABLE D2-11
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 42-FOOT PROJECT DEPTH (44 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -42 Feet or -44 Feet	2-Foot Overdepth to -44 Feet or -46 Feet	Total SF Ordinary Material	Cut to Depth -42/-44 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -46/48 Ft	Total Rock SF			
BSNEC (44 Ft)	7,169,238	2,173,226	9,342,464	115,584	385,350	155,847	656,781			
MSC-PR Reach	483,235	1,596,341	2,079,576	0	0	0	0			
MSC-PR to RC	5,275,558	1,395,318	6,670,876	75,913	39,545	7,720	123,178			
Expanded RCTA	917,401	1,290,123	2,207,524	1,478	3,466	2,771	7,715			
Reserved Channel	1,252,829	586,983	1,839,812	0	145	3,261	3,406			
Pres. Roads Anch	3,742,900	9,172,122	12,915,022	37,261	78,592	10,346	126,199			
TOTAL	18,841,161	16,214,113	35,055,274	230,236	507,098	179,945	917,279			

MAIN CHANNELS DEEPENING PLAN - 43-FOOT PROJECT DEPTH (45 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -43 Feet	2-Foot Overdepth to -45 Feet	Total SF Ordinary Material	Cut to Depth -43/-45 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -47/49 Ft	Total Rock SF			
BSNEC (45 Ft)	8,294,797	1,964,557	10,259,354	192,737	1,087,431	96,812	1,376,980			
MSC-PR Reach	1,162,576	1,808,197	2,970,773	0	0	0	0			
MSC-PR to RC	6,190,208	818,856	7,009,064	96,195	57,865	5,158	159,218			
Expanded RCTA	1,791,866	621,102	2,412,968	2,993	15,806	4,994	23,793			
Reserved Channel	1,702,939	176,491	1,879,430	0	16,451	8,378	24,829			
Pres. Roads Anch	9,644,691	4,221,178	13,865,869	59,212	108,370	4,370	171,952			
TOTAL	28,787,077	9,610,381	38,397,458	351,137	1,285,923	119,712	1,756,772			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 44-FOOT PROJECT DEPTH (46 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -44 Feet or -46 Feet	2-Foot Overdepth to -46 Feet or -48 Feet	Total SF Ordinary Material	Cut to Depth -44/-46 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -48/50 Ft	Total Rock SF			
BSNEC (46 Ft)	9,342,464	1,422,017	10,764,481	500,934	1,263,295	45,260	1,809,489			
MSC-PR Reach	2,079,576	1,706,395	3,785,971	0	0	0	0			
MSC-PR to RC	6,670,876	574,697	7,245,573	115,458	64,392	7,805	187,655			
Expanded RCTA	2,207,524	1,325,026	3,532,550	4,944	38,824	19,604	63,372			
Reserved Channel	1,839,812	51,488	1,891,300	145	58,196	9,934	68,275			
Pres. Roads Anch	12,915,022	1,451,808	14,366,830	115,853	73,580	4,197	193,630			
TOTAL	35,055,274	6,531,431	41,586,705	737,334	1,498,287	86,799	2,322,420			

MAIN CHANNELS DEEPENING PLAN - 45-FOOT PROJECT DEPTH (47 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -45 Feet or -47 Feet	2-Foot Overdepth to -47 Feet or -49 Feet	Total SF Ordinary Material	Cut to Depth -45/-47 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -49/51 Ft	Total Rock SF			
BSNEC (47 ft)	10,259,354	833,926	11,093,280	1,280,168	710,359	63,213	2,053,740			
MSC-PR Reach	2,970,773	1,695,512	4,666,285	0	0	0	0			
MSC-PR to RC	7,009,064	485,573	7,494,637	154,060	64,813	10,021	228,894			
Expanded RCTA	2,412,968	1,196,722	3,609,690	18,799	122,988	26,061	167,848			
Reserved Channel	1,879,430	16,462	1,895,892	16,451	91,560	12,684	120,695			
Pres. Roads Anch	13,865,869	831,667	14,697,536	167,582	42,838	4,103	214,523			
TOTAL	38,397,458	5,059,862	43,457,320	1,637,060	1,032,558	116,082	2,785,700			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 46-FOOT PROJECT DEPTH (48 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -46 Feet or - 48 Feet	2-Foot Overdepth to -48 Feet or - 50 Feet	Total SF Ordinary Material	Cut to Depth -46/-48 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -50/52 Ft	Total Rock SF			
BSNEC (48 Ft)	10,764,481	650,386	11,414,867	1,764,229	542,361	49,781	2,356,371			
MSC-PR Reach	3,785,971	1,820,959	5,606,930	0	0	60	60			
MSC-PR to RC	7,245,573	259,364	7,504,937	179,850	89,128	11,629	280,607			
Expanded RCTA	3,532,550	81,040	3,613,590	43,768	228,325	14,034	286,127			
Reserved Channel	1,891,300	5,328	1,896,628	58,341	113,090	23,425	194,856			
Pres. Roads Anch	14,366,830	514,858	14,881,688	189,433	41,501	4,105	235,039			
TOTAL	41,586,705	3,331,935	44,918,640	2,235,621	1,014,405	103,034	3,353,060			

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (49 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -47 Feet or - 49 Feet	2-Foot Overdepth to -49 Feet or - 51 Feet	Total SF Ordinary Material	Cut to Depth -47/-49 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -51/53 Ft	Total Rock SF			
BSNEC (49 Ft)	11,093,280	686,805	11,780,085	1,990,527	564,967	42,421	2,597,915			
MSC-PR Reach	4,666,285	1,762,286	6,428,571	0	300	180	480			
MSC-PR to RC	7,494,637	10,300	7,504,937	218,873	108,250	16,818	343,941			
Expanded RCTA	3,609,690	3,900	3,613,590	141,787	200,478	12,306	354,571			
Reserved Channel	1,895,892	736	1,896,628	108,011	180,545	34,828	323,384			
Pres. Roads Anch	14,697,536	359,244	15,056,780	210,420	41,039	4,014	255,473			
TOTAL	43,457,320	2,823,271	46,280,591	2,669,618	1,095,579	110,566	3,875,763			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 48-FOOT PROJECT DEPTH (50 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -48 Feet or -50 Feet	2-Foot Overdepth to -50 Feet or -52 Feet	Total SF Ordinary Material	Cut to Depth -48/-50 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -52/54 Ft	Total Rock SF			
BSNEC (50 Ft)	11,414,867	829,332	12,244,199	2,306,590	461,010	32,267	2,799,867			
MSC-PR Reach	5,606,930	1,411,386	7,018,316	0	1,200	240	1,440			
MSC-PR to RC	7,504,937	0	7,504,937	268,978	142,234	23,563	434,775			
Expanded RCTA	3,613,590	0	3,613,590	272,093	131,702	12,332	416,127			
Reserved Channel	1,896,628	0	1,896,628	171,431	291,263	27,523	490,217			
Pres. Roads Anch	14,881,688	362,372	15,244,060	230,934	40,593	4,233	275,760			
TOTAL	44,918,640	2,603,090	47,521,730	3,250,026	1,068,002	100,159	4,418,187			

MAIN CHANNELS DEEPENING PLAN - 49-FOOT PROJECT DEPTH (51 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -49 Feet or -51 Feet	2-Foot Overdepth to -51 Feet or -53 Feet	Total SF Ordinary Material	Cut to Depth -49/-51 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -53/55 Ft	Total Rock SF			
BSNEC (51 Ft)	11,780,085	894,502	12,674,587	2,555,494	373,442	25,403	2,954,339			
MSC-PR Reach	6,428,571	1,051,970	7,480,541	300	2,000	300	2,600			
MSC-PR to RC	7,504,937	0	7,504,937	327,123	201,906	28,998	558,027			
Expanded RCTA	3,613,590	0	3,613,590	342,265	123,192	17,894	483,351			
Reserved Channel	1,896,628	0	1,896,628	288,556	311,753	19,446	619,755			
Pres. Roads Anch	15,056,780	405,847	15,462,627	251,459	41,231	4,064	296,754			
TOTAL	46,280,591	2,352,319	48,632,910	3,765,197	1,053,524	96,105	4,914,826			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 2 OR 3 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 50-FOOT PROJECT DEPTH (52 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -50 Feet or -52 Feet	2-Foot Overdepth to -52 Feet or -54 Feet	Total SF Ordinary Material	Cut to Depth -50/-52 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -54/56 Ft	Total Rock SF			
BSNEC (52 Feet)	12,244,199	891,352	13,135,551	2,767,600	288,352	25,242	3,081,194			
MSC-PR Reach	7,018,316	863,571	7,881,887	1,200	2,700	380	4,280			
MSC-PR to RC	7,504,937	0	7,504,937	411,212	262,809	20,281	694,302			
Expanded RCTA	3,613,590	0	3,613,590	403,795	151,131	20,696	575,622			
Reserved Channel	1,896,628	0	1,896,628	462,694	234,844	19,517	717,055			
Pres. Roads Anch	15,244,060	509,009	15,753,069	271,527	41,484	3,902	316,913			
TOTAL	47,521,730	2,263,932	49,785,662	4,318,028	981,320	90,019	5,389,367			

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (50 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -47 Feet or -50 Feet	2-Foot Overdepth to -49 Feet or -52 Feet	Total SF Ordinary Material	Cut to Depth -47/-50 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -51/54 Ft	Total Rock SF			
BSNEC (50 Feet)	11,414,867	829,332	12,244,199	2,306,590	461,010	32,267	2,799,867			
MSC-PR Reach	4,666,285	1,762,286	6,428,571	0	300	180	480			
MSC-PR to RC	7,494,637	10,300	7,504,937	218,873	108,250	16,818	343,941			
Expanded RCTA	3,609,690	3,900	3,613,590	141,787	200,478	12,306	354,571			
Reserved Channel	1,895,892	736	1,896,628	108,011	180,545	34,828	323,384			
Pres. Roads Anch	14,697,536	359,244	15,056,780	210,420	41,039	4,014	255,473			
TOTAL	43,778,907	2,965,798	46,744,705	2,985,681	991,622	100,412	4,077,715			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 4 OR 5 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (51 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -47 Feet or -51 Feet	2-Foot Overdepth to -49 Feet or -53 Feet	Total SF Ordinary Material	Cut to Depth -47/-51 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -51/55 Ft	Total Rock SF			
BSNEC (51 Feet)	11,780,085	894,502	12,674,587	2,555,494	373,442	25,403	2,954,339			
MSC-PR Reach	4,666,285	1,762,286	6,428,571	0	300	180	480			
MSC-PR to RC	7,494,637	10,300	7,504,937	218,873	108,250	16,818	343,941			
Expanded RCTA	3,609,690	3,900	3,613,590	141,787	200,478	12,306	354,571			
Reserved Channel	1,895,892	736	1,896,628	108,011	180,545	34,828	323,384			
Pres. Roads Anch	14,697,536	359,244	15,056,780	210,420	41,039	4,014	255,473			
TOTAL	44,144,125	3,030,968	47,175,093	3,234,585	904,054	93,548	4,232,187			

MAIN CHANNELS DEEPENING PLAN - 47-FOOT PROJECT DEPTH (52 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -47 Feet or -52 Feet	2-Foot Overdepth to -49 Feet or -54 Feet	Total SF Ordinary Material	Cut to Depth -47/-52 Feet	2-Foot Additional Required	20% of 1-Ft Overdepth Increment -51/56 Ft	Total Rock SF			
BSNEC (52 Feet)	12,244,199	891,352	13,135,551	2,767,600	288,352	25,242	3,081,194			
MSC-PR Reach	4,666,285	1,762,286	6,428,571	0	300	180	480			
MSC-PR to RC	7,494,637	10,300	7,504,937	218,873	108,250	16,818	343,941			
Expanded RCTA	3,609,690	3,900	3,613,590	141,787	200,478	12,306	354,571			
Reserved Channel	1,895,892	736	1,896,628	108,011	180,545	34,828	323,384			
Pres. Roads Anch	14,697,536	359,244	15,056,780	210,420	41,039	4,014	255,473			
TOTAL	44,608,239	3,027,818	47,636,057	3,446,691	818,964	93,387	4,359,042			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 4 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 45-FOOT PROJECT DEPTH (49 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -45 Feet or -49 Feet	2-Foot Overdepth to -47 Feet or -51 Feet	Total CY Ordinary Material	Cut to Depth -45/-49 Feet	2-Foot Additional Required	2-Foot Overdepth to -49/-53 Feet	Total Rock SF			
BSNEC (49 Feet)	11,093,280	686,805	11,780,085	1,990,527	564,967	42,421	2,597,915			
MSC-PR Reach	2,970,773	1,695,512	4,666,285	0	0	0	0			
MSC-PR to RC	7,009,064	485,573	7,494,637	154,060	64,813	10,021	228,894			
Expanded RCTA	2,412,968	1,196,722	3,609,690	18,799	122,988	26,061	167,848			
Reserved Channel	1,879,430	16,462	1,895,892	16,451	91,560	12,684	120,695			
Pres. Roads Anch	13,865,869	831,667	14,697,536	167,582	42,838	4,103	214,523			
TOTAL	39,231,384	4,912,741	44,144,125	2,347,419	887,166	95,290	3,329,875			

MAIN CHANNELS DEEPENING PLAN - 46-FOOT PROJECT DEPTH (50 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -46 Feet or -50 Feet	2-Foot Overdepth to -48 Feet or -52 Feet	Total CY Ordinary Material	Cut to Depth -46/-50 Feet	2-Foot Additional Required	2-Foot Overdepth to -50/-54 Feet	Total Rock SF			
BSNEC (50 Feet)	11,414,867	829,332	12,244,199	2,306,590	461,010	32,267	2,799,867			
MSC-PR Reach	3,785,971	1,820,959	5,606,930	0	0	60	60			
MSC-PR to RC	7,245,573	259,364	7,504,937	179,850	89,128	11,629	280,607			
Expanded RCTA	3,532,550	81,040	3,613,590	43,768	228,325	14,034	286,127			
Reserved Channel	1,891,300	5,328	1,896,628	58,341	113,090	23,425	194,856			
Pres. Roads Anch	14,366,830	514,858	14,881,688	189,433	41,501	4,105	235,039			
TOTAL	42,237,091	3,510,881	45,747,972	2,777,982	933,054	85,521	3,796,557			

TABLE D2-11 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING AND ROCK AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLANS A, B & C - MAIN CHANNEL ALTERNATIVES

PLANS A, B & C - DEEPEN THE LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE AND RESERVED CHANNEL & TURNING AREA TO UNIFORM DEPTH WITH AN ADDITIONAL 4 FEET IN THE BROAD SOUND NORTH ENTRANCE CHANNEL

ROCK OVERDEPTH AREA CALCULATED AT 20% OF THE 1-FOOT OVERDEPTH ELEVATION

MAIN CHANNELS DEEPENING PLAN - 48-FOOT PROJECT DEPTH (52 FEET IN ENTRANCE CHANNEL)
NORTH ENTANCE CHANNEL, LOWER MAIN SHIP CHANNEL, P.R. ANCHORAGE, RESERVED CHANNEL & TURNING AREA

Channel Improvement Design Depth	Ordinary Material (Total All Areas - Sq Ft)			Area of Ledge Removal (Sq Ft - Requires Added 2 Feet)						
	Cut to Depth -48 Feet or -52 Feet	2-Foot Overdepth to -50 Feet or -54 Feet	Total CY Ordinary Material	Cut to Depth -48/-52 Feet	2-Foot Additional Required	2-Foot Overdepth to -52/-56 Feet	Total Rock SF			
BSNEC (52 Ft)	12,244,199	891,352	13,135,551	2,767,600	288,352	25,242	3,081,194			
MSC-PR Reach	5,606,930	1,411,386	7,018,316	0	1,200	240	1,440			
MSC-PR to RC	7,504,937	0	7,504,937	268,978	142,234	23,563	434,775			
Expanded RCTA	3,613,590	0	3,613,590	272,093	131,702	12,332	416,127			
Reserved Channel	1,896,628	0	1,896,628	171,431	291,263	27,523	490,217			
Pres. Roads Anch	14,881,688	362,372	15,244,060	230,934	40,593	4,233	275,760			
TOTAL	45,747,972	2,665,110	48,413,082	3,711,036	895,344	93,133	4,699,513			

TABLE D2-12
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL
DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	42/44-FOOT CHANNEL PLAN NORTH ENTRANCE & MAIN SHIP CHANNEL ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA 42/44-FOOT PROJECT DEPTH			43/45-FOOT CHANNEL PLAN NORTH ENTRANCE & MAIN SHIP CHANNEL ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA 43/45-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,133,000	LS	LS	$1,139,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,088,000	LS	LS	$1,197,000
Remobilization for AQ Shutdowns	0	$4,147,000	$0	0	$4,254,000	$0
			$4,837,000			$4,952,000
Dredging and Ocean Disposal						
BSN Entrance Channel	793,100	$17.67	$14,014,000	1,109,300	$14.98	$16,617,000
Main Ship Chan Incl PRR	662,400	$19.43	$12,870,000	979,800	$17.97	$17,607,000
Res Chan & Res Turn Area	341,100	$17.84	$6,085,000	495,000	$14.39	$7,123,000
Pres Roads Anchorage	479,100	$32.80	$15,714,000	954,400	$20.91	$19,957,000
	2,275,700	$21.39	$48,683,000	3,538,500	$17.32	$61,304,000
Ledge Drilling and Blasting						
BSN Entrance Channel	70,400	$124.20	$8,744,000	154,800	$119.37	$18,478,000
Main Ship Chan Incl PRR	22,600	$105.80	$2,391,000	30,400	$102.80	$3,125,000
Res Chan & Res Turn Area	1,460	$150.68	$220,000	4,800	$169.79	$815,000
Pres Roads Anchorage	14,300	$136.85	$1,957,000	23,400	$119.23	$2,790,000
	108,760	$122.40	$13,312,000	213,400	$118.13	$25,208,000
Ledge Removal & Disposal						
BSN Entrance Channel	70,400	$17.25	$1,214,000	154,800	$17.26	$2,672,000
Main Ship Chan Incl PRR	22,600	$20.29	$459,000	30,400	$20.51	$624,000
Res Chan & Res Turn Area	1,460	$41.58	$61,000	4,800	$26.14	$125,000
Pres Roads Anchorage	14,300	$21.59	$309,000	23,400	$19.97	$467,000
	108,760	$18.78	$2,043,000	213,400	$18.22	$3,888,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency			$69,159,000			$95,636,000
Construction Contingency		16.9%	$11,712,000		16.9%	$16,196,000
Subtotal - Construction			$80,871,000			$111,832,000
Planning, Engineering & Design		5.0%	$4,044,000		3.8%	$4,273,000
Supervision & Administration		5.5%	$4,432,000		4.5%	$5,044,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$59,000			$66,000
Total First Cost GNF - July 2011 Prices		111%	$89,598,000		109%	$121,407,000
Program Year 2013 First Cost			$92,713,000			$125,697,000
PED Escalation	1.03779		$4,197,000	1.03779		$4,434,000
CM Escalation	1.03779		$4,599,000	1.03779		$5,235,000
Real Estate Escalation	1.03692		$61,000	1.03692		$68,000
Construction Escalation	1.03692		$83,856,000	1.03692		$115,960,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$4,232,000	1.00843		$4,471,000
CM Escalation	1.04744		$4,817,000	1.05702		$5,533,000
Real Estate Escalation	1.02102		$62,000	1.02564		$70,000
Construction Escalation	1.02102		$85,619,000	1.02564		$118,934,000
Total Cost Escalated to Construction			$94,730,000			$129,008,000
ATON Escalation (USCG)	1.02102		$203,000	1.02564		$204,000
Construction Period (Months)		16			18	
July 2011 First Cost Plus IDC	0.0031250	1.02378	$91,729,000	0.0031250	1.02701	$124,686,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$4,088,000	3-3/4%	0.04457	$5,557,000
Increased Annual Maintenance			$223,000			$217,000
TOTAL			$4,311,000			$5,774,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$6,646,000	7%	0.07245	$9,034,000
Increased Annual Maintenance			$223,000			$217,000
TOTAL			$6,869,000			$9,251,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL
DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	44/46-FOOT CHANNEL PLAN NORTH ENTRANCE & MAIN SHIP CHANNEL ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA 44/46-FOOT PROJECT DEPTH			45/47-FOOT CHANNEL PLAN NORTH ENTRANCE & MAIN SHIP CHANNEL ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA 45/47-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,245,000	LS	LS	$1,366,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,197,000	LS	LS	$1,197,000
Remobilization for AQ Shutdowns	1	$4,360,000	$4,360,000	1	$4,467,000	$4,467,000
			$9,418,000			$9,646,000
Dredging and Ocean Disposal						
BSN Entrance Channel	1,439,000	$12.97	$18,664,000	1,782,600	$11.67	$20,803,000
Main Ship Chan Incl PRR	1,345,500	$14.18	$19,079,000	1,753,900	$12.55	$22,011,000
Res Chan & Res Turn Area	659,500	$14.07	$9,279,000	829,200	$12.05	$9,992,000
Pres Roads Anchorage	1,480,500	$15.06	$22,296,000	2,027,800	$12.61	$25,571,000
	4,924,500	$14.08	$69,318,000	6,393,500	$12.26	$78,377,000
Ledge Drilling and Blasting						
BSN Entrance Channel	242,500	$105.91	$25,683,000	327,700	$94.64	$31,014,000
Main Ship Chan Incl PRR	38,700	$97.70	$3,781,000	49,100	$95.17	$4,673,000
Res Chan & Res Turn Area	13,600	$160.29	$2,180,000	31,100	$154.02	$4,790,000
Pres Roads Anchorage	32,600	$111.29	$3,628,000	38,800	$106.44	$4,130,000
	327,400	$107.73	$35,272,000	446,700	$99.86	$44,607,000
Ledge Removal & Disposal						
BSN Entrance Channel	242,500	$16.62	$4,030,000	327,700	$16.18	$5,302,000
Main Ship Chan Incl PRR	38,700	$19.74	$764,000	49,100	$19.39	$952,000
Res Chan & Res Turn Area	13,600	$23.71	$322,000	31,100	$21.15	$658,000
Pres Roads Anchorage	32,600	$19.44	$634,000	38,800	$19.35	$751,000
	327,400	$17.56	$5,750,000	446,700	$17.15	$7,663,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency			$120,042,000			$140,577,000
Construction Contingency		16.9%	$20,329,000		16.9%	$23,807,000
Subtotal - Construction			$140,371,000			$164,384,000
Planning, Engineering & Design		3.2%	$4,522,000		2.9%	$4,710,000
Supervision & Administration		4.6%	$6,473,000		4.1%	$6,672,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$95,000			$99,000
Total First Cost GNF - July 2011 Prices		108%	$151,653,000		107%	$176,057,000
Program Year 2013 First Cost			$157,063,000			$182,367,000
PED Escalation	1.03779		$4,693,000	1.03779		$4,888,000
CM Escalation	1.03779		$6,718,000	1.03779		$6,924,000
Real Estate Escalation	1.03692		$99,000	1.03692		$103,000
Construction Escalation	1.03692		$145,553,000	1.03692		$170,452,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$4,733,000	1.00843		$4,929,000
CM Escalation	1.06756		$7,172,000	1.06756		$7,392,000
Real Estate Escalation	1.03027		$102,000	1.03027		$106,000
Construction Escalation	1.03027		$149,958,000	1.03027		$175,611,000
Total Cost Escalated to Construction			$161,965,000			$188,038,000
ATON Escalation (USCG)	1.03027		$205,000	1.03027		$205,000
Construction Period (Months)		26			27	
July 2011 First Cost Plus IDC	0.0031250	1.04006	$157,728,000	0.0031250	1.04170	$183,399,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$7,030,000	3-3/4%	0.04457	$8,174,000
Increased Annual Maintenance			$205,000			$204,000
TOTAL			$7,235,000			$8,378,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$11,427,000	7%	0.07245	$13,287,000
Increased Annual Maintenance			$205,000			$204,000
TOTAL			$11,632,000			$13,491,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	46/48-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 48 FEET WITH 46-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA			47/49-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 49 FEET WITH 50-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,472,000	LS	LS	$1,580,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,204,000	LS	LS	$1,204,000
Remobilization for AQ Shutdowns	1	$4,573,000	$4,573,000	1	$4,669,000	$4,669,000
			$9,865,000			$10,069,000
Dredging and Ocean Disposal						
BSN Entrance Channel	2,129,800	$10.85	$23,108,000	2,482,800	$10.05	$24,952,000
Main Ship Chan Incl PRR	2,204,100	$11.27	$24,840,000	2,690,100	$10.76	$28,945,000
Res Chan & Res Turn Area	995,600	$10.98	$10,932,000	1,156,200	$10.06	$11,631,000
Pres Roads Anchorage	2,587,900	$11.07	$28,648,000	3,155,800	$9.92	$31,306,000
	7,917,400	$11.06	$87,528,000	9,484,900	$10.21	$96,834,000
Ledge Drilling and Blasting						
BSN Entrance Channel	428,600	$87.30	$37,417,000	535,400	$83.70	$44,813,000
Main Ship Chan Incl PRR	61,910	$93.43	$5,784,000	77,750	$92.03	$7,155,000
Res Chan & Res Turn Area	58,000	$141.10	$8,184,000	92,700	$128.47	$11,909,000
Pres Roads Anchorage	48,500	$97.71	$4,739,000	58,800	$91.00	$5,351,000
	597,010	$94.01	$56,124,000	764,650	$90.54	$69,228,000
Ledge Removal & Disposal						
BSN Entrance Channel	428,600	$15.98	$6,849,000	535,400	$15.74	$8,427,000
Main Ship Chan Incl PRR	61,910	$19.23	$1,191,000	77,750	$19.02	$1,479,000
Res Chan & Res Turn Area	58,000	$20.78	$1,205,000	92,700	$20.15	$1,868,000
Pres Roads Anchorage	48,500	$18.93	$918,000	58,800	$18.46	$1,085,000
	597,010	$17.02	$10,163,000	764,650	$16.82	$12,859,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency			$163,964,000			$189,274,000
Construction Contingency		16.9%	$27,767,000		17.0%	$32,164,000
Subtotal - Construction			$191,731,000			$221,438,000
Planning, Engineering & Design		2.6%	$4,916,000		2.3%	$5,130,000
Supervision & Administration		3.7%	$7,103,000		3.4%	$7,561,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$103,000			$106,000
Total First Cost GNF - July 2011 Prices		106%	$204,045,000		106%	$234,427,000
Program Year 2013 First Cost			$211,389,000			$242,893,000
PED Escalation	1.03779		$5,102,000	1.03779		$5,324,000
CM Escalation	1.03779		$7,371,000	1.03779		$7,847,000
Real Estate Escalation	1.03692		$107,000	1.03692		$110,000
Construction Escalation	1.03692		$198,809,000	1.03692		$229,612,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$5,145,000	1.00843		$5,369,000
CM Escalation	1.06756		$7,869,000	1.06756		$8,377,000
Real Estate Escalation	1.03027		$110,000	1.03027		$113,000
Construction Escalation	1.03027		$204,826,000	1.03027		$236,561,000
Total Cost Escalated to Construction			$217,950,000			$250,420,000
ATON Escalation (USCG)	1.03027		$205,000	1.03027		$205,000
Construction Period (Months)		28			29	
July 2011 First Cost Plus IDC	0.0031250	1.04335	$212,891,000	0.0031250	1.04501	$244,978,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$9,489,000	3-3/4%	0.04457	$10,919,000
Increased Annual Maintenance			$207,000			$213,000
TOTAL			$9,696,000			$11,132,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$15,424,000	7%	0.07245	$17,749,000
Increased Annual Maintenance			$207,000			$213,000
TOTAL			$15,631,000			$17,962,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL
DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	48/50-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 50 FEET WITH 48-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA			49/51-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 51 FEET WITH 49-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,590,000	LS	LS	$1,603,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,204,000	LS	LS	$1,310,000
Remobilization for AQ Shutdowns	1	$4,672,000	$4,672,000	1	$4,791,000	$4,791,000
			$10,082,000			$10,320,000
Dredging and Ocean Disposal						
BSN Entrance Channel	2,844,800	$8.95	$25,461,000	3,218,800	$8.36	$26,909,000
Main Ship Chan Incl PRR	3,210,100	$9.79	$31,427,000	3,753,300	$9.39	$35,243,000
Res Chan & Res Turn Area	1,310,500	$9.70	$12,712,000	1,458,200	$9.33	$13,605,000
Pres Roads Anchorage	3,731,000	$9.32	$34,773,000	4,313,000	$8.62	$37,178,000
	11,096,400	$9.41	$104,373,000	12,743,300	$8.86	$112,935,000
Ledge Drilling and Blasting						
BSN Entrance Channel	647,800	$83.48	$54,079,000	763,700	$83.25	$63,578,000
Main Ship Chan Incl PRR	98,330	$92.04	$9,050,000	124,770	$92.70	$11,566,000
Res Chan & Res Turn Area	137,400	$119.34	$16,398,000	187,900	$110.10	$20,687,000
Pres Roads Anchorage	69,800	$85.83	$5,991,000	81,700	$81.76	$6,680,000
	953,300	$89.71	$85,518,000	1,158,070	$88.52	$102,511,000
Ledge Removal & Disposal						
BSN Entrance Channel	647,800	$15.63	$10,125,000	763,700	$15.66	$11,960,000
Main Ship Chan Incl PRR	98,330	$18.86	$1,855,000	124,770	$18.81	$2,347,000
Res Chan & Res Turn Area	137,400	$19.60	$2,693,000	187,900	$19.01	$3,572,000
Pres Roads Anchorage	69,800	$18.30	$1,277,000	81,700	$17.96	$1,467,000
	953,330	$16.73	$15,950,000	1,158,070	$16.71	$19,346,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency	12,049,730		$216,207,000	13,901,370		$245,396,000
Construction Contingency		17.0%	$36,815,000		17.1%	$41,893,000
Subtotal - Construction			$253,022,000			$287,289,000
Planning, Engineering & Design		2.1%	$5,362,000		2.0%	$5,802,000
Supervision & Administration		3.2%	$8,180,000		3.4%	$9,712,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$114,000			$147,000
Total First Cost GNF - July 2011 Prices		105%	$266,870,000		106%	$303,142,000
Program Year 2013 GNF First Cost			$276,532,000			$314,146,000
PED Escalation	1.03779		$5,564,000	1.03779		$6,021,000
CM Escalation	1.03779		$8,489,000	1.03779		$10,079,000
Real Estate Escalation	1.03692		$118,000	1.03692		$152,000
Construction Escalation	1.03692		$262,362,000	1.03692		$297,894,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$5,612,000	1.00843		$6,072,000
CM Escalation	1.07810		$9,151,000	1.08769		$10,963,000
Real Estate Escalation	1.03489		$121,000	1.03939		$158,000
Construction Escalation	1.03489		$271,517,000	1.03939		$309,629,000
Total Cost Escalated to Construction			$286,401,000			$326,822,000
ATON Escalation (USCG)	1.03489		$206,000	1.03939		$207,000
Construction Period (Months)		31			40	
July 2011 First Cost Plus IDC	0.0031250	1.04832	$279,766,000	0.0031250	1.06342	$322,368,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$12,469,000	3-3/4%	0.04457	$14,368,000
Increased Annual Maintenance			$216,000			$222,000
TOTAL			$12,685,000			$14,590,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$20,269,000	7%	0.07245	$23,356,000
Increased Annual Maintenance			$216,000			$222,000
TOTAL			$20,485,000			$23,578,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL
DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	50/52-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 52 FEET WITH 50-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA			HYBRID 47/50-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 50 FEET WITH 47-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,801,000	LS	LS	$1,583,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,310,000	LS	LS	$1,204,000
Remobilization for AQ Shutdowns	2	$4,989,000	$9,978,000	1	$4,672,000	$4,672,000
			$15,705,000			$10,075,000
Dredging and Ocean Disposal						
BSN Entrance Channel	3,607,800	$9.04	$32,615,000	2,844,800	$8.95	$25,461,000
Main Ship Chan Incl PRR	4,314,400	$9.25	$39,908,000	2,690,100	$10.76	$28,945,000
Res Chan & Res Turn Area	1,600,100	$9.07	$14,513,000	1,156,200	$10.06	$11,631,000
Pres Roads Anchorage	4,903,900	$8.56	$41,977,000	3,155,800	$9.92	$31,306,000
	14,426,200	$8.94	$129,013,000	9,846,900	$9.89	$97,343,000
Ledge Drilling and Blasting						
BSN Entrance Channel	883,100	$78.26	$69,111,000	647,800	$83.48	$54,079,000
Main Ship Chan Incl PRR	156,890	$92.14	$14,456,000	77,750	$92.03	$7,155,000
Res Chan & Res Turn Area	245,000	$102.51	$25,115,000	92,700	$128.47	$11,909,000
Pres Roads Anchorage	95,900	$77.41	$7,424,000	58,800	$91.00	$5,351,000
	1,380,890	$84.08	$116,106,000	877,050	$89.50	$78,494,000
Ledge Removal & Disposal						
BSN Entrance Channel	883,100	$15.35	$13,556,000	647,800	$15.63	$10,125,000
Main Ship Chan Incl PRR	156,890	$18.64	$2,924,000	77,750	$19.02	$1,479,000
Res Chan & Res Turn Area	245,000	$18.80	$4,606,000	92,700	$20.15	$1,868,000
Pres Roads Anchorage	95,900	$18.05	$1,731,000	58,800	$18.46	$1,085,000
	1,380,890	$16.52	$22,817,000	877,050	$16.60	$14,557,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency			$283,925,000			$200,753,000
Construction Contingency		17.1%	$48,470,000		17.0%	$34,115,000
Subtotal - Construction			$332,395,000			$234,868,000
Planning, Engineering & Design		1.8%	$6,146,000		2.2%	$5,267,000
Supervision & Administration		3.5%	$11,643,000		3.3%	$7,844,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$187,000			$110,000
Total First Cost GNF - July 2011 Prices		105%	$350,563,000		106%	$248,281,000
Program Year 2013 First Cost			$363,320,000			$257,258,000
PED Escalation	1.03779		$6,378,000	1.03779		$5,466,000
CM Escalation	1.03779		$12,083,000	1.03779		$8,140,000
Real Estate Escalation	1.03692		$194,000	1.03692		$114,000
Construction Escalation	1.03692		$344,665,000	1.03692		$243,538,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$6,432,000	1.00843		$5,512,000
CM Escalation	1.10877		$13,397,000	1.06756		$8,690,000
Real Estate Escalation	1.04881		$203,000	1.03027		$117,000
Construction Escalation	1.04881		$361,487,000	1.03027		$250,909,000
Total Cost Escalated to Construction			$381,519,000			$265,228,000
ATON Escalation (USCG)	1.04881		$209,000	1.03027		$205,000
Construction Period (Months)		51			30	
July 2011 First Cost Plus IDC	0.0031250	1.08227	$379,403,000	0.0031250	1.04666	$259,866,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$16,910,000	3-3/4%	0.04457	$11,582,000
Increased Annual Maintenance			$242,000			$216,000
TOTAL			$17,152,000			$11,798,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$27,488,000	7%	0.07245	$18,827,000
Increased Annual Maintenance			$242,000			$216,000
TOTAL			$27,730,000			$19,043,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL
DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	HYBRID 47/51-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 51 FEET WITH 47-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA			HYBRID 47/52-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 52 FEET WITH 47-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,596,000	LS	LS	$1,603,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,204,000	LS	LS	$1,310,000
Remobilization for AQ Shutdowns	1	$4,685,000	$4,685,000	1	$4,776,000	$4,776,000
			$10,101,000			$10,305,000
Dredging and Ocean Disposal						
BSN Entrance Channel	3,218,800	$8.42	$27,102,000	3,607,800	$9.04	$32,615,000
Main Ship Chan Incl PRR	2,690,100	$10.76	$28,945,000	2,690,100	$10.76	$28,945,000
Res Chan & Res Turn Area	1,156,200	$10.06	$11,631,000	1,156,200	$10.06	$11,631,000
Pres Roads Anchorage	3,155,800	$9.92	$31,306,000	3,155,800	$9.92	$31,306,000
	10,220,900	$9.68	$98,984,000	10,609,900	$9.85	$104,497,000
Ledge Drilling and Blasting						
BSN Entrance Channel	763,700	$83.25	$63,578,000	883,100	$78.26	$69,111,000
Main Ship Chan Incl PRR	77,750	$92.03	$7,155,000	77,750	$92.03	$7,155,000
Res Chan & Res Turn Area	92,700	$128.47	$11,909,000	92,700	$128.47	$11,909,000
Pres Roads Anchorage	58,800	$91.00	$5,351,000	58,800	$91.00	$5,351,000
	992,950	$88.62	$87,993,000	1,112,350	$84.08	$93,526,000
Ledge Removal & Disposal						
BSN Entrance Channel	763,700	$15.66	$11,960,000	883,100	$15.35	$13,556,000
Main Ship Chan Incl PRR	77,750	$19.02	$1,479,000	77,750	$19.02	$1,479,000
Res Chan & Res Turn Area	92,700	$20.15	$1,868,000	92,700	$20.15	$1,868,000
Pres Roads Anchorage	58,800	$18.46	$1,085,000	58,800	$18.46	$1,085,000
	992,950	$16.51	$16,392,000	1,112,350	$16.17	$17,988,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency			$213,754,000			$226,600,000
Construction Contingency		16.7%	$35,651,000		17.1%	$38,684,000
Subtotal - Construction			$249,405,000			$265,284,000
Planning, Engineering & Design		2.1%	$5,361,000			$5,442,000
Supervision & Administration		3.4%	$8,565,000			$8,874,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$125,000			$128,000
Total First Cost GNF - July 2011 Prices		106%	$263,648,000		106%	$279,920,000
Program Year 2013 First Cost			$273,195,000			$290,067,000
PED Escalation	1.03779		$5,564,000	1.03779		$5,648,000
CM Escalation	1.03779		$8,889,000	1.03779		$9,209,000
Real Estate Escalation	1.03692		$130,000	1.03692		$133,000
Construction Escalation	1.03692		$258,612,000	1.03692		$275,077,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$5,611,000	1.00843		$5,696,000
CM Escalation	1.07810		$9,583,000	1.08769		$10,016,000
Real Estate Escalation	1.03489		$135,000	1.03939		$138,000
Construction Escalation	1.03489		$267,635,000	1.03939		$285,914,000
Total Cost Escalated to Construction			$282,964,000			$301,764,000
ATON Escalation (USCG)	1.03489		$206,000	1.03939		$207,000
Construction Period (Months)		34			35	
July 2011 First Cost Plus IDC	0.0031250	1.05332	$277,707,000	0.0031250	1.05500	$295,315,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$12,377,000	3-3/4%	0.04457	$13,162,000
Increased Annual Maintenance			$222,000			$236,000
TOTAL			$12,599,000			$13,398,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$20,120,000	7%	0.07245	$21,396,000
Increased Annual Maintenance			$222,000			$236,000
TOTAL			$20,342,000			$21,632,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL
DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA
TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escalation Index Factors	HYBRID 45/49-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 49 FEET WITH 45-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA			HYBRID 46/50-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 50 FEET WITH 46-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$1,460,000	LS	LS	$1,463,000
Drilling & Blasting Plant	LS	LS	$2,616,000	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,197,000	LS	LS	$1,204,000
Remobilization for AQ Shutdowns	1	$4,561,000	$4,561,000	1	$4,564,000	$4,564,000
			$9,834,000			$9,847,000
Dredging and Ocean Disposal						
BSN Entrance Channel	2,482,800	$10.05	$24,952,000	3,218,800	$8.42	$27,102,000
Main Ship Chan Incl PRR	1,753,900	$12.55	$22,011,000	2,204,100	$11.27	$24,840,000
Res Chan & Res Turn Area	829,200	$12.05	$9,992,000	995,600	$10.98	$10,932,000
Pres Roads Anchorage	2,027,800	$12.61	$25,571,000	2,587,900	$11.07	$28,648,000
	7,093,700	$11.63	$82,526,000	9,006,400	$10.16	$91,522,000
Ledge Drilling and Blasting						
BSN Entrance Channel	535,400	$83.70	$44,813,000	763,700	$83.25	$63,578,000
Main Ship Chan Incl PRR	49,100	$95.17	$4,673,000	61,910	$93.43	$5,784,000
Res Chan & Res Turn Area	31,100	$154.02	$4,790,000	58,000	$141.10	$8,184,000
Pres Roads Anchorage	38,800	$106.44	$4,130,000	48,500	$97.71	$4,739,000
	654,400	$89.25	$58,406,000	932,110	$88.28	$82,285,000
Ledge Removal & Disposal						
BSN Entrance Channel	535,400	$15.74	$8,427,000	763,700	$15.66	$11,960,000
Main Ship Chan Incl PRR	49,100	$19.39	$952,000	61,910	$19.23	$1,191,000
Res Chan & Res Turn Area	31,100	$21.15	$658,000	58,000	$20.78	$1,205,000
Pres Roads Anchorage	38,800	$19.35	$751,000	48,500	$18.93	$918,000
	654,400	$16.49	$10,788,000	932,110	$16.39	$15,274,000
Miscellaneous Costs			$284,000			$284,000
Subtotal without Contingency			$161,838,000			$199,212,000
Construction Contingency		16.6%	$26,790,000		16.5%	$32,786,000
Subtotal - Construction			$188,628,000			$231,998,000
Planning, Engineering & Design		2.6%	$4,830,000			$5,039,000
Supervision & Administration		3.7%	$6,957,000			$7,680,000
Resetting of Aids to Navigation			$192,000			$192,000
Real Estate			$103,000			$106,000
Total First Cost GNF - July 2011 Prices		106%	$200,710,000		106%	$245,015,000
Program Year 2013 First Cost			$207,931,000			$253,871,000
PED Escalation	1.03779		$5,013,000	1.03779		$5,229,000
CM Escalation	1.03779		$7,220,000	1.03779		$7,970,000
Real Estate Escalation	1.03692		$107,000	1.03692		$110,000
Construction Escalation	1.03692		$195,591,000	1.03692		$240,562,000
ATON Escalation (USCG)	1.03692		$199,000	1.03692		$199,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$5,055,000	1.00843		$5,273,000
CM Escalation	1.06756		$7,708,000	1.06756		$8,508,000
Real Estate Escalation	1.03027		$110,000	1.03027		$113,000
Construction Escalation	1.03027		$201,511,000	1.03027		$247,843,000
Total Cost Escalated to Construction			$214,384,000			$261,737,000
ATON Escalation (USCG)	1.03027		$205,000	1.03027		$205,000
Construction Period (Months)		28			29	
July 2011 First Cost Plus IDC	0.0031250	1.04335	$209,411,000	0.0031250	1.04501	$256,042,000
Annual Costs at 3-3/4%						
Interest & Amortization	3-3/4%	0.04457	$9,333,000	3-3/4%	0.04457	$11,412,000
Increased Annual Maintenance			$206,000			$201,000
TOTAL			$9,539,000			$11,613,000
Annual Costs at 7%						
Interest & Amortization	7%	0.07245	$15,172,000	7%	0.07245	$18,550,000
Increased Annual Maintenance			$206,000			$201,000
TOTAL			$15,378,000			$18,751,000

TABLE D2-12 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

DEEPEN NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH TWO FEET GREATER DEPTH IN THE ENTRANCE CHANNEL

July-August 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escallation Index Factors	HYBRID 48/52-FOOT CHANNEL PLAN NORTH ENTRANCE CHANNEL AT 52 FEET WITH 48-FOOT MAIN SHIP CHANNEL, ANCHORAGE, RESERVED CHANNEL & RESERVED TURNING AREA		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization			
Ordinary Dredging & Disposal Plant	LS	LS	$1,694,000
Drilling & Blasting Plant	LS	LS	$2,616,000
Rock Removal & Disposal Plant	LS	LS	$1,204,000
Remobilization for AQ Shutdowns	1	$4,776,000	$4,776,000
			$10,290,000
Dredging and Ocean Disposal			
BSN Entrance Channel	3,607,800	$9.04	$32,615,000
Main Ship Chan Incl PRR	3,210,100	$9.79	$31,427,000
Res Chan & Res Turn Area	1,310,500	$9.70	$12,712,000
Pres Roads Anchorage	3,731,000	$9.32	$34,773,000
	11,859,400	$9.40	$111,527,000
Ledge Drilling and Blasting			
BSN Entrance Channel	883,100	$78.26	$69,111,000
Main Ship Chan Incl PRR	98,330	$92.04	$9,050,000
Res Chan & Res Turn Area	137,400	$119.34	$16,398,000
Pres Roads Anchorage	69,800	$85.83	$5,991,000
	1,188,630	$84.59	$100,550,000
Ledge Removal & Disposal			
BSN Entrance Channel	883,100	$15.35	$13,556,000
Main Ship Chan Incl PRR	98,330	$18.86	$1,855,000
Res Chan & Res Turn Area	137,400	$19.60	$2,693,000
Pres Roads Anchorage	69,800	$18.30	$1,277,000
	1,188,630	$16.31	$19,381,000
Miscellaneous Costs			$284,000
Subtotal without Contingency			$242,032,000
Construction Contingency		16.7%	$40,497,000
Subtotal - Construction			$282,529,000
Planning, Engineering & Design		2.0%	$5,533,000
Supervision & Administration		3.3%	$9,327,000
Resetting of Aids to Navigation			$192,000
Real Estate			$136,000
Total First Cost GNF - July 2011 Prices		105%	$297,717,000
Program Year 2013 First Cost			$306,641,000
PED Escalation	1.03779		$5,742,000
CM Escalation	1.03779		$9,679,000
Real Estate Escalation	1.03027		$140,000
Construction Escalation	1.03027		$291,080,000
ATON Escalation (USCG)	1.03027		$198,000
Fully Funded Cost Escalation			
PED Escalation	1.00843		$5,790,000
CM Escalation	1.08769		$10,528,000
Real Estate Escalation	1.03939		$146,000
Construction Escalation	1.03939		$302,547,000
Total Cost Escalated to Construction			$319,011,000
ATON Escalation (USCG)	1.03939		$206,000
Construction Period (Months)		37	
July 2011 First Cost Plus IDC	0.0031250	1.05836	$315,091,000
Annual Costs at 3-3/4%			
Interest & Amortization	3-3/4%	0.04457	$14,044,000
Increased Annual Maintenance			$225,000
TOTAL			$14,269,000
Annual Costs at 7%			
Interest & Amortization	7%	0.07245	$22,828,000
Increased Annual Maintenance			$225,000
TOTAL			$23,053,000

TABLE D2-13
BOSTON HARBOR IMPROVEMENT STUDY
COST ESTIMATES FOR NON-FEDERAL BERTH DEEPENING FOR ALTERANTIVE PLANS AND DEPTHS

PLAN A-B-C - DEEPEN BERTHS #11 AND #12 AT THE CONLEY TERMINAL
TO A DEPTH 3 FEET GREATER THAN THE PROPOSED INNER FEDERAL CHANNELS DEPTH

INNER FEDERAL CHANNELS DEPTH	42 FEET	43 FEET	44 FEET	45 FEET	46 FEET	47 FEET	48 FEET	49 FEET	50 FEET
BERTH DEPTH	45 FEET	46 FEET	47 FEET	48 FEET	49 FEET	50 FEET	51 FEET	52 FEET	53 FEET
CUBIC YARDS - 2 BERTHS (2 Ft OD)	0	6,200	12,400	18,700	24,900	31,100	37,300	43,600	49,800
First Cost of Construction - July/August 2011 Price Levels									
Mobilization/Demobilization	NA	$53,000	$53,000	$53,000	$53,000	$53,000	$53,000	$53,000	$53,000
Dredging and Ocean Disposal	NA	$14.39	$14.07	$12.05	$10.98	$10.06	$9.70	$9.33	$9.07
Ordinary Material	NA	$89,218	$174,468	$225,335	$273,402	$312,866	$361,810	$406,788	$451,686
Construction Contingency - Percentage	NA	17%	17%	17%	17%	17%	17%	17%	17%
Construction Contingency - Cost	NA	$15,100	$29,500	$38,200	$46,300	$53,200	$61,600	$69,400	$77,100
Subtotal - Construction	NA	$157,300	$257,000	$316,500	$372,700	$419,100	$476,400	$529,200	$581,800
Planning, Engineering and Design	NA	$6,000	$8,300	$9,100	$9,600	$9,700	$10,100	$10,700	$10,800
Construction Management	NA	$7,100	$11,900	$12,800	$13,800	$14,300	$15,400	$17,900	$20,400
Total First Cost - July 2011	NA	$170,000	$277,000	$338,000	$396,000	$443,000	$502,000	$558,000	$613,000
Escalated Costs									
Costs Escalated to Program Level FY2013	NA	$176,000	$287,000	$350,000	$411,000	$459,000	$521,000	$579,000	$636,000
Cost Escalated to Construction	NA	$181,000	$296,000	$361,000	$423,000	$473,000	$539,000	$602,000	$667,000
LSF PED Costs Only Escalated	NA	$6,000	$9,000	$10,000	$10,000	$10,000	$11,000	$12,000	$12,000
Annual Costs at 3-3/4%									
Construction Period (Months)	1	1	1	1	1	1	1	1	1
First Cost Plus IDC	0.0031250	$170,000	$277,000	$338,000	$396,000	$443,000	$502,000	$558,000	$613,000
Interest & Amortization (3-3/4%)	0.04457	$8,000	$12,000	$15,000	$18,000	$20,000	$22,000	$25,000	$27,000
Increased Annual Maintenance	5%	$9,000	$14,000	$17,000	$20,000	$22,000	$25,000	$28,000	$31,000
TOTAL		$17,000	$26,000	$32,000	$38,000	$42,000	$47,000	$53,000	$58,000
Annual Costs at 7%									
Construction Period (Months)	1	1	1	1	1	1	1	1	1
First Cost Plus IDC	0.0031250	$170,000	$277,000	$338,000	$396,000	$443,000	$502,000	$558,000	$613,000
Interest & Amortization (7%)	0.07245	$12,000	$20,000	$24,000	$29,000	$32,000	$36,000	$40,000	$44,000
Increased Annual Maintenance	5%	$9,000	$14,000	$17,000	$20,000	$22,000	$25,000	$28,000	$31,000
TOTAL		$21,000	$34,000	$41,000	$49,000	$54,000	$61,000	$68,000	$75,000

TABLE D2-14
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ANNUAL COSTS FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

DEEPEN THE NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH 2 TO 4 FEET GREATER DEPTH IN THE ENTRANCE

PLAN					
Inner Federal Channels Depth		42 Feet	43 Feet	44 Feet	45 Feet
North Entrance Channel Depth		44 Feet	45 Feet	46 Feet	47 Feet
Conley Terminal Berths Depth		45 Feet	46 Feet	47 Feet	48 Feet
Federal Project GNF Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$89,598,000	$121,407,000	$151,653,000	$176,057,000
Construction Duration (Months)		16	18	26	27
IDC Rate		1.02378	1.02701	1.04006	1.04170
Implementation Cost (+ IDC)		$91,729,000	$124,686,000	$157,728,000	$183,399,000
Interest & Amortization - 3-3/4%	0.04457	$4,088,000	$5,557,000	$7,030,000	$8,174,000
Increased Annual Maintenance		$223,000	$217,000	$205,000	$204,000
Total Federal GNF Annual Cost		$4,311,000	$5,774,000	$7,235,000	$8,378,000
Non-Federal Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		NA	$170,000	$277,000	$338,000
Implementation Cost (+ IDC)		NA	$170,000	$277,000	$338,000
Interest & Amortization - 3-3/4%	0.04457	NA	$8,000	$12,000	$15,000
Increased Annual Maintenance		NA	$9,000	$14,000	$17,000
Total Federal GNF Annual Cost		NA	$17,000	$26,000	$32,000
Federal Project GNF Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$6,646,000	$9,034,000	$11,427,000	$13,287,000
Increased Annual Maintenance		$223,000	$217,000	$205,000	$204,000
Total Federal GNF Annual Cost		$6,869,000	$9,251,000	$11,632,000	$13,491,000
Non-Federal Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$1	$12,000	$20,000	$24,000
Increased Annual Maintenance		NA	$9,000	$14,000	$17,000
Total Federal GNF Annual Cost		NA	$21,000	$34,000	$41,000
Total Federal and Non-Federal Annual Costs					
Total Project Annual Costs	3-3/4%	$4,311,000	$5,791,000	$7,261,000	$8,410,000
Total Project Annual Costs	7%	$6,869,000	$9,272,000	$11,666,000	$13,532,000

TABLE D2-14 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ANNUAL COSTS FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

DEEPEN THE NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH 2 TO 4 FEET GREATER DEPTH IN THE ENTRANCE

PLAN					
Inner Federal Channels Depth		46 Feet	47 Feet	48 Feet	49 Feet
North Entrance Channel Depth		48 Feet	49 Feet	50 Feet	51 Feet
Conley Terminal Berths Depth		49 Feet	50 Feet	51 Feet	52 Feet
Federal Project GNF Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$204,045,000	$234,427,000	$266,870,000	$303,142,000
Construction Duration (Months)		28	29	31	40
IDC Rate		1.04335	1.04501	1.04832	1.06342
Implementation Cost (+ IDC)		$212,891,000	$244,978,000	$279,766,000	$322,368,000
Interest & Amortization - 3-3/4%	0.04457	$9,489,000	$10,919,000	$12,469,000	$14,368,000
Increased Annual Maintenance		$207,000	$213,000	$216,000	$222,000
Total Federal GNF Annual Cost		$9,696,000	$11,132,000	$12,685,000	$14,590,000
Non-Federal Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$396,000	$443,000	$502,000	$558,000
Implementation Cost (+ IDC)		$396,000	$443,000	$502,000	$558,000
Interest & Amortization - 3-3/4%	0.04457	$18,000	$20,000	$22,000	$25,000
Increased Annual Maintenance		$20,000	$22,000	$25,000	$28,000
Total Federal GNF Annual Cost		$38,000	$42,000	$47,000	$53,000
Federal Project GNF Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$15,424,000	$17,749,000	$20,269,000	$23,356,000
Increased Annual Maintenance		$207,000	$213,000	$216,000	$222,000
Total Federal GNF Annual Cost		$15,631,000	$17,962,000	$20,485,000	$23,578,000
Non-Federal Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$29,000	$32,000	$36,000	$40,000
Increased Annual Maintenance		$20,000	$22,000	$25,000	$28,000
Total Federal GNF Annual Cost		$49,000	$54,000	$61,000	$68,000
Total Federal and Non-Federal Annual Costs					
Total Project Annual Costs	3-3/4%	$9,734,000	$11,174,000	$12,732,000	$14,643,000
Total Project Annual Costs	7%	$15,680,000	$18,016,000	$20,546,000	$23,646,000

TABLE D2-14 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ANNUAL COSTS FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

DEEPEN THE NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH 2 TO 4 FEET GREATER DEPTH IN THE ENTRANCE

PLAN					
Inner Federal Channels Depth		50 Feet	47 Feet	47 Feet	47 Feet
North Entrance Channel Depth		52 Feet	50 Feet	51 Feet	52 Feet
Conley Terminal Berths Depth		53 Feet	50 Feet	50 Feet	50 Feet
Federal Project GNF Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$350,563,000	$248,281,000	$263,648,000	$279,920,000
Construction Duration (Months)		51	30	34	35
IDC Rate		1.08227	1.04666	1.05332	1.05500
Implementation Cost (+ IDC)		$379,403,000	$259,866,000	$277,707,000	$295,315,000
Interest & Amortization - 3-3/4%	0.04457	$16,910,000	$11,582,000	$12,377,000	$13,162,000
Increased Annual Maintenance		$242,000	$216,000	$222,000	$236,000
Total Federal GNF Annual Cost		$17,152,000	$11,798,000	$12,599,000	$13,398,000
Non-Federal Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$613,000	$443,000	$443,000	$443,000
Implementation Cost (+ IDC)		$613,000	$443,000	$443,000	$443,000
Interest & Amortization - 3-3/4%	0.04457	$27,000	$20,000	$20,000	$20,000
Increased Annual Maintenance		$31,000	$22,000	$22,000	$22,000
Total Federal GNF Annual Cost		$58,000	$42,000	$42,000	$42,000
Federal Project GNF Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$27,488,000	$18,827,000	$20,120,000	$21,396,000
Increased Annual Maintenance		$242,000	$216,000	$222,000	$236,000
Total Federal GNF Annual Cost		$27,730,000	$19,043,000	$20,342,000	$21,632,000
Non-Federal Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$44,000	$32,000	$32,000	$32,000
Increased Annual Maintenance		$31,000	$22,000	$22,000	$22,000
Total Federal GNF Annual Cost		$75,000	$54,000	$54,000	$54,000
Total Federal and Non-Federal Annual Costs					
Total Project Annual Costs	3-3/4%	$17,210,000	$11,840,000	$12,641,000	$13,440,000
Total Project Annual Costs	7%	$27,805,000	$19,097,000	$20,396,000	$21,686,000

TABLE D2-14 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
ANNUAL COSTS FOR ALTERANTIVE PLANS AND DEPTHS
PLANS A, B & C - MAIN CHANNELS DEEPENING TO CONLEY TERMINAL

DEEPEN THE NORTH ENTRANCE, LOWER MAIN SHIP CHANNEL, PRESIDENT ROADS ANCHORAGE, LOWER RESERVED CHANNEL & RESERVED CHANNEL TURNING AREA TO A DEPTH OF UP TO -50 FEET MLLW WITH 2 TO 4 FEET GREATER DEPTH IN THE ENTRANCE

PLAN					
Inner Federal Channels Depth		45 Feet	46 Feet	48 Feet	
North Entrance Channel Depth		49 Feet	50 Feet	52 Feet	
Conley Terminal Berths Depth		48 Feet	49 Feet	51 Feet	
Federal Project GNF Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$200,710,000	$245,015,000	$297,717,000	
Construction Duration (Months)		28	29	37	
IDC Rate		1.04335	1.04501	1.05836	
Implementation Cost (+ IDC)		$209,411,000	$256,042,000	$315,091,000	
Interest & Amortization - 3-3/4%	0.04457	$9,333,000	$11,412,000	$14,044,000	
Increased Annual Maintenance		$206,000	$201,000	$225,000	
Total Federal GNF Annual Cost		$9,539,000	$11,613,000	$14,269,000	
Non-Federal Annual Cost - 3-3/4%					
First Cost - July/Aug 2011		$338,000	$396,000	$502,000	
Implementation Cost (+ IDC)		$338,000	$396,000	$502,000	
Interest & Amortization - 3-3/4%	0.04457	$15,000	$18,000	$22,000	
Increased Annual Maintenance		$17,000	$20,000	$25,000	
Total Federal GNF Annual Cost		$32,000	$38,000	$47,000	
Federal Project GNF Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$15,172,000	$18,550,000	$22,828,000	
Increased Annual Maintenance		$206,000	$201,000	$225,000	
Total Federal GNF Annual Cost		$15,378,000	$18,751,000	$23,053,000	
Non-Federal Annual Cost - 7%					
Interest & Amortization - 7%	0.07245	$24,000	$29,000	$36,000	
Increased Annual Maintenance		$17,000	$29,000	$25,000	
Total Federal GNF Annual Cost		$41,000	$49,000	$61,000	
Total Federal and Non-Federal Annual Costs					
Total Project Annual Costs	3-3/4%	$9,571,000	$11,651,000	$14,316,000	
Total Project Annual Costs	7%	$15,419,000	$18,800,000	$23,114,000	

DETAILED ESTMATES

MAIN SHIP CHANNEL DEEPENING EXTENSION TO THE MASSPORT MARINE TERMINAL – PLAN D

Project Description

The Main Ship Channel Deepening Extension Plan consists of improvements to deepen the existing 40-foot deep lane of the Main Ship Channel above the Reserved Channel Turning Area to access the Massport Marine Terminal located between the Drydock Channel and the Ted Williams Tunnel (I-90). The proposed deepening would extend about 2,600 feet above the turning area. This plan is shown in Figure D2-3.

This improvement also requires that the berth at the Marine Terminal be deepened to at least the depth provided by any improved channel. No other Local Service Facility costs are necessary to accrue project benefits as Massport and its partners are moving forward with the development of this terminal with or without any channel deepening. The deeper channel would enable larger bulk carriers to access the terminal.

The following tables provide detail estimates for the main channels improvements.

Table D2-15 shows the quantity estimates for this project feature by one-foot increments.

Table D2-16 shows the quantity estimates for maintenance material for this channel reach.

Table D2-17 shows the detailed quantity and dredging footprint area estimates in one-foot increments for ordinary material dredging and rock removal.

Table D2-18 shows the cost estimates for the 4 incremental depths for the main ship channel deepening extension improvement plan (Plan D).

Table D2-19 shows the costs for the deepening of Massport's berth at the Marine Terminal; the Non-Federal Local Service Facilities (LSF).

Table D2-20 shows the annual costs of the 4 incremental depths.

Following these tables are the summary sheets from the contingency risk analyses for the recommended plan for the main ship channel deepening extension improvement; the 45-foot project plan.

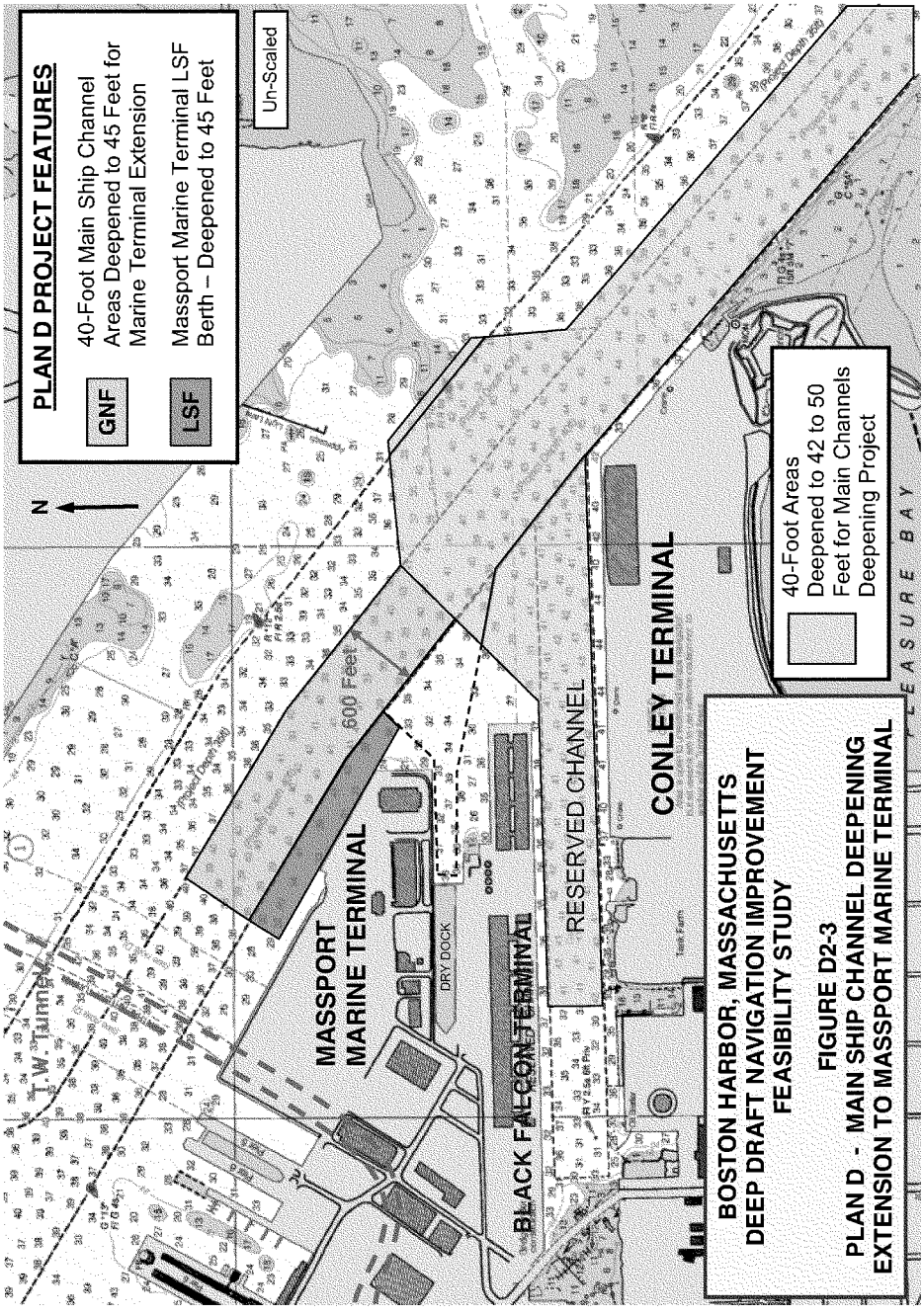

PLAN D PROJECT FEATURES
GNF
40-Foot Main Ship Channel Areas Deepened to 45 Feet for Marine Terminal Extension
LSF
Massport Marine Terminal LSF Berth – Deepened to 45 Feet
Un-Scaled
N
MASSPORT MARINE TERMINAL
600 Feet
DRY DOCK
BLACK FALCON TERMINAL
RESERVED CHANNEL
CONLEY TERMINAL
T.W. Turner
40-Foot Areas Deepened to 42 to 50 Feet for Main Channels Deepening Project
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY
FIGURE D2-3
PLAN D - MAIN SHIP CHANNEL DEEPENING
EXTENSION TO MASSPORT MARINE TERMINAL

TABLE D2-15
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN D - MAIN SHIP CHANNEL EXTENSION

DEEPEN THE AREA OF THE MAIN SHIP CHANNEL ABOVE THE RESERVED CHANNEL TURNING AREA ALONG THE SOUTHERN CHANNEL LANE ADJACENT TO MASSPORT'S MARINE TERMINAL IN SOUTH BOSTON TO DEPTHS GREATER THAN THE 40-FOOT EXISTING PROJECT DEPTH AT 600 FEET WIDE

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Design Depth	2-Foot Overdepth	Total CY Ordinary	Cut to Design Depth	2-Foot Additional Required	2-Foot Overdepth Allowance	Total Rock CY	All Required Material	All Overdepth	Total All Material
42-Foot Depth	0	100,000	100,000	300	4,100	13,700	18,100	4,400	113,700	118,100
43-Foot Depth	46,200	105,600	151,800	900	11,700	23,700	36,300	58,800	129,300	188,100
44-Foot Depth	99,800	100,400	200,200	4,300	21,400	31,200	56,900	125,500	131,600	257,100
45-Foot Depth	151,800	94,500	246,300	12,600	29,500	36,300	78,400	193,900	130,800	324,700
46-Foot Depth	200,200	90,100	290,300	25,800	35,300	41,100	102,200	261,300	131,200	392,500
47-Foot Depth	246,200	85,600	331,800	42,200	40,300	46,000	128,500	328,700	131,600	460,300
48-Foot Depth	290,200	80,800	371,000	61,100	45,100	50,300	156,500	396,400	131,100	527,500
49-Foot Depth	331,900	76,300	408,200	82,400	49,600	54,800	186,800	463,900	131,100	595,000
50-Foot Depth	371,100	71,800	442,900	106,100	54,100	59,000	219,200	531,300	130,800	662,100

DREDGE AND ROCK AREAS BY CHANNEL DESIGN DEPTH FOR 600-FOOT WIDE CHANNEL

	Ordinary Material - SF			Ledge Removal (Requires Added 2 Feet) - SF						
	Required	2-Foot Overdepth	Total Area Ordinary	Required to Design Depth	2-Foot Additional Required	20% of 1/2 of 2-Foot Overdepth Allowance	Total Rock			Total Project Footprint (Acres)
42-Foot Depth	1,024,182	518,600	1,542,782	8,874	147,965	28,234	185,073			36.2
43-Foot Depth	1,403,872	174,397	1,578,269	40,149	257,860	21,747	319,756			36.5
44-Foot Depth	1,542,782	49,124	1,591,906	156,839	249,905	13,999	420,743			36.6
45-Foot Depth	1,578,269	17,461	1,595,730	298,009	178,730	12,924	489,663			36.6
46-Foot Depth	1,591,906	3,824	1,595,730	406,744	134,615	13,558	554,917			36.6
47-Foot Depth	1,595,730	0	1,595,730	476,739	132,408	11,454	620,601			36.6
48-Foot Depth	1,595,730	0	1,595,730	541,359	125,057	12,267	678,683			36.6

Notes: Rock Overdepth Allowance Area is area for 20 Percent of One-Half of overdepth elevation. Rock overdepth quantity is for 2-foot removal increment below that area plus requried area. Side slopes are 1:3 in ordinary material and 1:1 in rock.

TABLE D2-16
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR 40-FOOT MAINTENANCE INCREMENT - PLAN D - MAIN SHIP CHANNEL EXTENSION

MAINTENANCE DREDGING QUANTITY
FOR MAINTENANCE DREDGING OF 40-FOOT CHANNEL LANE 600 FEET WIDE OVER SAME DIMENSIONS

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Design Depth	2-Foot Overdepth	Total CY Ordinary	Cut to Design Depth	2-Foot Additional Required	2-Foot Overdepth Allowance	Total Rock CY	All Required Material	All Overdepth	Total All Material
35-Foot Channel Lane for 50-Foot Width	0	200	200	0	0	0	0	0	200	200
40-Foot Channel Lane for 600-Foot Width	10,300	47,600	57,900	0	0	0	0	10,300	47,600	57,900
Total O&M	10,300	47,800	58,100	0	0	0	0	10,300	47,800	58,100

TABLE D2-17
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY AND AREA ESTIMATES FOR ORDINARY MATERIAL - ALTERANTIVE PLANS AND DEPTHS
PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENSION TO MASSPORT MARINE TERMINAL

QUANTITIES AND AREAS BY ELEVATION BY FOOT AT MEAN LOWER LOW WATER

Elevation (Maintenance)	Total for All Material (A.C. 12-07)				Rock (A.C. 03-08)				Quantity for Rock Overdepth Calculation	
	Quantity (CY)		Area (SF)		Quantity (CY)		Area (SF)			
	Existing 600-Foot Channel Limits	50-Foot Width of Existing 35-Foot Lane	Existing 600-Foot Channel Limits	50-Foot Width of Existing 35-Foot Lane	Existing 600-Foot Channel Limits	50-Foot Width of Existing 35-Foot Lane	Existing 600-Foot Channel Limits	50-Foot Width of Existing 35-Foot Lane	Overdepth Elevation Increment	Rock Overdepth Quantity (CY)
-35	0	0	0	0	0	0	0	0	For 600-foot wide channel. Area at bottom of required depth, plus 20% of additional area for one-foot greater depth (for side slopes and overwidth drilling, times 2 feet of removal.	
-36	0	7	0	865	0	0	0	0		
-37	4	249	689	14,767	0	0	0	0		
-38	690	1,622	35,491	50,967	0	0	0	0		
-39	3,064	4,615	94,524	94,534	0	0	0	0		
-40	10,260	9,420	295,434	126,102	0	12	0	2,891		
-41	27,735	15,153	620,001	136,526	1	234	318	29,794		
-42	57,812	21,026	1,024,182	136,526	281	1,595	8,874	69,962	42 to 44	1,121
-43	104,911	26,890	1,403,872	136,526	925	3,842	40,149	82,998	43 to 45	4,703
-44	161,951	32,741	1,542,782	136,526	4,345	6,473	156,839	86,694	44 to 46	13,709
-45	222,225	38,577	1,578,269	136,526	12,648	9,193	298,009	88,968	45 to 47	23,686
-46	283,799	44,390	1,591,906	136,526	25,765	12,078	406,744	91,686	46 to 48	31,166
-47	346,206	50,178	1,595,730	136,526	42,164	15,079	476,739	93,293	47 to 49	36,271
-48	409,154	55,952	1,595,730	136,526	61,071	18,186	541,359	94,710	48 to 50	41,105
-49	472,102	61,726	1,595,730	136,526	82,434	21,398	609,147	94,060	49 to 51	45,970
-50	535,050	67,500	1,595,730	136,526	106,129	24,728	666,416	96,392	50 to 52	50,273
-51	597,998	73,274	1,595,730	136,526	132,034	28,199	727,753	98,834	51 to 53	54,761
-52	660,946	79,048	1,595,730	136,526	160,227	31,850	785,373	101,221	52 to 54	58,953
-53					190,459	35,637	837,854	104,974		
-54					222,695	39,570	888,908	107,707		

TABLE D2-18
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MASSPORT MARINE TERMINAL

DEEPEN THE REACH OF THE MAIN SHIP CHANNEL ABOVE THE RESERVED CHANNEL TURNING AREA AND BELOW THE TED WILLIAMS TUNNEL TO ACCESS THE MASSPORT MARINE TERMINAL IN SOUTH BOSTON TO DEPTHS UP TO -45 FEET MLLW

DEEPENING INCLUDES THE 600-FOOT WIDTH OF THE 40-FOOT CHANNEL LANE

July 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escalation Index Factors	PLAN D-42 MAIN SHIP CHANNEL DEEPENING EXTENSION TO MARINE TERMINAL 42-FOOT PROJECT DEPTH			PLAN D-43 MAIN SHIP CHANNEL DEEPENING EXTENSION TO MARINE TERMINAL 43-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$74,000	LS	LS	$74,000
Drilling & Blasting Plant	LS	LS	$189,000	LS	LS	$189,000
Rock Removal & Disposal Plant	LS	LS	$100,000	LS	LS	$100,000
Dredging and Ocean Disposal						
Ordinary Material	100,000	$24.39	$2,439,000	151,800	$19.19	$2,913,000
Ledge Drilling & Blasting	18,100	$129.17	$2,338,000	36,300	$116.31	$4,222,000
Ledge Removal & Disposal	18,100	$22.82	$413,000	36,300	$20.86	$757,000
Miscellaneous Costs			$71,000			$71,000
Subtotal - Before Contingency			$5,624,000			$8,326,000
Construction Contingency		22.4%	$1,260,000		22.4%	$1,865,000
Subtotal - Construction	118,100		$6,884,000	188,100		$10,191,000
Planning, Engineering & Design		4.5%	$313,000		3.3%	$332,000
Supervision & Administration		9.1%	$626,000		6.5%	$659,000
Resetting of Aids to Navigation			$24,000			$24,000
Real Estate			$11,000			$11,000
Total First Cost - July 2011 Prices		114%	$7,858,000		110%	$11,217,000
Program Year 2013 First Cost			$8,124,000			$11,607,000
PED Escalation	1.03779		$325,000	1.03779		$345,000
CM Escalation	1.03779		$650,000	1.03779		$684,000
Real Estate Escalation	1.03692		$11,000	1.03692		$11,000
Construction Escalation	1.03692		$7,138,000	1.03692		$10,567,000
ATON Escalation (USCG)	1.03692		$25,000	1.03692		$25,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$328,000	1.00843		$348,000
CM Escalation	1.12889		$734,000	1.12889		$772,000
Real Estate Escalation	1.05810		$12,000	1.05810		$12,000
Construction Escalation	1.05810		$7,553,000	1.05810		$11,181,000
Total Cost Escalated to Construction			$8,627,000			$12,313,000
ATON Escalation (USCG)	1.05810		$26,000	1.05810		$26,000

NOTES:

Ordinary Material - Plant for 44-Foot Plan = One 21 CY Bucket Dredge with 16 CY bucket, 2 Tugs, 3 Scows, 1.39 Months Dredging Time, 1.04 Months Haul Time. Plant for 45-Ft Plan = One 21 CY Bucket Dredge with 16 CY bucket, 2 Tugs, 3 Scows, 1.38 Months Dredging Time, 1.23 Months Haul Time.

Drilling and Blasting: Plant for 42 Feet = 2 Drill Boats, 0.62 Months. For 43 Feet = 2 Drill Boats, 1.13 Months.

Rock Removal: Plant for 42 Feet = One 21 CY Bucket Dredge with 14 CY Bucket, 3 Tugs, 4 Scows, 0.12 Months Excavation Time, 0.12 Months Haul Time. Plant for 43 Feet = One 21 CY Bucket Dredge with 14 CY Bucket, 3 Tugs, 4 Scows, 0.23 Months Excavation Time, 0.23 Months Haul Time.

Quantities for Ordinary Material include a 2-Foot Allowable Overdepth (Dredging Tolerance) and 1/3 Side Slopes

Quantities in Rock Include an Additional 2-Foot Required Removal and a 2-Foot Allowable Overdepth and 1/1 Side Slopes

TABLE D2-18
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MASSPORT MARINE TERMINAL

DEEPEN THE REACH OF THE MAIN SHIP CHANNEL ABOVE THE RESERVED CHANNEL TURNING AREA AND BELOW THE TED WILLIAMS TUNNEL TO ACCESS THE MASSPORT MARINE TERMINAL IN SOUTH BOSTON TO DEPTHS UP TO -45 FEET MLLW

DEEPENING INCLUDES THE 600-FOOT WIDTH OF THE 40-FOOT CHANNEL LANE

July 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escalation Index Factors	PLAN D-44 MAIN SHIP CHANNEL DEEPENING EXTENSION TO MARINE TERMINAL 44-FOOT PROJECT DEPTH			PLAN D-45 MAIN SHIP CHANNEL DEEPENING EXTENSION TO MARINE TERMINAL 45-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$81,000	LS	LS	$81,000
Drilling & Blasting Plant	LS	LS	$189,000	LS	LS	$189,000
Rock Removal & Disposal Plant	LS	LS	$100,000	LS	LS	$100,000
Dredging and Ocean Disposal						
Ordinary Material	200,200	$16.36	$3,275,000	246,300	$14.22	$3,502,000
Ledge Drilling & Blasting	56,900	$103.11	$5,867,000	78,400	$91.80	$7,197,000
Ledge Removal & Disposal	56,900	$20.22	$1,151,000	78,400	$19.23	$1,508,000
Miscellaneous Costs			$71,000			$71,000
Subtotal - Before Contingency			$10,734,000			$12,648,000
Construction Contingency		22.4%	$2,404,000		22.4%	$2,833,000
Subtotal - Construction	257,100		$13,138,000	324,700		$15,481,000
Planning, Engineering & Design		2.7%	$353,000		2.4%	$367,000
Supervision & Administration		6.2%	$819,000		5.4%	$843,000
Resetting of Aids to Navigation			$24,000			$24,000
Real Estate			$15,000			$15,000
Total First Cost - July 2011 Prices		109%	$14,349,000		108%	$16,730,000
Program Year 2013 First Cost			$14,855,000			$17,324,000
PED Escalation	1.03779		$366,000	1.03779		$381,000
CM Escalation	1.03779		$850,000	1.03779		$875,000
Real Estate Escalation	1.03692		$16,000	1.03692		$16,000
Construction Escalation	1.03692		$13,623,000	1.03692		$16,052,000
ATON Escalation (USCG)	1.03692		$25,000	1.03692		$25,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$369,000	1.00843		$384,000
CM Escalation	1.12889		$960,000	1.12889		$988,000
Real Estate Escalation	1.05810		$17,000	1.05810		$17,000
Construction Escalation	1.05810		$14,415,000	1.05810		$16,985,000
Total Cost Escalated to Construction			$15,761,000			$18,374,000
ATON Escalation (USCG)	1.05810		$26,000	1.05810		$26,000

NOTES:

Ordinary Material - Plant for 44-Foot Plan = One 21 CY Bucket Dredge, 2 Tugs, 3 Scows, 1.39 Months Dredging Time, 1.04 Months Haul Time. Plant for 45-Ft Plan = One 21 CY Bucket Dredge, 2 Tugs, 3 Scows, 1.38 Months Dredging Time, 1.23 Months Haul Time.

Drilling and Blasting: Plant for 44 Feet = 2 Drill Boats, 1.54 Months. For 45 Feet = 2 Drill Boats, 1.90 Months.

Rock Removal: Plant for 44 Feet = One 21 CY Bucket Dredge with 14 CY Bucket, 3 Tugs, 4 Scows, 0.35 Months Excavation Time, 0.35 Months Haul Time. Plant for 45 Feet = One 21 CY Bucket Dredge with 14 CY Bucket, 3 Tugs, 4 Scows, 0.46 Months Excavation Time, 0.46 Months Haul Time.

Quantities for Ordinary Material include a 2-Foot Allowable Overdepth (Dredging Tolerance) and 1/3 Side Slopes

Quantities in Rock include an Additional 2-Foot Required Removal and a 2-Foot Allowable Overdepth and 1/1 Side Slopes

TABLE D2-19
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR NON-FEDERAL BERTH DEEPENING - PLAN D - MAIN SHIP CHANNEL EXTENSION

DEEPEN THE BERTH AT THE MASSPORT MARINE TERMINAL IN SOUTH BOSTON TO THE SAME DEPTH AS THE MAIN SHIP CHANNEL EXTENSION ABOVE THE RESERVED CHANNEL

July 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escalation Index Factors	PLAN D-42 MASSPORT MARINE TERMINAL 42-FOOT BERTH DEPTH			PLAN D-43 MASSPORT MARINE TERMINAL 43-FOOT BERTH DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization	LS	LS	$37,000	LS	LS	$37,000
Dredging and Ocean Disposal	29,400	$24.39	$717,000	44,100	$19.19	$846,000
Construction Contingency		22.4%	$169,000		22.4%	$198,000
Planning, Engineering & Design Costs			$8,000			$6,000
Construction Management Costs			$15,000			$13,000
Subtotal - Construction	29,400		$946,000	44,100		$1,100,000
Cost Escalated to Program Year 2013			$981,000			$1,141,000
Cost Escalated to Construction			$1,038,000			$1,207,000
PED Only Escalated			$9,000			$7,000

July 2011 Price Levels with Dec 2012 Contingency Adjustments & Oct 2012 Escalation Index Factors	PLAN D-44 MASSPORT MARINE TERMINAL 44-FOOT BERTH DEPTH			PLAN D-45 MASSPORT MARINE TERMINAL 45-FOOT BERTH DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization	LS	LS	$41,000	LS	LS	$41,000
Dredging and Ocean Disposal	58,800	$16.36	$962,000	73,500	$14.22	$1,045,000
Construction Contingency		22.4%	$225,000		22.4%	$243,000
Planning, Engineering & Design Costs			$6,000			$6,000
Construction Management Costs			$14,000			$13,000
Subtotal - Construction	58,800		$1,248,000	73,500		$1,348,000
Cost Escalated to Program Year 2013			$1,294,000			$1,398,000
Cost Escalated to Construction			$1,369,000			$1,479,000
PED Only Escalated			$7,000			$7,000

TABLE D2-20
PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENSION
ANNUAL COSTS

EXTEND THE DEEPENING OF THE LOWER MAIN SHIP CHANNEL AT 600 FEET WIDE FROM ABOVE THE RESERVED CHANNEL TO BELOW THE TED WILLIAMS TUNNEL TO ACCESS THE MASSPORT MARINE TERMINAL IN SOUTH BOSTON

PLAN D - FEDERAL GNF			42 Feet	43 Feet	44 Feet	45 Feet
First Cost - July 2011			$7,858,000	$11,217,000	$14,349,000	$16,730,000
Construction Duration (Months)			3	3	4	4
IDC Rate			1.00318	1.00312	1.00467	1.00472
Implementation Cost (+ IDC)		0.003125	$7,883,000	$11,252,000	$14,416,000	$16,809,000
Interest & Amortization	3-3/4%	0.04457	$351,000	$502,000	$643,000	$749,000
Increased Annual Maintenance			$16,000	$15,000	$15,000	$15,000
Total Federal GNF Annual Cost			$367,000	$517,000	$658,000	$764,000
Interest & Amortization	7%	0.07245	$571,000	$815,000	$1,044,000	$1,218,000
Increased Annual Maintenance			$16,000	$15,000	$15,000	$15,000
Total Federal GNF Annual Cost			$587,000	$830,000	$1,059,000	$1,233,000
PLAN D - NON-FEDERAL BERTH (LSF)			**42 Feet**	**43 Feet**	**44 Feet**	**45 Feet**
First Cost - July 2011			$946,000	$1,100,000	$1,248,000	$1,348,000
Interest & Amortization	3-3/4%	0.04457	$42,000	$49,000	$56,000	$60,000
Increased Annual Maintenance			$5,000	$6,000	$6,000	$7,000
Total Non-Federal LSF Annual Cost			$47,000	$55,000	$62,000	$67,000
Interest & Amortization	7%	0.07245	$69,000	$80,000	$90,000	$98,000
Increased Annual Maintenance			$5,000	$6,000	$6,000	$7,000
Total Non-Federal LSF Annual Cost			$74,000	$86,000	$96,000	$105,000
PLAN D - TOTAL ANNUAL COST			**42 Feet**	**43 Feet**	**44 Feet**	**45 Feet**
Total Annual Cost - July 2011	3-3/4%		$414,000	$572,000	$720,000	$831,000
Total Annual Cost - July 2011	7%		$661,000	$916,000	$1,155,000	$1,338,000

DETAILED ESTMATES

MYSTIC RIVER CHANNEL DEEPENING TO ACCESS MASSPORT'S MEDFORD STREET TERMINAL – PLAN E

Project Description

The Mystic River Channel deepening is limited to a small 9-acre area of the 35-foot Federal channel lying between the 40-foot channel and Massport's 40-foot berth at the Medford Street Terminal in Charlestown. This area was not included in the last 40-foot deepening project (WRDA 1990) as that terminal's future use had not been determined. This plan is shown in Figure D2-4.

As Massport has already deepened their berth at the Medford Street Terminal to 40 feet, no local service facility costs are included with this plan. The deeper channel would enable larger bulk carriers to access the terminal.

The following tables provide detail estimates for the main channels improvements.

Table D2-21 shows the quantity estimates for this project feature by one-foot increments.

Table D2-22 shows the quantity estimates for maintenance material for this channel reach and the dredging area calculations for this project feature.

Table D2-23 shows the cost estimates for the 4 incremental depths for the Mystic River Channel improvement plan (Plan E).

Table D2-24 shows the annual costs of the 4 incremental depths.

Following these tables are the summary sheets from the contingency risk analyses for the recommended plan for the Mystic River Channel deepening to the Medford Street Terminal; the 40-foot project plan.

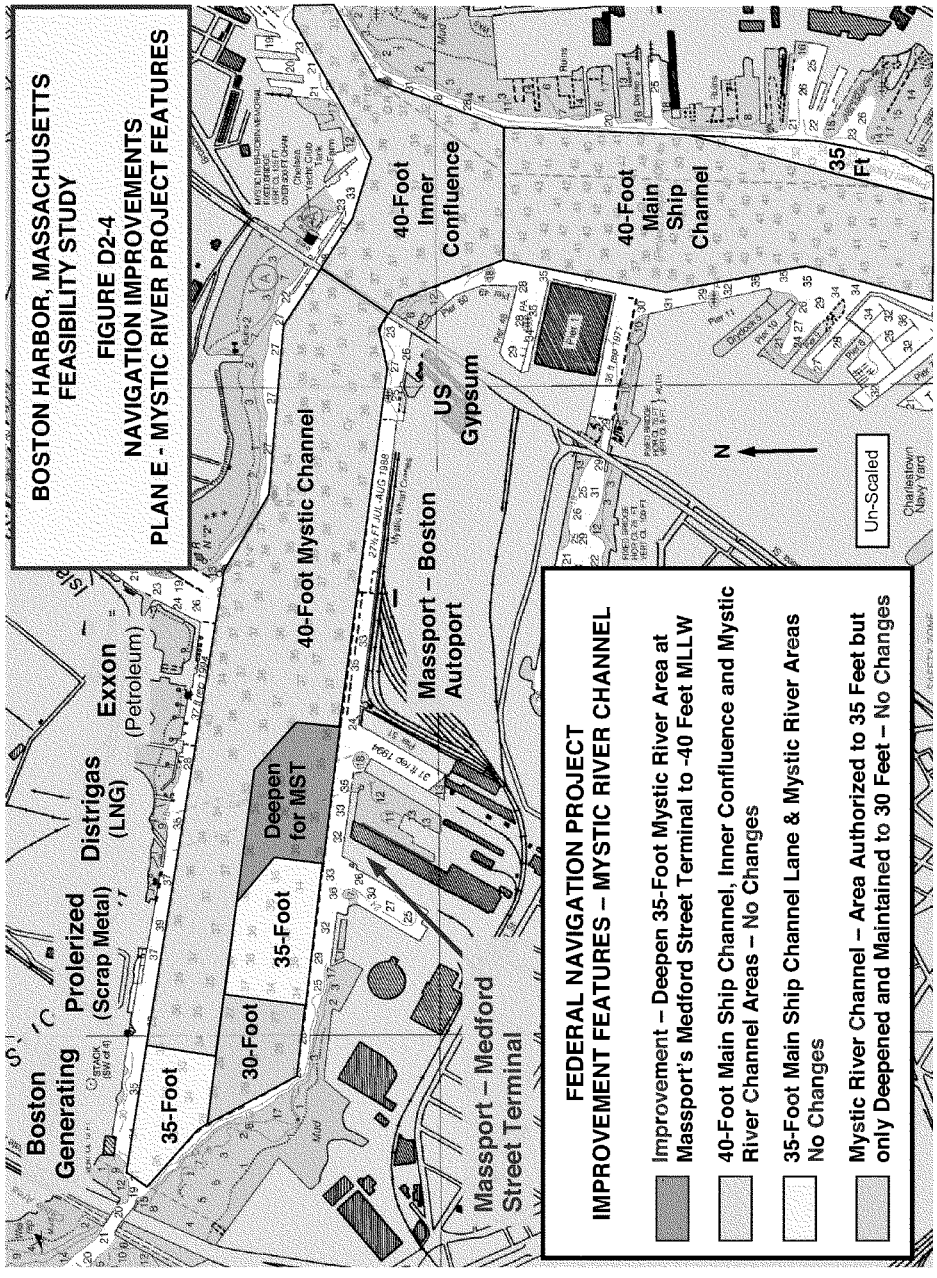

BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY STUDY
FIGURE D2-4
NAVIGATION IMPROVEMENTS
PLAN E - MYSTIC RIVER PROJECT FEATURES
FEDERAL NAVIGATION PROJECT
IMPROVEMENT FEATURES – MYSTIC RIVER CHANNEL
Improvement – Deepen 35-Foot Mystic River Area at Massport's Medford Street Terminal to -40 Feet MLLW
40-Foot Main Ship Channel, Inner Confluence and Mystic River Channel Areas – No Changes
35-Foot Main Ship Channel Lane & Mystic River Areas No Changes
Mystic River Channel – Area Authorized to 35 Feet but only Deepened and Maintained to 30 Feet – No Changes
Un-Scaled
N
Boston Generating
Prolerized (Scrap Metal)
Distrigas (LNG)
Exxon (Petroleum)
35-Foot
30-Foot
35-Foot
Deepen for MST
40-Foot Mystic Channel
Massport – Medford Street Terminal
Massport – Boston Autoport
US Gypsum
40-Foot Inner Confluence
40-Foot Main Ship Channel
35 Ft
Charlestown Navy Yard

TABLE D2-21
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN E - MYSTIC RIVER CHANNEL AT MST

IMPROVEMENT DREDGING QUANTITIES FOR 37, 38, 39 AND 40 FOOT DEPTHS
DEEPEN THE AREA OF THE MYSTIC RIVER ALONG THE SOUTHERN CHANNEL LANE ADJACENT TO MASSPORT'S MEDFORD STREET TERMINAL TO DEPTHS GREATER THAN THE 35-FOOT EXISTING PROJECT DEPTH UP TO -40 FEET

Channel Improvement Design Depth	Ordinary Material			Ledge Removal - None Required in Mystic River				Total All Materials		
	Cut to Design Depth	2-Foot Overdepth	Total CY Ordinary	Cut to Design Depth	2-Foot Additional Required	2-Foot Overdepth	Total Rock CY	All Required Material	All Overdepth	Total All Material
37-Foot Depth	0	25,100	25,100	0	0	0	0	0	25,100	25,100
38-Foot Depth	12,200	26,300	38,500	0	0	0	0	12,200	26,300	38,500
39-Foot Depth	25,100	27,400	52,500	0	0	0	0	25,100	27,400	52,500
40-Foot Depth	38,500	28,600	67,100	0	0	0	0	38,500	28,600	67,100

TABLE D2-22
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
MAINTENANCE QUANTITY ESTIMATE AND DREDGING AREA ESTIMATES FOR ALTERANTIVE PLANS
PLAN E - MYSTIC RIVER CHANNEL AT MST

MAINTENANCE DREDGING QUANTITY
FOR MAINTENANCE DREDGING OF 35-FOOT CHANNEL AREA AT MEDFORD STREET TERMINAL

Channel Improvement Design Depth	Ordinary Material - 2007 Survey			Ledge Removal - None Required in Mystic River				Total All Materials		
	Cut to 35-Ft Design Depth	2-Foot Overdepth	Total CY Ordinary	Cut to Design Depth	2-Foot Additional Required	2-Foot Overdepth	Total Rock CY	All Required Material	All Overdepth	Total All Material
35-Foot Depth - Maintenance Over Improvement Area Only	5,500	19,200	24,700	0	0	0	0	5,500	19,200	24,700
35-Foot Depth - Maintenance of Larger Area from 2008 Specs Survey	10,000	30,600	40,600	0	0	0	0	10,000	30,600	40,600

Note: This material is scheduled to be removed in 2008-2009 as part of the Inner Harbor Maintenance project.

DREDGING AREAS FOR MYSTIC RIVER AT MEDFORD STREET TERMINAL

Dredge Areas by One-Foot Elevation (Including Side Slopes)			Dredging Areas for Alterantive Plans				
Square Feet	Acres	Elevation Feet MLLW	Channel Design Depth	Cut to Depth	2-Foot Overdepth	Total Square Feet	Total Acres
244,936	5.6	35 Feet	35-Foot Maintenance	244,936	86,630	331,566	7.6
307,483	7.1	36 Feet					
331,566	7.6	37 Feet	37-Foot Improvement	331,566	31,311	362,877	8.3
349,186	8.0	38 Feet	38-Foot Improvement	349,186	27,566	376,752	8.6
362,877	8.3	39 Feet	39-Foot Improvement	362,877	27,147	390,024	9.0
376,752	8.6	40 Feet	40-Foot Improvement	376,752	20,451	397,203	9.1
390,024	9.0	41 Feet					
397,203	9.1	42 Feet					

TABLE D2-23
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN E - MYSTIC RIVER CHANNEL

IMPROVEMENT DREDGING COSTS FOR 37, 38, 39 AND 40 FOOT DEPTHS
DEEPEN THE AREA OF THE MYSTIC RIVER ALONG THE SOUTHERN CHANNEL LANE
ADJACENT TO MASSPORT'S MEDFORD STREET TERMINAL
TO DEPTHS GREATER THAN THE 35-FOOT EXISTING PROJECT DEPTH UP TO -40 FEET

July 2011 Price Level with Dec 2012 Contingency Adjustments and Oct 2012 Cost Escalation	PLAN E-37 MYSTIC RIVER CHANNEL MEDFORD STREET TERMINAL AREA 37-FOOT PROJECT DEPTH			PLAN E-38 MYSTIC RIVER CHANNEL MEDFORD STREET TERMINAL AREA 38-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization	LS	LS	$86,000	LS	LS	$86,000
Dredging and Ocean Disposal						
Ordinary Material	25,100	$34.45	$865,000	38,500	$27.26	$1,050,000
Miscellaneous Costs			$26,000			$26,000
Subtotal - Before Contingency			$977,000			$1,162,000
Construction Contingency		23.5%	$230,000		23.5%	$273,000
Subtotal - Construction			$1,207,000			$1,435,000
Planning, Engineering & Design	13.92%		$168,000	11.71%		$168,000
Construction Management	21.71%		$262,000	18.40%		$264,000
Resetting of Aids to Navigation	None		$0	None		$0
Real Estate			$4,000			$4,000
Total First Cost - July 2011 Prices		136%	$1,641,000		130%	$1,871,000
Program Year 2013 First Cost			$1,702,000			$1,940,000
PED Escalation	1.03779		$174,000	1.03779		$174,000
CM Escalation	1.03779		$272,000	1.03779		$274,000
Real Estate Escalation	1.03692		$4,000	1.03692		$4,000
Construction Escalation	1.03692		$1,252,000	1.03692		$1,488,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$175,000	1.00843		$175,000
CM Escalation	1.03690		$282,000	1.03690		$284,000
Real Estate Escalation	1.01584		$4,000	1.01584		$4,000
Construction Escalation	1.01584		$1,272,000	1.01584		$1,512,000
Total Cost Escalated to Construction			$1,733,000			$1,975,000

NOTES:		
Ordinary Material Plant - Dredge	One 16 CY Bucket on 21 CY Dredge	One 16 CY Bucket on 21 CY Dredge
Tugs	2	2
Scows	3	3
Dredging Time	0.36 Months	0.44 Months
Hauling Time	0.30 Months	0.44 Months

Quantities Include a 2-Foot Overdepth Allowance for Dredging Tolerance

TABLE D2-23 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN E - MYSTIC RIVER CHANNEL

IMPROVEMENT DREDGING QUANTITIES FOR 37, 38, 39 AND 40 FOOT DEPTHS
DEEPEN THE AREA OF THE MYSTIC RIVER ALONG THE SOUTHERN CHANNEL LANE
ADJACENT TO MASSPORT'S MEDFORD STREET TERMINAL
TO DEPTHS GREATER THAN THE 35-FOOT EXISTING PROJECT DEPTH UP TO -40 FEET

July 2011 Price Level with Dec 2012 Contingency Adjustments and Oct 2012 Cost Escalation	PLAN E-39 MYSTIC RIVER CHANNEL MEDFORD STREET TERMINAL AREA 39-FOOT PROJECT DEPTH			PLAN E-40 MYSTIC RIVER CHANNEL MEDFORD STREET TERMINAL AREA 40-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization	LS	LS	$90,000	LS	LS	$90,000
Dredging and Ocean Disposal						
Ordinary Material	52,500	$22.81	$1,198,000	67,100	$21.14	$1,418,000
Miscellaneous Costs			$26,000			$26,000
Subtotal - Before Contingency			$1,314,000			$1,534,000
Construction Contingency		23.5%	$309,000		23.5%	$360,000
Subtotal - Construction			$1,623,000			$1,894,000
Planning, Engineering & Design	10.35%		$168,000	8.98%		$170,000
Construction Management	16.33%		$265,000	14.20%		$269,000
Resetting of Aids to Navigation	None		$0	None		$0
Real Estate			$4,000			$4,000
Total First Cost - July 2011 Prices		127%	$2,060,000		123%	$2,337,000
Program Year 2013 First Cost			$2,136,000			$2,423,000
PED Escalation	1.03779		$174,000	1.03779		$176,000
CM Escalation	1.03779		$275,000	1.03779		$279,000
Real Estate Escalation	1.03692		$4,000	1.03692		$4,000
Construction Escalation	1.03692		$1,683,000	1.03692		$1,964,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$175,000	1.00843		$177,000
CM Escalation	1.03690		$285,000	1.03690		$289,000
Real Estate Escalation	1.01584		$4,000	1.01584		$4,000
Construction Escalation	1.01584		$1,710,000	1.01584		$1,995,000
Total Cost Escalated to Construction		134%	$2,174,000		130%	$2,465,000

NOTES:		
Ordinary Material Plant - Dredge	One 16 CY Bucket on 21 CY Dredge	One 16 CY Bucket on 21 CY Dredge
Tugs	3	3
Scows	4	4
Dredging Time	0.40 Months	0.41 Months
Hauling Time	0.39 Months	0.47 Months
Quantities Include a 2-Foot Overdepth Allowance for Dredging Tolerance		

TABLE D2-24
PLAN E - MYSTIC RIVER CHANNEL
ANNUAL COSTS AND BENEFIT-COST ANALYSIS

DEEPEN THE AREA OF THE MYSTIC RIVER ALONG THE SOUTHERN CHANNEL LANE ADJACENT TO MASSPORT'S MEDFORD STREET TERMINAL TO DEPTHS GREATER THAN THE 35-FOOT EXISTING PROJECT DEPTH UP TO -40 FEET

PLAN E - FEDERAL GNF - MYSTIC RIVER			37 Feet	38 Feet	39 Feet	40 Feet
First Cost (July 2011 - without Escalation)			$1,641,000	$1,871,000	$2,060,000	$2,337,000
Construction Duration (Months)			1	1	1	1
IDC Rate			1.00000	1.00000	1.00000	1.00000
Implementation Cost (+ IDC)		0.003125	$1,641,000	$1,871,000	$2,060,000	$2,337,000
Interest & Amortization	3-3/4%	0.04457	$73,000	$83,000	$92,000	$104,000
Increased Annual Maintenance	10% or 16%		$12,000	$11,000	$10,000	$11,000
Total Federal GNF Annual Cost			$85,000	$94,000	$102,000	$115,000
Interest & Amortization	7%	0.07245	$119,000	$136,000	$149,000	$169,000
Increased Annual Maintenance	10% or 16%		$12,000	$11,000	$10,000	$11,000
Total Federal GNF Annual Cost			$131,000	$147,000	$159,000	$180,000

DETAILED ESTMATES

CHELSEA RIVER CHANNEL DEEPENING – PLAN F

Project Description

The Chelsea River Channel improvement would deepen the existing 38-foot channel to a depth of either 39 or 40 feet at mean lower low water (MLLW). This improvement is contingent on the completion of construction of the new Chelsea Street Bridge by the State, City and USCG, as currently underway, and the removal of the old highway span and appurtenant in-water works, and removal of the remaining debris, piles and counterweight from the former Grand Trunk Railroad Bridge immediately upstream of Chelsea Street. Replacement of the KeySpan gas line beneath the channel with a deep directional bore as cited in the 2008 Draft Final Feasibility Report was accomplished in 2008. Widening of the 38-foot existing channel to 175 feet (the current width between fenders at the McArdle Bridge) to take advantage of the new wider bridge opening at Chelsea Street is currently underway under O&M authority and scheduled to be completed in the 2011-2012 dredging season. As part if that ongoing work, temporary bulkheads were placed through the old Chelsea Street Bridge area to prevent vessel passage impacts on the remaining MWRA water line.

With the deepening improvement beyond the current 38 feet, whether or not further widening is accomplished in this area, the temporary bulkheads would need to be relocated. The presence of a second MWRA water tunnel downstream of the Chelsea Street Bridge, not identified at the time of the 2008 report, required additional investigations by the Corps and State. The cost of replacing this second water line, removing the old line, and relocating the temporary bulkheads, was estimated by State agencies at about $15 million including design efforts. Downstream of Chelsea Street the channel would be widened by 50 feet towards the East Boston shore in two locations to ease transit of larger tank ships: immediately upstream of the McArdle Bridge at the River's mouth, and in the bend between the two bridges.

The five beneficiary terminals, Eastern Minerals and the four upstream petroleum terminals would all need to deepen their berths to at least the same depth as the improve channel in order to benefit from the proposed improvements. This plan is shown in Figure D2-5.

The following tables provide detail estimates for the main channels improvements.

Table D2-25 shows the improvement quantity estimates for the two depths investigated for this project feature, and quantity estimates for maintenance of the channel.

Table D2-26 shows the dredging area calculations for maintenance and improvement material for this project feature.

Table D2-27 shows the detailed foot-by-foot incremental quantities and areas for the Chelsea River Channel (Plan F).

Table D2-28 shows the cost estimates for the two improvement depths examined and for non-Federal berth deepening.

Table D2-29 shows the annual costs of the two incremental depths and the non-Federal berth deepening.

Following these tables are the summary sheets from the contingency risk analyses for the recommended plan for the Chelsea River Channel deepening; the 40-foot project plan.

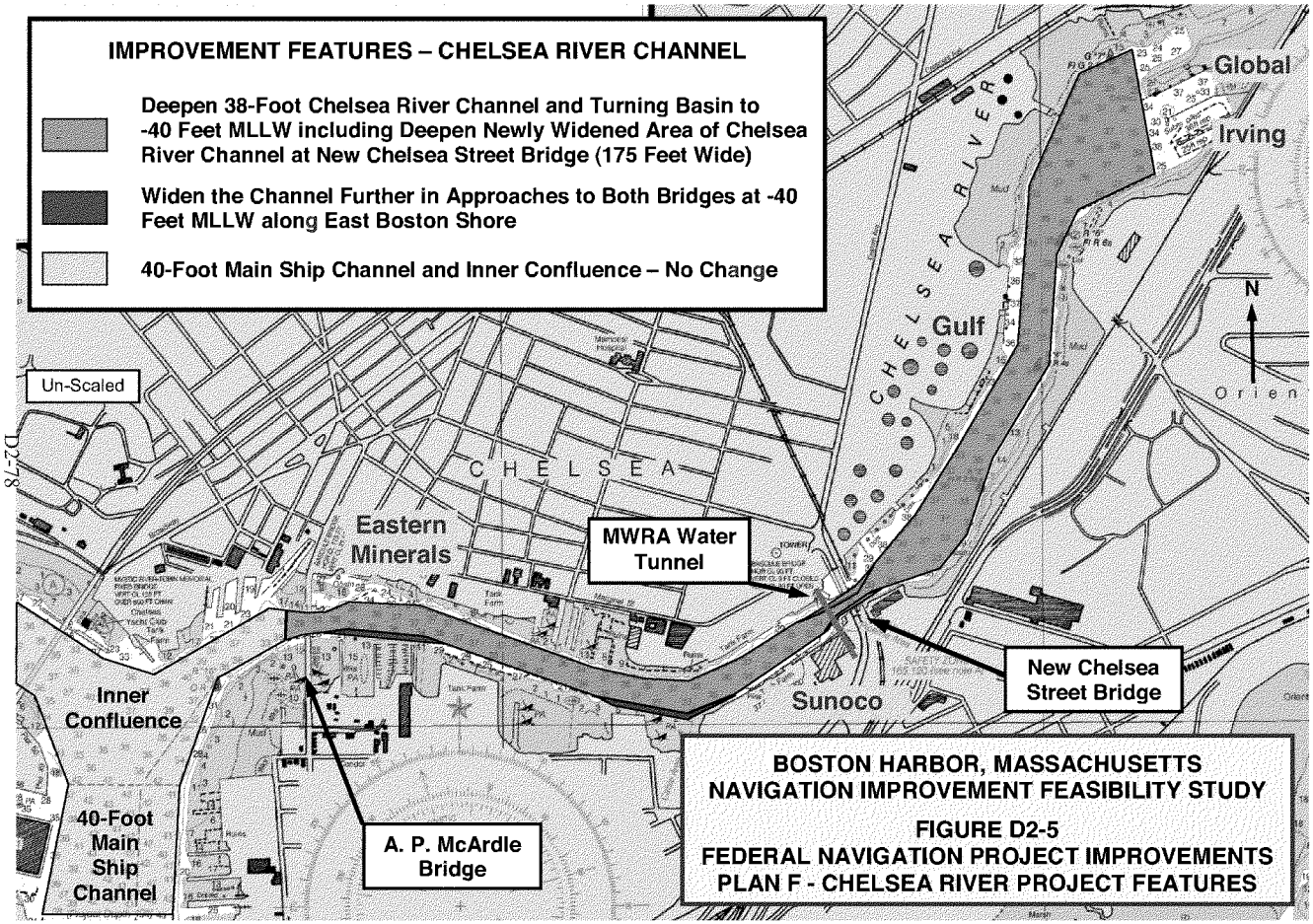

IMPROVEMENT FEATURES – CHELSEA RIVER CHANNEL
Deepen 38-Foot Chelsea River Channel and Turning Basin to -40 Feet MLLW including Deepen Newly Widened Area of Chelsea River Channel at New Chelsea Street Bridge (175 Feet Wide)
Widen the Channel Further in Approaches to Both Bridges at -40 Feet MLLW along East Boston Shore
40-Foot Main Ship Channel and Inner Confluence – No Change
Un-Scaled
CHELSEA
CHELSEA RIVER
Gulf
Global
Irving
N
Eastern Minerals
MWRA Water Tunnel
New Chelsea Street Bridge
Sunoco
Inner Confluence
40-Foot Main Ship Channel
A. P. McArdle Bridge
BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT FEASIBILITY STUDY
FIGURE D2-5
FEDERAL NAVIGATION PROJECT IMPROVEMENTS
PLAN F - CHELSEA RIVER PROJECT FEATURES

TABLE D2-25
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN F - CHELSEA RIVER CHANNEL & BASIN

IMPROVEMENT DREDGING QUANTITIES FOR 39 AND 40 FOOT DEPTHS
ASSUMES WITHOUT-PROJECT REPLACEMENT OF THE CHELSEA STREET BRIDGE AND KEYSPAN GAS LINE BY OTHERS
WIDENING OF CHANNEL THROUGH NEW CHELSEA STREET BRIDGE OPENING ACCOMPLISHED UNDER O&M AUTHORITY
IMPROVEMENT INCLUDES CHANNEL WIDENING AT KEY TURNS AND BRIDGE APPROACHES

Channel Improvement Design Depth	Ordinary Material			Ledge Removal (Requires Added 2 Feet)				Total All Materials		
	Cut to Design Depth	2-Foot Overdepth Allowance	Total CY Ordinary	Cut to Design Depth	2-Foot Additional Required	2-Foot Overdepth Allowance	Total Rock CY	All Required Material	All Overdepth	Total All Material
39-Foot Depth	74,100	119,300	193,400	0	10	60	70	74,100	119,400	193,500
40-Foot Depth	80,200	262,400	342,600	0	50	490	540	80,200	262,900	343,100

MAINTENANCE DREDGING QUANTITY
FOR MAINTENANCE TO 38 FEET INCLUDING WIDENED CHANNEL AREA AT NEW CHELSEA STREET BRIDGE OPENING

Channel Maintenance to -38 Feet MLLW	Ordinary Material - From 2007 Survey as Adjusted from 2012 Afterdredge Survey of Chelsea Street Bridge Area			Ledge Removal - None Required for Chelsea O&M				Total All Materials		
	Cut to Design Depth	2-Foot Overdepth Allowance	Total CY Ordinary	Cut to Design Depth	2-Foot Additional Required	2-Foot Overdepth Allowance	Total Rock CY	All Required Material	All Overdepth	Total All Material
Pre-2012 Channel Limits	100,900	82,100	183,000	0	0	0	0	100,900	82,100	183,000
Widened Area at New Bridge	5,100	3,400	8,500	0	0	0	0	5,100	3,400	8,500
Total O&M	106,000	85,500	191,500	0	0	0	0	106,000	85,500	191,500

TABLE D2-26
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
DREDGING FOOTPRINT AREA ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS
PLAN F - CHELSEA RIVER CHANNEL & BASIN

Elevation MLLW	Rock Area		Total Dredge Area Incl. Ordinary Material		Improvement Plans		SF Area for Drill & Blast and Rock Removal (20% of 1st Foot of OD)	CY Rock Quantity Estimates by Elevation (Ft MLLW)	Quantity for Rock Overdepth Calculation	
	Square Feet	Acres Including Side Slopes	Square Feet	Acres Including Side Slopes	Plan and Channel Design Depth (MLLW)	Acres Including Side Slopes			Overdepth Elevation Increment	CY Rock Overdepth Quantity
-38	0	0.0	360,991	8.3				0		
-39	0	0.0	1,138,228	26.1	Plan F-39	66.9	785	0		
-40	0	0.0	2,358,789	54.2	Plan F-40	68.7	6,648	0		
-41	95	0.0	2,915,338	66.9				10	41 to 43	60
-42	3,546	0.1	2,992,237	68.7				50	42 to 44	490
-43	19,056	0.4						430		
-44	36,165	0.8						1,520		

Note: Drill & Blast Area and Rock Removal Area are limited to requried area plus 20% of the first foot of overdepth elevation foorprint.
Rock Calculations by R. Meader - March 2008, Checked by J. Garabedian

TABLE D2-27
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
QUANTITY AND AREA ESTIMATES FOR ORDINARY MATERIAL
ALTERANTIVE PLANS AND DEPTHS - PLAN F - CHELSEA RIVER CHANNEL & BASIN

AREAS BY ELEVATION BY FOOT AT MEAN LOWER LOW WATER

Elevation (Maintenance)	Dredging Quantities (CY)				Dredging Areas (SF)				Total Dredging Area	Acres
	Pre-2012 Channel Limits	Widening Area #1	Widening Area #2	Areas Widened to 175 Feet at New Cheslea Street Bridge	Pre-2012 Channel Limits	Widening Area #1	Widening Area #2	Areas Widened to 175 Feet at New Cheslea Street Bridge		
-38	126,326	26,241	41,931	5,062	232,510	36,363	32,493	59,625	360,991	8.3
-39	158,928	29,211	44,853	6,328	1,000,921	40,680	33,908	62,719	1,138,228	26.1
-40	214,644	32,405	47,821	8,524	2,218,129	41,719	33,908	65,033	2,358,789	54.2
-41	316,929	35,741	50,835	13,005	2,773,776	41,995	33,908	65,659	2,915,338	66.9
-42	453,253	39,059	53,876	19,666	2,850,675	41,995	33,908	65,659	2,992,237	68.7

Notes: Ordinary Material Calculations by A. Chin - December 2007. Except Bridge Area from 2012 Afterdredge Survey (R. Meader 2012)

TABLE D2-28
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN F - CHELSEA RIVER CHANNEL

IMPROVEMENT DREDGING COSTS FOR 39 AND 40 FOOT DEPTHS
IMPROVEMENT INCLUDES CHANNEL WIDENING AT KEY TURNS AND BRIDGE APPROACHES
ASSUMES WITHOUT-PROJECT REPLACEMENT OF THE CHELSEA STREET BRIDGE
AND KEYSPAN GAS LINE BY OTHERS AND WIDENING OF CHANNEL THROUGH
NEW CHELSEA STREET BRIDGE OPENING ACCOMPLISHED UNDER O&M AUTHORITY

July 2011 Price Levels with Dec 2012 Contingency Adjustments and Oct 2012 Cost Esclation	PLAN F-39 CHELSEA RIVER CHANNEL DEEPEN ENTIRE CHANNEL & BASIN 39-FOOT PROJECT DEPTH			PLAN F-40 CHELSEA RIVER CHANNEL DEEPEN ENTIRE CHANNEL & BASIN 40-FOOT PROJECT DEPTH		
First Cost of Construction	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization						
Ordinary Dredging & Disposal Plant	LS	LS	$82,000	LS	LS	$100,000
Drilling & Blasting Plant	LS	LS	$140,000	LS	LS	$142,000
Rock Removal & Disposal Plant	LS	LS	$89,000	LS	LS	$89,000
Dredging and Ocean Disposal						
Ordinary Material	193,400	$29.85	$5,773,000	342,600	$22.84	$7,825,000
Ledge Drilling & Blasting	70	$1,528.57	$107,000	540	$457.41	$247,000
Ledge Removal & Disposal	70	$166.00	$12,000	540	$44.26	$24,000
Miscellaneous Costs			$71,000			$71,000
Subtotal - Before Contingency			$6,274,000			$8,498,000
Construction Contingency		17.2%	$1,079,000		17.2%	$1,462,000
Subtotal - Construction	193,470		$7,353,000	343,140		$9,960,000
Planning, Engineering & Design		0.05222	$384,000		0.03956	$394,000
Construction Management		0.10894	$801,000		0.09639	$960,000
Resetting of Aids to Navigation			$48,000			$48,000
Real Estate			$15,000			$18,000
Total First Cost - July 2011 Prices		117%	$8,601,000		114%	$11,380,000
Program Year 2013 First Cost			$8,870,000			$11,753,000
PED Escalation	1.03779		$399,000	1.03779		$409,000
CM Escalation	1.03779		$831,000	1.03779		$997,000
Real Estate Escalation	1.03692		$16,000	1.03692		$19,000
Construction Escalation	1.03692		$7,624,000	1.03692		$10,328,000
ATON Escalation (USCG)	1.03692		$50,000	1.03692		$50,000
Fully Funded Cost Escalation						
PED Escalation	1.00843		$402,000	1.00843		$412,000
CM Escalation	1.02731		$854,000	1.03690		$1,034,000
Real Estate Escalation	1.01180		$16,000	1.01584		$19,000
Construction Escalation	1.01180		$7,714,000	1.01584		$10,492,000
Total Cost Escalated to Construction			$8,986,000			$11,957,000
ATON Escalation (USCG)	1.01180		$51,000	1.01584		$51,000

NOTES:

Ordinary Material: Plant = One 10 CY Bucket Dredge with 8 CY bucket. For 40-Foot Depth: 2 Tugs, 3 Scows, 4.38 Months Dredging Time, 3.4 Months Haul Time. For 39-Foot Depth: 1 Tug, 2 Scows, 4.1 Months Dredging Time, 4.25 Months Hauling Time.

Drilling and Blasting - Plant = 1 Drill Boat. For 39 Feet = 1 Day Drilling Time. For 40 Feet = 3 Days Drilling Time

Rock Removal - Plant = One 21 CY Bucket Dredge with a 14 CY bucket, One Tug, 2 Scows. For 39 Feet = 0.01 Months Excavation Time, 0.01 Months Haul Time. For 40 Feet = 0.02 Months Excavation Time, 0.02 Months Haul Time.

Quantities for Ordinary Material Include a 2-Foot Allowable Overdepth (Dredging Tolerance)

Quantities in Rock Include an Additional 2-Foot Required Removal and a 2-Foot Allowable Overdepth (Beneath the Required Footprint plus the 20% of the Area of One-Half the Overdepth Footprint to Account for Side Slopes and Overdrill)

TABLE D2-28 (Continued)
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
COST ESTIMATES FOR ALTERANTIVE PLANS AND DEPTHS - PLAN F - CHELSEA RIVER CHANNEL

CHELSEA RIVER - ASSOCIATED NON-FEDERAL BERTH DEEPENING

July 2011 Price Levels with Dec 2012 Contingency Adjustments and Oct 2012 Cost Esclation	PLAN F-39 CHELSEA RIVER CHANNEL 39-FOOT PROJECT DEPTH			PLAN F-40 CHELSEA RIVER CHANNEL 40-FOOT PROJECT DEPTH		
First Cost of Non-Federal Berths	Quantity (CY)	Unit Cost	Cost	Quantity (CY)	Unit Cost	Cost
Mobilization/Demobilization			$41,000			$50,000
Dredging and Ocean Disposal - 5 Berths	20,500	$35.79	$734,000	41,000	$26.66	$1,093,000
Construction Contingency		17%	$116,000		17%	$171,000
LSF Planning, Engineering & Design			$47,000			$52,000
LSF Construction Management			$97,000			$127,000
Total First Cost LSF - July 2011 Prices			$1,035,000			$1,493,000
LSF Cost Escalated to Program Year 2013			$1,073,000			$1,548,000
LSF PED Escalated to PY2013			$49,000			$54,000
LSF Construction Escalated to PY2013			$1,024,000			$1,494,000
Fully Funded LSF Cost Escalation	1.01180		$1,086,000	1.01584		$1,573,000
LSF PED Escalated to Design Mid-Point			$50,000			$55,000
LSF Construction Escalated to Mid-Point			$1,036,000			$1,518,000

TABLE D2-29
PLAN F - CHELSEA RIVER CHANNEL
ANNUAL COST AND BENEFIT COST ANALYSIS

DEEPEN THE EXISTING 38-FOOT CHELSEA RIVER CHANNEL AND TURNING BASIN TO 39 OR 40 FEET WITH MINOR WIDENING IN CRITICAL BENDS AND BRIDGE APPROACHES

ASSUMES NEW CHELSEA STREET BRIDGE COMPLETED UNDER THE WITHOUT PROJECT CONDITION AND BULKHEAD AND UTILITY RELOCATION BY OTHERS UNDER THE WITH-PROJECT CONDITION AND CHANNEL WIDENING THORUGH THE BRIDGE AT 38 FEET UNDER O&M AUTHORITY

PLAN F - FEDERAL GNF			39 Feet	40 Feet
First Cost (July 2011 - without Escalation)			$8,601,000	$11,380,000
Construction Duration (Months)			4	5
IDC Rate			1.00465	1.00624
Implementation Cost (+ IDC)		0.0031250	$8,641,000	$11,451,000
Interest & Amortization	3-3/4%	0.04457	$385,000	$510,000
Increased Annual Maintenance			$57,000	$51,000
Total Federal GNF Annual Cost			$442,000	$561,000
Interest & Amortization	7%	0.07245	$626,000	$830,000
Increased Annual Maintenance			$57,000	$51,000
Total Federal GNF Annual Cost			$683,000	$881,000

PLAN F - TERMINAL BERTHS (Local Service Facilities)			39 Feet	40 Feet
First Cost (July 2011 - without Escalation)			$1,035,000	$1,493,000
Interest & Amortization	3-3/4%	0.04457	$46,000	$67,000
Increased Annual Maintenance	5% or 6%		$52,000	$90,000
Total Non-Federal LSF Annual Cost			$98,000	$157,000
Interest & Amortization	7%	0.07245	$75,000	$108,000
Increased Annual Maintenance			$52,000	$75,000
Total NF LSF Annual Cost			$127,000	$183,000

PLAN F - TOTAL ANNUAL COSTS		39 Feet	40 Feet
Total Annual Cost - July 2011	3-3/4%	$540,000	$718,000
Total Annual Cost - July 2011	7%	$1,897,000	$1,064,000

PROJECT CONSTRUCTION SCHEDULE
AND CONSTRUCTION TIMELINES FOR ALTERANTIVE PLANS

Table D2-30 – Detailed Project Construction Schedule for Alternative Plans
- 30A –Including 45-Foot Main Channels Improvement with 49-Foot Entrance Channel
- 30B –Including 46-Foot Main Channels Improvement with 48 or 50-Foot Entrance
- 30C –Including 47-Foot Main Channels Improvement with 49, 50, 51 or 52-Ft Entrance
- 30D –Including 48-Foot Main Channels Improvement with 50 or 52-Foot Entrance
- 30E –Including 49-Foot Main Channels Improvement with 51-Foot Entrance Channel

Table D2-31 – Construction Timelines for the Nine Original Alternative Depth Increments – In 2 Pages

TABLE D2-30A (Page 1 of 1) - CONSTRUCTION SCHEDULE

BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 45/49-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)

Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A2 - MAIN CHANNELS IMPROVEMENT - 45/49 FEET	28					1					June 2015	July 2016
Broad Sound North Entrance Channel - 49 Feet	15										Nov 2014	June 2015
Dredging and Disposal - Ordinary Material		2	4	6			10	10	4.94 MO	5.03 MO		
Drill and Blast Ledge					2			25		12.30 MO		
Rock Removal and Disposal		2	4	6			3	4	1.72 MO	1.81 MO		
President Roads Anchorage - 46 Feet	10										March 2015	July 2015
Dredging and Disposal - Ordinary Material		2	5	7			12	11	6.17 MO	5.43 MO		
Drill and Blast Ledge					2			2		1.10 MO		
Rock Removal and Disposal		1	3	4			1	1	0.25 MO	0.30 MO		
Main Ship Channel - Roads to Reserved Channel - 46 Feet	5										Feb 2016	July 2016
Dredging and Disposal - Ordinary Material		2	3	5			10	9	5.14 MO	4.54 MO		
Drill and Blast Ledge					2			3		1.30 MO		
Rock Removal and Disposal		1	2	3			1	1	0.31 MO	0.39 MO		
Lower Reserved Channel and Turning Area - 46 Feet	5										Oct 2015	April 2016
Dredging and Disposal - Ordinary Material		2	3	5			5	4	2.32 MO	2.14 MO		
Drill and Blast Ledge					2			5		1.30 MO		
Rock Removal and Disposal		1	2	3			1	1	0.21 MO	0.26 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4										Sept 2016	Oct 2016
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO		
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			0	0	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1										Sept 2014	Sept 2014
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO		
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5										July 2014	Aug 2014
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO		
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

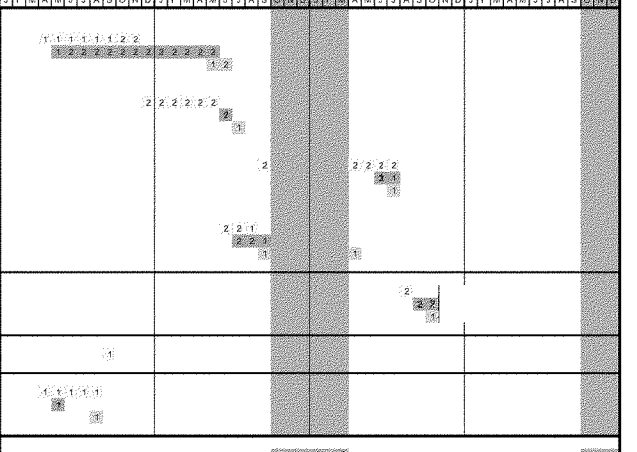
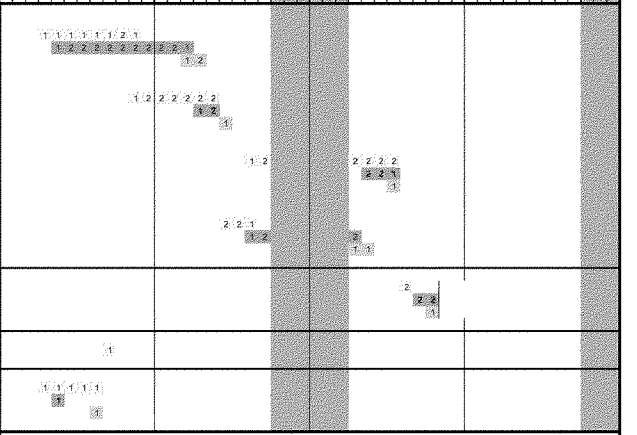


TABLE D2-30B (Page 1 of 2) - CONSTRUCTION SCHEDULE
BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 46/48-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)
Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A2 - MAIN CHANNELS IMPROVEMENT - 46/48 FEET	31					1					June 2015	July 2016
Broad Sound North Entrance Channel - 48 Feet	17										Oct 2014	April 2015
Dredging and Disposal - Ordinary Material		2	4	6			10	9	4.62 MO	4.35 MO		
Drill and Blast Ledge					2			20		10.10 MO		
Rock Removal and Disposal		2	4	6			3	3	1.38 MO	1.46 MO		
President Roads Anchorage - 46 Feet	10										March 2015	June 2015
Dredging and Disposal - Ordinary Material		2	5	7			13	14	6.34 MO	6.77 MO		
Drill and Blast Ledge					2			3		1.30 MO		
Rock Removal and Disposal		1	3	4			1	1	0.31 MO	0.37 MO		
Main Ship Channel - Roads to Reserved Channel - 46 Feet	8										Feb 2016	July 2016
Dredging and Disposal - Ordinary Material		2	3	5			11	11	5.48 MO	5.62 MO		
Drill and Blast Ledge					2			5		2.53 MO		
Rock Removal and Disposal		1	2	3			1	1	0.40 MO	0.33 MO		
Lower Reserved Channel and Turning Area - 46 Feet	9										Dec 2015	May 2016
Dredging and Disposal - Ordinary Material		2	3	5			5	5	2.33 MO	2.53 MO		
Drill and Blast Ledge					2			5		2.23 MO		
Rock Removal and Disposal		1	2	3			1	1	0.39 MO	0.49 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4										Sept 2016	Oct 2016
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO		
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			0	0	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1										Sept 2014	Sept 2014
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO		
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5										July 2014	Aug 2014
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.46 MO		
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)												
Drill and Blast Ledge (1 Plant Only)												
Rock Removal and Disposal (1 Plant Only)												

Total Never More than 2
Total Never More than 2
Total Never More than 1 Except for Entrance Channel



Dredge Plants (Two 21 CY Dredges, 5 Tugs & 7 Scows)
Drill & Blast Plant (2 Drill Barges, Blast Barge, Small Tug)
Rock Removal Plants (21 CY Buckets)

TABLE D2-30B (Page 2 of 2) - CONSTRUCTION SCHEDULE
BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 46/50-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)
Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A2 - MAIN CHANNELS IMPROVEMENT - 46/50 FEET	29					1					June 2015	Aug 2016
Broad Sound North Entrance Channel - 50 Feet	17											
Dredging and Disposal - Ordinary Material		2	4	6			10	9	5.20 MO	4.61 MO	Dec 2014	Aug 2015
Drill and Blast Ledge					2			30		15.20 MO		
Rock Removal and Disposal		2	4	6			4	4	2.06 MO	2.18 MO		
President Roads Anchorage - 46 Feet	10										March 2015	Sept 2015
Dredging and Disposal - Ordinary Material		2	5	7			13	14	6.34 MO	6.77 MO		
Drill and Blast Ledge					2			3		1.30 MO		
Rock Removal and Disposal		1	3	4			1	1	0.31 MO	0.37 MO		
Main Ship Channel - Roads to Reserved Channel - 46 Feet	8										Feb 2016	August 2016
Dredging and Disposal - Ordinary Material		2	3	5			11	11	5.48 MO	5.62 MO		
Drill and Blast Ledge					2			5		2.53 MO		
Rock Removal and Disposal		1	2	3			1	1	0.40 MO	0.33 MO		
Lower Reserved Channel and Turning Area - 46 Feet	9										Dec 2015	June 2016
Dredging and Disposal - Ordinary Material		2	3	5			5	5	2.33 MO	2.53 MO		
Drill and Blast Ledge					2			5		2.23 MO		
Rock Removal and Disposal		1	2	3			1	1	0.39 MO	0.49 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	Sept 2016	Oct 2016
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			0	0	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

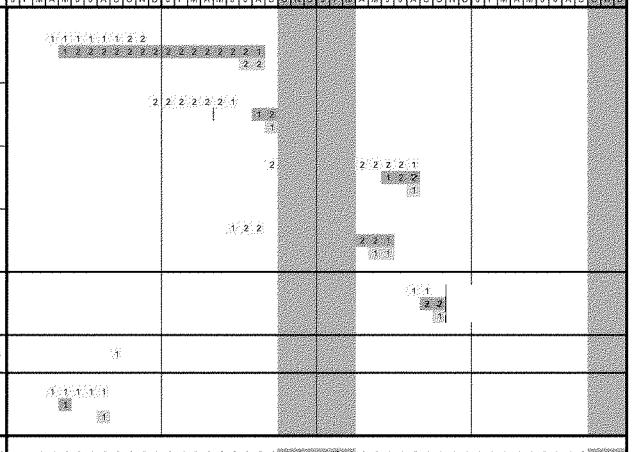


TABLE D2-30C (Page 1 of 4) - CONSTRUCTION SCHEDULE

BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 47/49-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)

Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6 Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A3 - MAIN CHANNELS IMPROVEMENT - 47/49 FEET	31					1					June 2015	Aug 2016
Broad Sound North Entrance Channel - 49 Feet	17											
Dredging and Disposal - Ordinary Material		2	4	6			10	10	4.94 MO	5.03 MO	Nov 2014	June 2015
Drill and Blast Ledge					2			25		12.30 MO		
Rock Removal and Disposal		2	4	6			3	4	1.72 MO	1.81 MO		
President Roads Anchorage - 47 Feet	10										April 2015	Aug 2015
Dredging and Disposal - Ordinary Material		2	4	6			12	13	6.10 MO	6.37 MO		
Drill and Blast Ledge					2			3		1.50 MO		
Rock Removal and Disposal		1	2	3			1	1	0.37 MO	0.44 MO		
Main Ship Channel - Roads to Reserved Channel - 47 Feet	8										Feb 2016	Aug 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	10	5.92 MO	5.19 MO		
Drill and Blast Ledge					2			4		2.00 MO		
Rock Removal and Disposal		1	3	4			1	1	0.50 MO	0.41 MO		
Lower Reserved Channel and Turning Area - 47 Feet	9										Dec 2015	May 2016
Dredging and Disposal - Ordinary Material		2	4	6			5	4	2.32 MO	2.18 MO		
Drill and Blast Ledge					2			7		3.27 MO		
Rock Removal and Disposal		1	2	3			2	2	0.61 MO	0.77 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	Sept 2016	Nov 2016
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

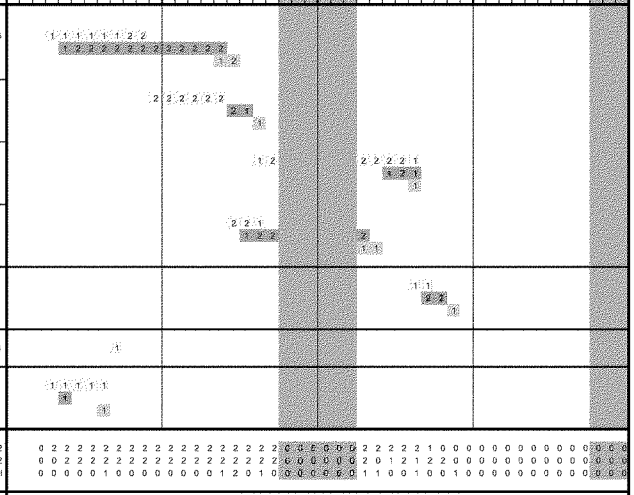


TABLE D2-30C (Page 2 of 4) - CONSTRUCTION SCHEDULE

BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 47/50-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)

Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A3 - MAIN CHANNELS IMPROVEMENT - 47/50 FEET	30					1					June 2015	Sept 2016
Broad Sound North Entrance Channel - 50 Feet	17											
Dredging and Disposal - Ordinary Material		2	4	6			10	9	5.20 MO	4.61 MO	Dec 2014	Aug 2015
Drill and Blast Ledge					2			30		15.20 MO		
Rock Removal and Disposal		2	4	6			4	4	2.08 MO	2.18 MO		
President Roads Anchorage - 47 Feet	10										April 2015	Sept 2015
Dredging and Disposal - Ordinary Material		2	4	6			12	13	6.10 MO	6.37 MO		
Drill and Blast Ledge					2			3		1.50 MO		
Rock Removal and Disposal		1	2	3			1	1	0.37 MO	0.44 MO		
Main Ship Channel - Roads to Reserved Channel - 47 Feet	12										Nov 2015	May 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	10	5.92 MO	5.10 MO		
Drill and Blast Ledge					2			4		2.00 MO		
Rock Removal and Disposal		1	3	4			1	1	0.50 MO	0.41 MO		
Lower Reserved Channel and Turning Area - 47 Feet	6										July 2016	Sept 2016
Dredging and Disposal - Ordinary Material		2	4	6			5	4	2.32 MO	2.18 MO		
Drill and Blast Ledge					2			7		3.27 MO		
Rock Removal and Disposal		1	2	3			2	2	0.61 MO	0.77 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	Sept 2016	Nov 2016
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

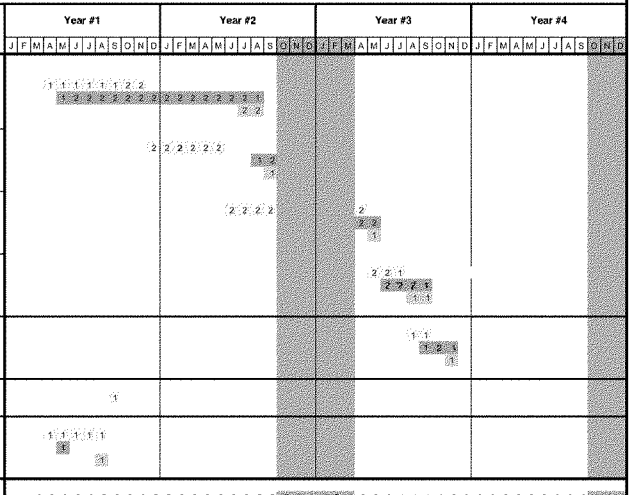


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TABLE D2-30C (Page 3 of 4) - CONSTRUCTION SCHEDULE
BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 47/51-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)
Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A3 - MAIN CHANNELS IMPROVEMENT - 47/51 FEET	34					1					Aug2015	Jan 2017
Broad Sound North Entrance Channel - 51 Feet	17											
Dredging and Disposal - Ordinary Material		2	4	6			11	10	5.36 MO	5.19 MO	May 2015	July 2016
Drill and Blast Ledge					2			36		18.20 MO		
Rock Removal and Disposal		2	4	6			5	5	2.41 MO	2.59 MO		
President Roads Anchorage - 47 Feet	10										Oct 2015	Aug 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	13	6.10 MO	6.37 MO		
Drill and Blast Ledge					2			3		1.50 MO		
Rock Removal and Disposal		1	2	3			1	1	0.37 MO	0.44 MO		
Main Ship Channel - Roads to Reserved Channel - 47 Feet	12										Feb 2016	Oct 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	10	5.92 MO	5.10 MO		
Drill and Blast Ledge					2			4		2.00 MO		
Rock Removal and Disposal		1	3	4			1	1	0.50 MO	0.41 MO		
Lower Reserved Channel and Turning Area - 47 Feet	6										Sept 2016	Jan 2017
Dredging and Disposal - Ordinary Material		2	4	6			5	4	2.32 MO	2.18 MO		
Drill and Blast Ledge					2			7		3.27 MO		
Rock Removal and Disposal		1	2	3			2	2	0.61 MO	0.77 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	Nov 2016	Mar 2017
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.48 MO	0.48 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)										Total Never More than 2		
Drill and Blast Ledge (1 Plant Only)										Total Never More than 2		
Rock Removal and Disposal (1 Plant Only)										Total Never More than 1 Except for Entrance Channel		

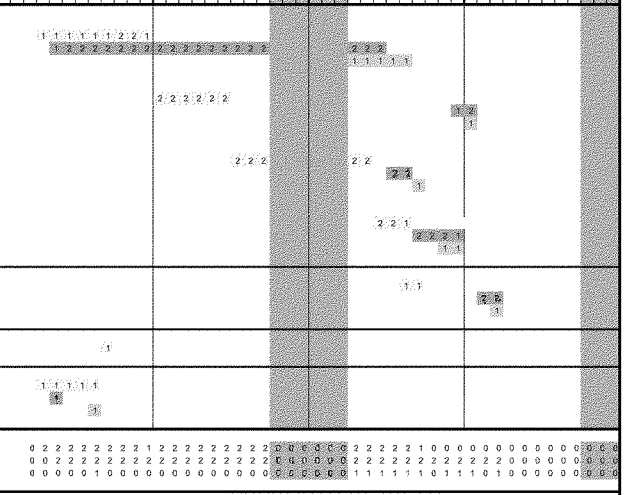

TABLE D2-30C (Page 4 of 4) - CONSTRUCTION SCHEDULE
BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 47/52-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)
Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN A3 - MAIN CHANNELS IMPROVEMENT - 47/52 FEET	35					1					Sept 2015	Feb 2017
Broad Sound North Entrance Channel - 52 Feet	28										May 2015	July 2016
Dredging and Disposal - Ordinary Material		2	4	6			11	12	5.53 MO	5.79 MO		
Drill and Blast Ledge					2			40		19.90 MO		
Rock Removal and Disposal		2	4	6			5	6	2.78 MO	2.93 MO		
President Roads Anchorage - 47 Feet	20										Oct 2015	Aug 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	13	6.10 MO	6.37 MO		
Drill and Blast Ledge					2			3		1.50 MO		
Rock Removal and Disposal		1	2	3			1	1	0.37 MO	0.44 MO		
Main Ship Channel - Roads to Reserved Channel - 47 Feet	16										Feb 2016	Oct 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	10	5.92 MO	5.10 MO		
Drill and Blast Ledge					2			4		2.00 MO		
Rock Removal and Disposal		1	3	4			1	1	0.50 MO	0.41 MO		
Lower Reserved Channel and Turning Area - 47 Feet	9										Oct 2016	Feb 2017
Dredging and Disposal - Ordinary Material		2	4	6			5	4	2.32 MO	2.16 MO		
Drill and Blast Ledge					2			7		3.27 MO		
Rock Removal and Disposal		1	2	3			2	2	0.61 MO	0.77 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	9										Dec 2016	Apr 2017
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO		
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1										Sept 2014	Sept 2014
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO		
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5										July 2014	Aug 2014
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO		
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS A2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

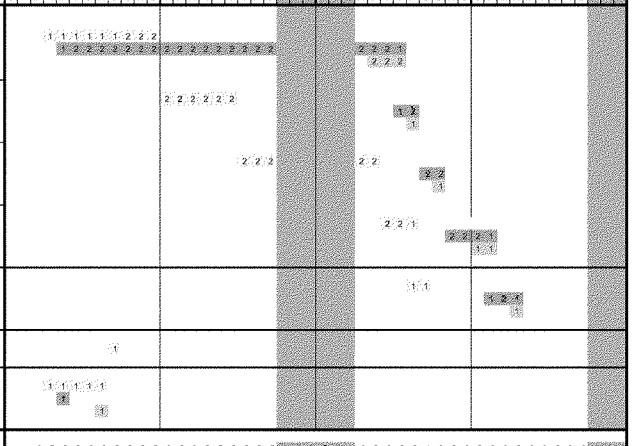

TABLE D2-30D (Page 1 of 2) - CONSTRUCTION SCHEDULE
BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 48/50-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)
Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6 Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&S or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN B1 - MAIN CHANNELS IMPROVEMENT - 48/50 FEET	31					1					July 2015	Oct 2016
Broad Sound North Entrance Channel - 50 Feet	17											
Dredging and Disposal - Ordinary Material		2	4	6			10	9	5.20 MO	4.61 MO	Dec 2014	Aug 2015
Drill and Blast Ledge					2			30		15.20 MO		
Rock Removal and Disposal		2	4	6			4	4	2.05 MO	2.18 MO		
President Roads Anchorage - 48 Feet	10										April 2015	Sept 2015
Dredging and Disposal - Ordinary Material		2	5	7			13	11	6.40 MO	5.70 MO		
Drill and Blast Ledge					2			3		1.70 MO		
Rock Removal and Disposal		1	2	3			1	1	0.44 MO	0.52 MO		
Main Ship Channel - Roads to Reserved Channel - 48 Feet	8										March 2016	Oct 2016
Dredging and Disposal - Ordinary Material		2	4	6			12	12	6.11 MO	6.01 MO		
Drill and Blast Ledge					2			5		2.53 MO		
Rock Removal and Disposal		1	3	4			1	1	0.63 MO	0.52 MO		
Lower Reserved Channel and Turning Area - 48 Feet	9										Feb 2016	Sept 2016
Dredging and Disposal - Ordinary Material		2	4	6			5	5	2.50 MO	2.45 MO		
Drill and Blast Ledge					2			9		4.51 MO		
Rock Removal and Disposal		1	2	3			1	1	0.90 MO	1.12 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	Nov 2016	Dec 2016
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS B1-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

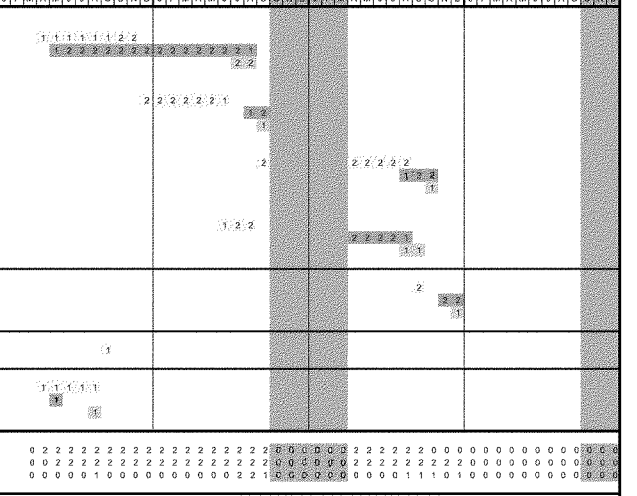

TABLE D2-30D (Page 2 of 2) - CONSTRUCTION SCHEDULE
BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 48/50-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)
Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN B1 - MAIN CHANNELS IMPROVEMENT - 48/52 FEET	37					1					Oct 2015	April 2017
Broad Sound North Entrance Channel - 52 Feet	20											
Dredging and Disposal - Ordinary Material		2	4	6			11	12	5.53 MO	5.79 MO	June 2015	Aug 2016
Drill and Blast Ledge					2			40		19.90 MO		
Rock Removal and Disposal		2	4	6			6	6	2.78 MO	2.93 MO		
President Roads Anchorage - 48 Feet	10										Nov	Sept
Dredging and Disposal - Ordinary Material		2	5	7			13	11	6.40 MO	5.70 MO	2015	2016
Drill and Blast Ledge					2			3		1.70 MO		
Rock Removal and Disposal		1	2	3			1	1	0.44 MO	0.52 MO		
Main Ship Channel - Roads to Reserved Channel - 48 Feet	8										April	Nov
Dredging and Disposal - Ordinary Material		2	4	6			12	12	6.11 MO	6.01 MO	2016	2016
Drill and Blast Ledge					2			5		2.53 MO		
Rock Removal and Disposal		1	3	4			1	1	0.63 MO	0.52 MO		
Lower Reserved Channel and Turning Area - 48 Feet	9										Dec	April
Dredging and Disposal - Ordinary Material		2	4	6			5	5	2.56 MO	2.45 MO	2016	2017
Drill and Blast Ledge					2			9		4.51 MO		
Rock Removal and Disposal		1	2	3			1	1	0.90 MO	1.12 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	April 2017	May 2017
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS B1-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	

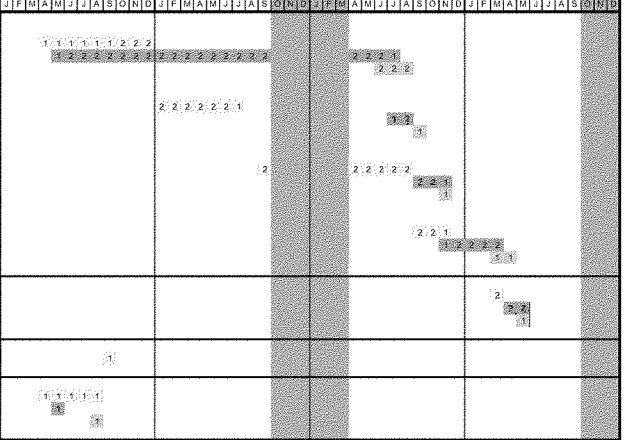

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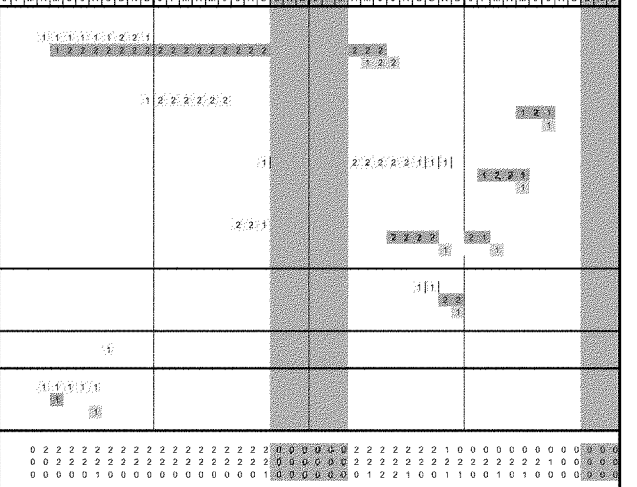
TABLE D2-30E (Page 1 of 1) - CONSTRUCTION SCHEDULE

BOSTON HARBOR, MASSACHUSETTS - DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT - RECOMMENDED PLANS OF IMPROVEMENT WITH 49/51-FOOT MAIN CHANNELS PLAN

Schedule assuming air quality shutdown from months 19 to 24, and assuming separate rock removal plant(s)

Schedule also assumes Chelsea and Mystic Rivers will be done in Year #1

CURRENT FEASIBILITY ESTIMATE	Total Duration Months	# of Dredges	# of Tugs	# of Scows	# of D&B Plants	Numer of 6-Month Air Quality Shutdowns	Plant-Months Excavation	Plant-Months D&B or Hauling	Excavation Time (Months)	Hauling Time (Months)	Construct Mid-Point	Construct End-Point
PLAN B2 - MAIN CHANNELS IMPROVEMENT - 49/51 FEET	31					1					Dec 2015	July 2017
Broad Sound North Entrance Channel - 51 Feet	17											
Dredging and Disposal - Ordinary Material		2	4	6			11	10	5.36 MO	5.19 MO	Mar 2015	July 2016
Drill and Blast Ledge					2			36		18.20 MO		
Rock Removal and Disposal		2	4	6			5	5	2.41 MO	2.59 MO		
President Roads Anchorage - 49 Feet	10										March 2016	July 2017
Dredging and Disposal - Ordinary Material		2	5	7			13	13	6.52 MO	6.55 MO		
Drill and Blast Ledge					2			4		1.90 MO		
Rock Removal and Disposal		1	2	3			1	1	0.51 MO	0.80 MO		
Main Ship Channel - Roads to Reserved Channel - 49 Feet	8										July 2016	May-17
Dredging and Disposal - Ordinary Material		2	4	6			13	14	6.30 MO	6.97 MO		
Drill and Blast Ledge					2			6		3.23 MO		
Rock Removal and Disposal		1	3	4			2	1	0.80 MO	0.66 MO		
Lower Reserved Channel and Turning Area - 49 Feet	9										May 2016	March 2017
Dredging and Disposal - Ordinary Material		2	4	6			5	5	2.48 MO	2.71 MO		
Drill and Blast Ledge					2			11		5.72 MO		
Rock Removal and Disposal		1	3	4			1	1	1.22 MO	1.01 MO		
PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 Feet	4											
Dredging and Disposal - Ordinary Material		1	2	3			2	1	1.38 MO	1.23 MO	Nov 2016	Dec 2016
Drill and Blast Ledge					2			4		1.97 MO		
Rock Removal and Disposal		1	3	4			1	1	0.46 MO	0.46 MO		
PLAN E - MYSTIC RIVER CHANNEL AT MST - 40 Feet	1											
Dredging and Disposal - Ordinary Material		1	3	4			1	1	0.41 MO	0.47 MO	Sept 2014	Sept 2014
PLAN F - CHELSEA RIVER CHANNEL - 40 Feet	5											
Dredging and Disposal - Ordinary Material (1 Plant Only)		1	2	3			4	3	4.38 MO	3.40 MO	July 2014	Aug 2014
Drill and Blast Ledge (1 Plant Only)					1			1		0.11 MO		
Rock Removal and Disposal (1 Plant Only)		1	1	2			1	1	0.02 MO	0.02 MO		
TOTAL - COMBINED PLANS B2-D-E-F	34											
Dredging and Disposal - Ordinary Material (1 Plant Only)											Total Never More than 2	
Drill and Blast Ledge (1 Plant Only)											Total Never More than 2	
Rock Removal and Disposal (1 Plant Only)											Total Never More than 1 Except for Entrance Channel	



Dredge Plants (Two 21 CY Dredges, 5 Tugs & 7 Scows)

Drill & Blast Plant (2 Drill Barges, Blast Barge, Small Tug)

Rock Removal Plants (21 CY Buckets)

TABLE D2-31
CONSTRUCTION TIMELINE FOR AIR QUALITY IMPACT AVOIDANCE
COMPARISON OF ALL PLANS WITH 2-FOOT ENTRANCE CHANNEL INCREASE

PLAN	Total Project Constr Months	Total Project Months Duration	Total Project # of Shutdowns	Total Project Shutdown Months	Main Channels Duration (Mid Pt)	Year #1												Year #2											
						J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
42/44-Foot	16	16	0	0	Dec-14				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					
D	3	3			Feb-16																								
E&F	6	6	0	0	Sep-14				1	1	1	1	1	1															
43/45-Foot	18	18	0	0	Jan-15				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	3	3	1	3	Feb-16																								
E&F	6	6							1	1	1	1	1	1															
44/46-Foot	20	26	1	6	May-15				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	4			Aug-16																								
E&F	6	6							1	1	1	1	1	1															
45/47-Foot	21	27	1	6	May-15				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	4			Sep-16																								
E&F	6	6							1	1	1	1	1	1															
46/48-Foot	22	28	1	6	May-15				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	4			Oct-16																								
E&F									1	1	1	1	1	1															
47/49-Foot	23	29	1	6	June 2015				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	4			Nov-16																								
E&F									1	1	1	1	1	1															
48/50-Foot	25	31	1	6	July 2015				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	35			Jan-17																								
E&F									1	1	1	1	1	1															
49/51-Foot	34	40	1	6	Dec 2015				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	4	1	5	Mar-18																								
E&F									1	1	1	1	1	1															
50/52-Foot	39	51	2	12	May-16				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1			
D	4	4			Sep-18																								
E&F									1	1	1	1	1	1															

M & C = Mystic and Chelsea River Tributaries - Smaller Dredge Plant

1 Main Channels (Conley) Plans

1 Main Ship Channel Extension to MMT

1 Mystic River (MST) Deepening

1 Chelsea River Deepening

TABLE D2-31 (Continued)
CONSTRUCTION TIMELINE FOR AIR QUALITY IMPACT AVOIDANCE
COMPARISON OF ALL PLANS WITH 2-FOOT ENTRANCE CHANNEL INCREASE

	Year #3												Year #4												Year #5											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
42/44-Foot M&C		1	1																																	
43/45-Foot M&C		1	1																																	
44/46-Foot M&C		1	1			1	1	1																												
45/47-Foot M&C		1	1	1		1	1	1																												
46/48-Foot M&C		1	1	1	1	1	1	1																												
47/49-Foot M&C		1	1	1	1	1	1	1																												
48/50-Foot M&C		1	1	1	1	1	1	1																												
49/51-Foot M&C		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1																
50/52-Foot M&C		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1						1	1	1								

1 Main Channels (Conley) Plans

1 Main Ship Channel Extension to MMT

1 Mystic River (MST) Deepening

1 Chelsea River Deepening

TOTAL PROJECT COST SUMMARY SPREADHSEETS

TPCS Summary Sheets are provided for the combined Recommended Plan of Improvement including all four project segments, including:

- 47-Foot Main Channels Improvement to the Conley Terminal with 51-Foot Entrance Channel
- 45-Foot Main Ship Channel Extension Improvement to the Marine Terminal
- 40-Foot Mystic River Channel Deepening at the Medford Street Terminal
- 40-Foot Chelsea River Channel Deepening

PROJECT: **Boston Harbor Deep Draft Navigation Improvement** DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **Total of 4 Project Segments - with 47/51 Main Channels Plan** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report; Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2013 Effective Price Level Date: 1 OCT 12								
WBS NUMBER A	Civil Works Feature & Sub-Feature Description B	COST ($K) C	CNTG ($K) D	CNTG (%) E	TOTAL ($K) F	ESC (%) G	COST ($K) H	CNTG ($K) I	TOTAL ($K) J	Spent Thru: 1-Jul-11 ($K) K	L	COST ($K) M	CNTG ($K) N	FULL ($K) O
12	NAVIGATION PORTS & HARBORS													
	Plan ABC - Main Channels	$213,754	$35,651	17%	$249,405	3.7%	$221,646	$36,967	$258,613			$229,378	$36,257	$267,634
	Plan D - Main Ship Channel Extension	$12,648	$2,833	22%	$15,481	3.7%	$13,115	$2,938	$16,053			$13,877	$3,108	$16,985
	Plan E - Mystic River Channel	$1,534	$360	24%	$1,894	3.7%	$1,591	$374	$1,964			$1,616	$380	$1,996
	Plan F - Chelsea River Channel	$8,498	$1,462	17%	$9,960	3.7%	$8,812	$1,516	$10,327			$8,951	$1,540	$10,491
	CONSTRUCTION ESTIMATE TOTALS:	$236,434	$40,306		$276,740	3.7%	$245,163	$41,794	$286,958			$253,821	$43,285	$297,106
01	LANDS AND DAMAGES	$144	$17	12%	$161	3.7%	$149	$18	$167			$154	$19	$173
30	PLANNING, ENGINEERING & DESIGN	$5,392	$901	17%	$6,293	3.8%	$5,596	$935	$6,531			$5,643	$943	$6,586
31	CONSTRUCTION MANAGEMENT	$9,314	$1,324	14%	$10,638	3.8%	$9,666	$1,374	$11,040			$10,413	$1,480	$11,894
	PROJECT COST TOTALS:	$251,284	$42,549	17%	$293,833		$260,575	$44,122	$304,696			$270,032	$45,726	$315,758

_____ CHIEF, COST ENGINEERING, PATRICIA BOLTON

_____ PROJECT MANAGER, MIKE KEEGAN

_____ CHIEF, REAL ESTATE, JOSEPH REDLINGER

_____ CHIEF, PLANNING, JOHN KENNELLY

_____ CHIEF, ENGINEERING, ANTHONY MACKOS

_____ CHIEF, OPERATIONS, FRANK FEDELE

_____ CHIEF, CONSTRUCTION, SEAN DOLAN

_____ CHIEF, CONTRACTING, SHEILA WINSTON

_____ CHIEF, PM-PB, **

_____ CHIEF, DPM, WILLIAM SCULLY

ESTIMATED FEDERAL COST:	70%	**$219,550**
ESTIMATED NON-FEDERAL COST:	30%	**$96,208**
ESTIMATED TOTAL PROJECT COST:		**$315,758**

Project includes 4 separable navigation project segments, one of which (Plan ABC) involes deepening both above and below -45 feet MLLW. A 25% up-front cost share applies to dredging for project feature depths up to 45 feet, and 50% for project feature depths beyond 45 feet. LERRDs are a 100% non-Federal project cost up-front. Estimated cost-sharing shown above is based on up-front cost distribution and apportionment.

Matches Dec 2012 Feasibility Cost Appendix D-2

**** CONTRACT COST SUMMARY ****

PROJECT: **Boston Harbor Deep Draft Navigation Improvement** DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN ABC - Main Channels Improvement Plan** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report; Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Doller Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
PLAN ABC - Main Channels Improvement 47/51-Foot Deepening/Widening		Estimate Prepared: 1-Aug-11 Effective Price Level: 1-Jul-11				Program Year (Budget EC): 2013 Effective Price Level Date: 1 OCT 12								
				RISK BASED										
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	Contract 1 Base													
12	NAVIGATION PORTS & HARBORS													
12	Broad Sound North Entrance Channel	$105,299	$15,058	14%	$120,357	3.7%	$109,187	$15,614	$124,800	2015Q4	3.5%	$112,996	$16,158	$129,154
	Main Ship Channel	$38,032	$7,911	21%	$45,943	3.7%	$39,436	$8,203	$47,639	2015Q4	3.5%	$40,812	$8,489	$49,301
	Reserved Channel & Turning Area	$27,576	$5,681	21%	$33,257	3.7%	$28,594	$5,890	$34,485	2015Q4	3.5%	$29,592	$6,096	$35,688
	President Roads Anchorage	$38,162	$6,220	16%	$44,382	3.7%	$39,571	$6,450	$46,021	2015Q4	3.5%	$40,951	$6,675	$47,627
	Air Quality Shutdown Remob-Demob	$4,685	$781	17%	$5,466	3.7%	$4,858	$810	$5,668	2015Q4	3.5%	$5,027	$839	$5,866
	CONSTRUCTION ESTIMATE TOTALS:	$213,754	$35,651	17%	$249,405		$221,646	$36,967	$258,613			$229,379	$38,257	$267,635
01	LANDS AND DAMAGES	$114	$11	10%	$125	3.7%	$118	$12	$130	2015Q4	3.5%	$122	$12	$135
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$704	$120	17%	$824	3.8%	$731	$124	$855	2014Q1	0.8%	$737	$125	$862
2.0%	Planning & Environmental Compliance	$1,006	$171	17%	$1,177	3.8%	$1,044	$177	$1,222	2014Q1	0.8%	$1,053	$179	$1,232
8.5%	Engineering & Design	$2,517	$428	17%	$2,945	3.8%	$2,612	$444	$3,056	2014Q1	0.8%	$2,634	$448	$3,082
2.0%	Engineering Tech Review ITR & VE	$170	$29	17%	$199	3.8%	$176	$30	$206	2014Q1	0.8%	$178	$30	$208
2.0%	Contracting & Reprographics	$185	$32	17%	$217	3.8%	$192	$33	$225	2014Q1	0.8%	$194	$33	$227
2.0%	Project Operations													
					$5,361				$5,564					$5,610
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$4,934	$740	15%	$5,674	3.8%	$5,120	$768	$5,889	2015Q4	7.8%	$5,519	$828	$6,347
3.0%	Engineering During Construction	$1,267	$127	10%	$1,394	3.8%	$1,315	$131	$1,446	2015Q4	7.8%	$1,418	$142	$1,560
2.0%	Planning During Construction	$493	$74	15%	$567	3.8%	$512	$77	$589	2015Q4	7.8%	$551	$83	$635
2.0%	Project Operation:													
2.5%	Project Management	$809	$121	15%	$930	3.8%	$840	$126	$966	2015Q4	7.8%	$906	$136	$1,041
					$8,566				$8,889					$9,582
	CONTRACT COST TOTALS:	$225,953	$37,504		$263,457		$234,306	$38,890	$273,196			$242,690	$40,273	**$282,963**

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****** CONTRACT COST SUMMARY ******

PROJECT: **Boston Harbor Deep Draft Navigation Improvement** DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN D - Main Ship Channel Extension Plan** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report; Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Doller Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
	PLAN D - Main Ship Channel Extension 45-Foot Deepening/Widening 246,300 CY Ordinary Dredging 78,400 CY Rock	Estimate Prepared: Effective Price Level:			1-Aug-11 1-Jul-11	Program Year (Budget EC): Effective Price Level Date:			2013 1 OCT 12					
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	INFLATED (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	Contract 1 Option 1													
12	NAVIGATION PORTS & HARBORS	$12,648	$2,833	22%	$15,481	3.7%	$13,115	$2,938	$16,053	2017Q1	5.8%	$13,877	$3,108	$16,985
	CONSTRUCTION ESTIMATE TOTALS:	$12,648	$2,833	22%	**$15,481**		$13,115	$2,938	$16,053			$13,877	$3,108	$16,985
01	LANDS AND DAMAGES	$12	$3	22%	$15	3.7%	$12	$3	$15	2017Q1	5.8%	$13	$3	$16
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$45	$7	15%	$52	3.8%	$47	$7	$54	2014Q1	0.8%	$47	$7	$54
2.0%	Planning & Environmental Compliance	$80	$12	15%	$92	3.8%	$83	$12	$95	2014Q1	0.8%	$84	$13	$96
8.5%	Engineering & Design	$152	$23	15%	$175	3.8%	$158	$24	$182	2014Q1	0.8%	$159	$24	$183
2.0%	Engineering Tech Review ITR & VE	$14	$2	15%	$16	3.8%	$15	$2	$17	2014Q1	0.8%	$15	$2	$17
2.0%	Contracting & Reprographics	$28	$4	15%	$32	3.8%	$29	$4	$33	2014Q1	0.8%	$29	$4	$34
2.0%	Project Operations													
					$367				$381					$384
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$526	$79	15%	$605	3.8%	$546	$82	$628	2017Q1	12.9%	$616	$93	$709
3.0%	Engineering During Construction	$97	$10	10%	$107	3.8%	$101	$10	$111	2017Q1	12.9%	$114	$11	$125
2.0%	Planning During Construction	$43	$6	15%	$49	3.8%	$45	$7	$51	2017Q1	12.9%	$50	$8	$58
2.0%	Project Operation:													
2.5%	Project Management	$71	$11	15%	$82	3.8%	$74	$11	$85	2017Q1	12.9%	$83	$12	$96
					$843				$875					$988
	CONTRACT COST TOTALS:	$13,716	$2,990		**$16,706**		$14,223	$3,101	$17,324			$15,088	$3,286	**$18,374**
									1.0370					

**** CONTRACT COST SUMMARY ****

PROJECT: **Boston Harbor Deep Draft Navigation Improvement** DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN E - Mystic River Channel - Medford St. Terminal Area Deepening** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report; Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Doller Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
PLAN E - Mystic River Channel 40-Foot Deepening 67,100 CY Ordinary Dredging		Estimate Prepared: Effective Price Level:			1-Aug-11 1-Jul-11	Program Year (Budget EC): Effective Price Level Date:			2013 1 OCT 12					
WBS NUMBER *A*	Civil Works Feature & Sub-Feature Description *B*	COST ($K) *C*	CNTG ($K) *D*	CNTG (%) *E*	TOTAL ($K) *F*	ESC (%) *G*	COST ($K) *H*	CNTG ($K) *I*	TOTAL ($K) *J*	Mid-Point Date *P*	INFLATED (%) *L*	COST ($K) *M*	CNTG ($K) *N*	FULL ($K) *O*
	Contract 1 Option 2													
12	NAVIGATION PORTS & HARBORS	$1,534	$360	24%	$1,894	3.7%	$1,591	$374	$1,964	2014Q4	1.6%	$1,616	$380	$1,996
	CONSTRUCTION ESTIMATE TOTALS:	$1,534	$360	24%	**$1,894**		$1,591	$374	$1,964			$1,616	$380	$1,996
01	LANDS AND DAMAGES	$3	$1	24%	$4	3.7%	$3	$1	$4	2014Q4	1.6%	$3	$1	$4
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$28	$4	15%	$32	3.8%	$29	$4	$33	2014Q1	0.8%	$29	$4	$34
2.0%	Planning & Environmental Compliance	$31	$5	15%	$36	3.8%	$32	$5	$37	2014Q1	0.8%	$32	$5	$37
8.5%	Engineering & Design	$60	$9	15%	$69	3.8%	$62	$9	$72	2014Q1	0.8%	$63	$9	$72
2.0%	Engineering Tech Review ITR & VE	$8	$1	15%	$9	3.8%	$8	$1	$10	2014Q1	0.8%	$8	$1	$10
2.0%	Contracting & Reprographics	$21	$3	15%	$24	3.8%	$22	$3	$25	2014Q1	0.8%	$22	$3	$25
2.0%	Project Operations				$170				$177					$178
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$165	$24	15%	$189	3.8%	$171	$25	$196	2014Q4	3.7%	$178	$26	$204
3.0%	Engineering During Construction	$29	$3	10%	$32	3.8%	$30	$3	$33	2014Q4	3.7%	$31	$3	$34
2.0%	Planning During Construction	$13	$2	15%	$15	3.8%	$13	$2	$16	2014Q4	3.7%	$14	$2	$16
2.0%	Project Operation:													
2.5%	Project Management	$29	$4	15%	$33	3.8%	$30	$5	$35	2014Q4	3.7%	$31	$5	$36
					$269				$280					$290
	CONTRACT COST TOTALS:	$1,921	$417		**$2,338**		$1,992	$432	$2,425			$2,028	$440	**$2,468**
									1.0371					1.0177

****** CONTRACT COST SUMMARY ******

PROJECT: **Boston Harbor Deep Draft Navigation Improvement** DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN F - Chelsea River Channel Deepening Plan** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report; Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Doller Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
PLAN F - Chelsea River Channel 40-Foot Deepening/Widening 342,600 CY Ordinary Dredging 540 CY Rock		Estimate Prepared: 1-Aug-11 Effective Price Level: 1-Jul-11				Program Year (Budget EC): 2013 Effective Price Level Date: 1 OCT 12				FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	Contract 1 Option 3													
12	NAVIGATION PORTS & HARBORS	$8,498	$1,462	17%	$9,960	3.7%	$8,812	$1,516	$10,327	2014Q4	1.6%	$8,951	$1,540	$10,491
	CONSTRUCTION ESTIMATE TOTALS:	$8,498	$1,462	17%	$9,960		$8,812	$1,516	$10,327			$8,951	$1,540	$10,491
01	LANDS AND DAMAGES	$15	$3	17%	$18	3.7%	$16	$3	$18	2014Q4	1.6%	$16	$3	$19
30	PLANNING, ENGINEERING & DESIGN													
2.5%	Project Management	$40	$6	15%	$46	3.8%	$42	$6	$48	2014Q1	0.8%	$42	$6	$48
2.0%	Planning & Environmental Compliance	$122	$18	15%	$140	3.8%	$127	$19	$146	2014Q1	0.8%	$128	$19	$147
8.5%	Engineering & Design	$148	$22	15%	$170	3.8%	$154	$23	$177	2014Q1	0.8%	$155	$23	$178
2.0%	Engineering Tech Review ITR & VE	$8	$1	15%	$9	3.8%	$8	$1	$10	2014Q1	0.8%	$8	$1	$10
2.0%	Contracting & Reprographics	$25	$4	15%	$29	3.8%	$26	$4	$30	2014Q1	0.8%	$26	$4	$30
2.0%	Project Operations				$394				$409					$413
31	CONSTRUCTION MANAGEMENT													
10.0%	Construction Management	$686	$102	15%	$788	3.8%	$712	$106	$818	2014Q4	3.7%	$738	$110	$848
3.0%	Engineering During Construction	$57	$6	10%	$63	3.8%	$59	$6	$65	2014Q4	3.7%	$61	$6	$67
2.0%	Planning During Construction	$25	$4	15%	$29	3.8%	$26	$4	$30	2014Q4	3.7%	$27	$4	$31
2.0%	Project Operation:													
2.5%	Project Management	$70	$11	15%	$81	3.8%	$73	$11	$84	2014Q4	3.7%	$75	$11	$87
					$960				$996					$1,033
	CONTRACT COST TOTALS:	$9,694	$1,638		**$11,332**		$10,053	$1,698	$11,751			$10,228	$1,728	**$11,955**
									1.0370					

WALLA WALLA COST ENGINEERING TECHNICAL CENTER OF EXPERTISE

COST AGENCY TECHNICAL REVIEW

CERTIFICATION STATEMENT

For

NAE – Boston Harbor Deep Draft Navigation Improvement (109034)

The Boston Harbor Deep Draft Navigation Improvements as presented by New England District has undergone a successful Cost Agency Technical Review (Cost ATR), performed by the Walla Walla District Cost Engineering Mandatory Center of Expertise (Cost MCX) team. The Cost ATR included study of the project scope, report, cost estimates, schedules, escalation, and risk-based contingencies. This certification signifies the products meet the quality standards as prescribed in ER 1110-2-1150 Engineering and Design for Civil Works Projects and ER 1110-2-1302 Civil Works Cost Engineering.

Qualifiers: Several items were questioned by ATR reviewer as being non-typ. 1) The Total Project Cost carries below average Planning Engineering and Design (2.3%) and Construction Management (3.9%). The contingencies for these are 17% and 14%. The PM has stated all offices concur with these values and will execute within these parameters. 2) The Project cites a Program Year of 2013, the PM has stated the project is slated for FY13 authorization.

As of December 21, 2012, the Cost MCX certifies the estimated total project cost of:

FY 2013 Price Level: $304,696,000
Fully Funded Amount: $315,758,000

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

Michael Jacobs, PE, CCE
Chief, Cost Engineering
Walla Walla District

Date 14 Feb 2013

US Army Corps of Engineers®

US Army Corps of Engineers®

Boston Harbor Deep Draft Navigation Improvement Project

Project Cost and Schedule Risk Analysis Report

Prepared by:

New England District
U.S. Army Corps of Engineers
Cost Engineering Section

February 13, 2013

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EXECUTIVE SUMMARY

Under the auspices of the US Army Corps of Engineers (USACE), New England District, this report presents a recommendation for the project cost and schedule contingencies for the Boston Harbor Deep Draft Navigation Improvement Project Feasibility Report. In compliance with Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008, a formal risk analysis study was conducted for the development of contingency on the project cost. The purpose of this risk analysis study was to establish project contingencies by identifying and measuring the cost and schedule impact of project uncertainties with respect to the estimated project cost.

New England District, in concert with the Walla Walla Cost TCX performed risk analysis using the *Monte Carlo* technique, producing the aforementioned contingencies and identifying key risk drivers.

The Boston Harbor Deep Draft Navigation Improvement Project is divided into 4 Plans. Plan ABC Main Channel Improvement 47/51 Foot Deepening/Widening is the base plan. Specific to this plan, the project cost (base case at price level) is estimated at $213.7 Million. Based on the results of the analysis, the NAE Cost Engineer is submitting a recommended total contingency value of $35.7 Million, or 16.7%. This contingency is a weighted average of contingencies calculated separately for each reach on the recommended plan. The following table ES-1 portrays the development of contingencies (16.7%). The contingency is based the development of on an 80% confidence level on all reaches compromising the recommended plan, as per USACE Civil Works guidance.

Table ES-1. Contingency Analysis Table, Estimated Cost

TABLE D2-2
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT STUDY
CONSTRUCTION CONTINGENCY COSTS - WEIGHTED AVERAGE - FROM CONTINGENCY RISK ANALYSIS
REVISED PLANS FROM NOVEMBER 2012 WITH 4-FOOT INCREASED ENTRANCE CHANNEL DEPTH

MAIN CHANNELS IMPROVEMENT PLANS December 2012 Contingency Risk Analysis	Contingency Percentage 47/51	Item Cost 47/51-Foot	Contingency Cost 47/51-Foot
Broad Sound North Entrance Channel	14.3%	$105,299,000	$15,058,000
Main Ship Chan Including President Roads Reach	20.8%	$38,032,000	$7,911,000
Reserved Channel & Turning Area	20.6%	$27,576,000	$5,681,000
President Roads Anchorage	16.3%	$38,162,000	$6,220,000
Weighted Average Contingency	16.7%	$209,069,000	$34,870,000
Air Quality Shutdowns	16.7%	$4,685,000	$781,000
		Total	$35,651,000
Total Dredging	16.7%		

Page 1

The following table ES-2 portrays the full costs of the recommended alternative based on the anticipated contracts. The costs are intended to address the congressional request of estimates to implement the project. The contingency is based on an 80% confidence level, as per accepted USACE Civil Works guidance.

Table ES-2. Total Project Cost (Fully Funded) Cost Summary

INSERT TABLE FROM PAGE D2-245 OF APPENDIX

Boston Harbor Deep Draft Navigation Improvement Project		COST ($1,000)	CNTG ($1,000)	TOTAL ($1,000)
01	LANDS AND DAMAGES	154	19	173
12	NAVIGATION PORTS & HARBORS			
	Plan ABC – Main Channels	229,378	38,257	267,634
	Plan D – Main Ship Channel Extension	13,877	3,108	16,985
	Plan E – Mystic River Channel	1,616	380	1,996
	Plan F – Chelsea River Channel	8,951	1,540	10,491
30	PLANNING, ENGINEERING AND DESIGN	5,643	943	6,586
31	CONSTRUCTION MANAGEMENT	10,413	1,480	11,894
	TOTAL PROJECT COSTS	**270,032**	**45,726**	**315,758**
	Schedule Completion with Contingency	**5 SEPT 2016**	**6 months**	**5 MAR 2017**

Notes:
1) Costs include the recommended contingency of 18%.
2) Costs exclude O&M and Life Cycle Cost estimates.

KEY FINDINGS/OBSERVATIONS RECOMMENDATIONS

Risk Mitigation was conducted through a formal analysis of the project as it is currently presented in addition to the acknowledgement of risk in the estimated quantity of rock. The District has taken an approach to mitigate this risk through a conservative approach to the amount of ledge, the required excavation means, and the planning of extensive subsurface explorations during the Design phase. The mitigation of this risk will be further discussed in the main report. Additional factors assessed that may have additional impact to the project were considered and addressed in the base cost. These factors were weather and jobsite conditions and commodities/raw materials. The district chose to mitigate through direct cost addition to each reach due to a large amount of historical information and contractor familiarity to the area. The amounts included in the project cost provide an amount that the PDT is confident will provide substantive costs to mitigate issues. The district will continue to monitor

and include all risks in continuing assessment of contingency and amend as necessary as an essential element to the continued development of the project.

The key cost risk drivers identified through formal risk and sensitivity analysis were; Current Fuel Price, Contractor Overhead, and Daily Hours Worked, which together contribute an absolute value of 18.06 percent of the statistical cost variance.

Current Fuel Price. This risk identified is significant and present on all reaches. The eventual impact of fuel price is largely dependent on the time of the construction contract and national economic factors. This item presents potential risk for cost and impacted by schedule, as well as opportunity for savings for the same. This risk is mitigated through contingency risk % on the project costs and added cost escalation to the midpoint of construction.

Contractor Overhead. This moderate risk impacts the reaches of Broad Sound North, President Roads Anchorage, Main Ship Channel, Reserve Channel and Turning Area, Main Ship Channel Extension, and Chelsea. The only reach not impacted is the Mystic. The risk identified in contractor overhead includes the differences in both contractor and subcontractor overhead markups for the work effort. This is largely dependent on the contractor performing the work and company operations which may vary from one contractor to another. This risk is mitigated through the application of contingency to the project cost.

Daily Hours Worked. The risk due to daily hours worked is not present in all reaches and found only in the Broad Sound North, Reserved Channel and Turning Area, and the Main Ship Channel Extension. The risk is related not correlated with other risks, however may be related to environmental factors and potentially contractor dependant. There is a strong likelihood that the level of effort will be less than presumed for the Drill & Blast work in these reaches, hence greater man-hours may be required. There exists and opportunity for savings by completing additional analysis to determine the exact quantities of material to be blasted. The current estimate was derived from the assumption that all material with minimal rebound was determined as rock whereas the quantities likely represent some loose rock in addition to the hard consolidated rock material. This risk is weighted to the right indicating that this is addressed as a more significant factor and increasing the risk percentage for these areas. This risk has been mitigated through increased contingency percentage.

The key schedule risk drivers identified through sensitivity analysis were Risk PPM-8 (Construction Schedule – 4 years) EST – 2 (Fuel), and EST – 4 (Two Dredge Productivity), which together have already been computed in the percent of the statistical schedule variance as a part of the CEDEP risk analysis computations.

Risk PPM-8 (Construction Schedule 3 – 4 years), represents moderate risk on the project and is identified in the CEDEP Risk Analysis. Historically, 2 dredges have been utilized based on market availability as well as quantities. The construction estimate assumes two medium sized dredges. The mechanical dredge size and number of dredges is commonly established by the quantity in the contract. A market study and contract development could result in opportunity for reduction of costs and schedule. Secondly, this risk has also been associated with CON-2(Schedule Constraints). The risk presented highlights potential requirement for shut down for air quality. The PDT has confirmed with the sponsor that it is strongly anticipated that purchased or earned credits will be used to avoid shutdown due to air quality requirements. Though this is strongly anticipated, the PDT has decided to include the full costs of shutdowns directly in the project cost and is detailed in the

TPCS. This is a full 100% contingency applied, thereby mitigated and any changes would be represented by a credit or reduction in cost of the the project.

Risk EST-2 (Fuel), represents the largest risk contingency on the project. Immediate market history with in the last 6 months indicates increasing costs of fuel, however they have leveled in the past month and historically recede and rebound. There exists an opportunity for savings on fuel should prices continue on the current historical path given the additional contingency reflected in the cost estimate and contingency.

Risk EST-4 (Two Dredge Productivity), the estimate assumes certain productivity based on two medium sized dredges with a 20-28 mile haul (depending on the project reach being worked) where productivity may vary. These estimate assumptions establish the schedule. There exists great opportunity for risk reduction through determining the number of dredges and dredge size.

Recommendations, as detailed within the main report, include the implementation of cost and schedule contingencies, further iterative study of risks throughout the project life-cycle, potential mitigation throughout the PED phase, and proactive monitoring and control of risk identified in this study.

MAIN REPORT

1.0 PURPOSE

Under the auspices of the US Army Corps of Engineers (USACE), New England District, this report presents a recommendation for the project cost and schedule contingencies for the Boston Harbor Deep Draft Navigation Improvement Project.

2.0 BACKGROUND

The Main Channels Improvement Plans consist of improvements to deepen access from the sea to the Conley Container Terminal in South Boston. This requires deepening the Broad Sound North Entrance Channel from Massachusetts Bay into the harbor, the Main Ship Channel from the Outer Confluence of the entrance channels through President Roads and up-harbor to the Reserved Channel, the Reserved Channel Turning Area at the confluence of that channel with the Main Ship Channel, the lower Reserved Channel up to the Conley Terminal, and the President Roads Anchorage Area.

3.0 REPORT SCOPE

The scope of the risk analysis report is to calculate and present the cost and schedule contingencies at the 80 percent confidence level using the risk analysis processes, as mandated by U.S. Army Corps of Engineers (USACE) Engineer Regulation (ER) 1110-2-1150, Engineering and Design for Civil Works, ER 1110-2-1302, Civil Works Cost Engineering, and Engineer Technical Letter 1110-2-573, Construction Cost Estimating Guide for Civil Works. The report presents the contingency results for cost risks for all project features. The study and presentation does not include consideration for life cycle costs.

3.1 Project Scope

The Boston Harbor Deep Draft Navigation Improvement Project involves improvements to four separate segments of the existing waterway. These are:

PLAN ABC: This plan, referred to as the Main Channels Improvement Plan, consist of deepening access from the sea to the Conley Container Terminal in South Boston for the benefit of the larger Panamax and Post-Panamax containerships. This plan includes deepening the Broad Sound North Entrance Channel, the Main Ship Channel

from President Roads to the Reserved Channel, the Reserved Channel Turning Area, the lower Reserved Channel up to the Conley Terminal, and the President Roads Anchorage Area. In all segments, the entrance channel would be deepened an additional two feet to compensate for increased sea states in the bay and outer harbor. The contingency risk analysis was developed for plans A-C was to the 47 foot project depth with a 51 ft depth at the for the Broad Sound North Entrance Channel.

The Main Channels Improvement Plans (ABC) include expansion of the Reserved Channel Turning Area to a 1500-Foot diameter, widened at its junctions with the Main Ship and Reserved Channels and further widened to the northeast by 100 feet, all as recommended by the ship simulation study. This plan also includes widening the deep lane of the Main Ship Channel to a width of 800 to 900 feet in the reaches above the Roads to the Reserved Channel, and widened further at the three critical bends at Finns Ledge, Spectacle Island and the Lower Middle Shoal below Castle Island.

Plans D, E, and F were also included in the contingency analysis as part of the complete project package.

PLAN D: This plan, referred to as the Main Ship Channel Deepening Extension, involves extending the deepening of the harbor's Main Ship Channel above the Reserved Channel Turning Area to the Massport Marine Terminal in South Boston to a depth of up to –45 feet MLLW. This plan's costs would be incremental to the main channels plans, and would benefit Massport's redevelopment of the MMT as a bulk cargo facility with 45-foot berth.

PLAN E: Deepening a small portion of the 35-foot segment of the Mystic River Channel to up to 40 feet to access Massport's Medford Street Terminal in Charlestown, and connect the existing 40-foot channel to the 40-foot berth at the terminal. This area was not deepened as part of the 1990 authorized improvement as the benefits of improving access to an undefined planned bulk cargo facility were not yet developed. Massport has now redeveloped this terminal and deepened its berth to 40 feet to accommodate smaller bulk cargo operations for which space is not available at the Marine Terminal in South Boston.1

PLAN F: This plan involves deepening and minor widening of the Chelsea River Channel, including its upstream turning basin from its current depth of –38 feet to –40 feet MLLW, to improve access to most of the port's petroleum terminals and other users of that channel. The Keyspan gas siphon located under the channel immediately downstream of the Chelsea Street Bridge has been replaced since the publication of the 2008 Draft Final Feasibility Report by a deep directional bore and the old siphon was

removed during the 2008-2010 major maintenance dredging operation for the inner harbor. The presence of a second MWRA water tunnel downstream of the Chelsea Street Bridge, not identified at the time of the 2008 report, required additional investigations by the Corps and State. The MWRA estimates the 2015 cost of replacement and removal of that water tunnel at about $15 million including design efforts and temporary bulkhead relocation.

3.2 USACE Risk Analysis Process

The risk analysis process for this study follows the USACE Headquarters requirements as well as the guidance provided by the Cost Engineering PCX. The risk analysis process reflected within this report uses probabilistic cost and schedule risk analysis methods within the framework of the Crystal Ball software. Furthermore, the scope of the report includes the identification and communication of important steps, logic, key assumptions, limitations, and decisions to help ensure that risk analysis results can be appropriately interpreted.

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

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

- Cost and Schedule Risk Analysis Process guidance prepared by the USACE Cost Engineering PCX.
- Engineer Regulation (ER) 1110-2-1302 CIVIL WORKS COST ENGINEERING, dated September 15, 2008.
- Engineer Technical Letter (ETL) CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS, dated September 30, 2008.

The formal process included extensive involvement of the PDT for risk identification and the development of the risk register. The analysis process evaluated the base case Cost Engineering Dredge Estimating Program(CEDEP) cost estimate, schedule, and

funding profiles using Crystal Ball software to conduct a *Monte Carlo* simulation and statistical sensitivity analysis, per the guidance in Engineer Technical Letter (ETL) CONSTRUCTION COST ESTIMATING GUIDE FOR CIVIL WORKS, dated September 30, 2008.

The project technical scope, estimates, and schedules were developed and presented by the New England District. Consequently, these documents serve as the basis for the risk analysis.

The scope of this study addresses the identification of problems, needs, opportunities and potential solutions that are viable from an economic, environmental, and engineering viewpoint.

4.0 METHODOLOGY / PROCESS

The Cost and Schedule Risk Analysis, was developed relying on local District staff to provide expertise and information gathering. The Chief of Cost Engineering facilitated risk identification meetings on site with the PDT. The initial risk identification meeting also included qualitative analysis to produce a risk register that served as the framework for the risk analysis. Revisions to the cost estimate and schedule occurred and were provided on April 20, 2012. The revised report was transmitted May 5, 2012. The final estimate for this report was revised on 17 December to accommodate changes in depth, however this does not affect the risk methodology since the same methodology was applied to all estimates.

The risk analysis process for this study is intended to determine the probability of various cost outcomes and quantify the required contingency needed in the cost estimate to achieve any desired level of cost confidence.

In simple terms, contingency is an amount added to an estimate to allow for items, conditions or events for which the occurrence or impact is uncertain and that experience suggests will likely result in additional costs being incurred or additional time being required. The amount of contingency included in project control plans depends, at least in part, on the project leadership's willingness to accept risk of project overruns. The less risk that project leadership is willing to accept the more contingency should be applied in the project control plans. The risk of overrun is expressed, in a probabilistic context, using confidence levels.

The Cost PCX guidance for cost and schedule risk analysis generally focuses on the 80-percent level of confidence (P80) for cost contingency calculation. It should be noted that use of P80 as a decision criteria is a risk averse approach (whereas the use of P50 would be a risk neutral approach, and use of levels less than 50 percent would be risk seeking). Thus, a P80 confidence level results in greater contingency as

compared to a P50 confidence level. The selection of contingency at a particular confidence level is ultimately the decision and responsibility of the project's District and/or Division management.

The risk analysis process uses *Monte Carlo* techniques to determine probabilities and contingency. The *Monte Carlo* techniques are facilitated computationally by a commercially available risk analysis software package (Crystal Ball) that is an add-in to Microsoft Excel. Cost estimates are completed in an Excel format and used directly for cost risk analysis purposes. The level of detail recreated in the Excel-format schedule is sufficient for risk analysis purposes that reflect the established risk register, but generally less than that of the native format.

The primary steps, in functional terms, of the risk analysis process are described in the following subsections. Risk analysis results are provided in Section 6.

4.1 Identify and Assess Risk Factors

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

Formal PDT meetings were held for the purposes of identifying and assessing risk factors. The formal meeting conducted on November 8-9, 2011 included the following:

Figure 1. Project Delivery Team

Name	Organization	Title
Michael Klosterman	USACE – NAE	Project Manager
Mark Habel	USACE – NAE	Study Team Lead
Rosemary Schmidt	USACE – NAE	Chief, Geology & Chemistry Engineering
Patricia Bolton	USACE – NAE	Chief, Cost Engineering
Christopher Lindsay	USACE – NAE	Former Chief, Cost Engineering
Catherine Rogers	USACE – NAE	Environmental Team Member
Robert Mueller	USACE – NAE	Cost Engineer

The initial formal meetings focused primarily on risk factor identification using brainstorming techniques, but also included some facilitated discussions based on risk factors common to projects of similar scope and geographic location. Subsequent meetings focused primarily on risk factor assessment and quantification.

Additionally, numerous conference calls and informal meetings were conducted throughout the risk analysis process on an as-needed basis to further facilitate risk factor identification, market analysis, and risk assessment.

4.2 Quantify Risk Factor Impacts

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

Similar to the identification and assessment process, risk factor quantification involved multiple project team disciplines and functions. However, the quantification process relied more extensively on collaboration between cost engineering and risk analysis team members with lesser inputs from other functions and disciplines. This process used an iterative approach to estimate the following elements of each risk factor:

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

The resulting product from the PDT discussions is captured within a risk register as presented in section 6 for both cost and schedule risk concerns. Note that the risk register records the PDT's risk concerns, discussions related to those concerns, and potential impacts to the current cost and schedule estimates. The concerns and discussions support the team's decisions related to event likelihood, impact, and the resulting risk levels for each risk event.

4.3 Analyze Cost Estimate and Schedule Contingency

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

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

5.0 PROJECT ASSUMPTIONS

The following data sources and assumptions were used in quantifying the costs associated with the Boston Harbor Deep Draft Navigation Improvement Project.

a. The NAE District used an Excel based CEDEP (Cost Engineering Dredge Estimating Program) program for the bases of cost and schedule risk analyses.

b. The cost comparisons and risk analyses performed and reflected within this report are based on design scope and estimates that are at the feasibility level.

c. Schedules are analyzed for impact to the project cost in terms of both uncaptured escalation (variance from OMB factors and the local market) and unavoidable fixed contract costs and/or languishing federal administration costs incurred throughout delay. Specific to the Boston Harbor Deep Draft Navigation Improvement Project, the schedule was analyzed only for impacts due to residual fixed costs in the CEDEP.

d. Per the CWCCIS Historical State Adjustment Factors in EM 1110-2-1304, State Adjustment Factor for the Commonwealth of Massachusetts 1.12, meaning that the average inflation for the project area is assumed to be 12% higher than the national average for inflation. Therefore, the area cost adjustment factor was accounted in the base cost estimate within the CEDEP cost estimate and the project has been escalated 2.5% to 2013 program year.

e. Per the data in the estimate, the Job Office Overhead (JOOH) percentage for the Dredge Contractor is 17% and the JOOH for the Drilling Contractor is 15%. However, since construction is not anticipated to begin until 2015, a weighted average based on overall duration versus construction duration was calculated.

f. The Cost TCX guidance focuses on the eighty-percent level of confidence (P80) for cost contingency calculation. For this risk analysis, the eighty-percent level of confidence (P80) was used. It should be noted that the use of P80 as a decision criteria is a moderately risk averse approach, generally resulting in higher cost contingencies. However, the P80 level of confidence also assumes a small degree of risk that the recommended contingencies may be inadequate to capture actual project costs.

g. Only high and moderate risk level impacts, as identified in the risk register, were considered for the purposes of calculating cost contingency. Low level risk impacts should be maintained in project management documentation, and reviewed at each project milestone to determine if they should be placed on the risk "watch list".

6.0 RESULTS

The cost and schedule risk analysis results are provided in the following sections. In addition to contingency calculation results, sensitivity analyses are presented to provide decision makers with an understanding of variability and the key contributors to the cause of this variability.

6.1 Risk Register

A risk register is a tool commonly used in project planning and risk analysis. The actual risk register is provided in Appendix A. The complete risk register includes low level risks, as well as additional information regarding the nature and impacts of each risk.

It is important to note that a risk register can be an effective tool for managing identified risks throughout the project life cycle. As such, it is generally recommended that risk registers be updated as the designs, cost estimates, and schedule are further refined, especially on large projects with extended schedules. Recommended uses of the risk register going forward include:

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

6.2 Cost Contingency and Sensitivity Analysis

The result of risk or uncertainty analysis is quantification of the cumulative impact of all analyzed risks or uncertainties as compared to probability of occurrence. These results, as applied to the analysis herein, depict the overall project cost at intervals of confidence (probability).

Table 1 provides the construction cost contingencies calculated for the P80 confidence level and rounded to the nearest thousand. The construction cost contingencies for the P50 and P100 confidence levels are also provided for illustrative purposes only.

Contingency was quantified as approximately $26 Million at the P80 confidence level (25% of the baseline cost estimate). For comparison, the cost contingency at the P50 and P100 confidence levels was quantified as 13% and 72% of the baseline cost estimate, respectively.

Table 1. Project Construction Cost Contingency Summary (x100)

Risk Analysis Forecast	Baseline Estimate	Total Contingency[1,2] ($)	Total Contingency (%)
50% Confidence Level			
Project Cost	$236,434	$13,457	5.4%
80% Confidence Level			
Project Cost	$236,433	$40,246	16.7%
100% Confidence Level			
Project Cost	$236,433	$143,984	60.6%

Notes:
1) These figures combine uncertainty in the baseline cost estimates and schedule.
2) A P100 confidence level is an abstract concept for illustration only, as the nature of risk and uncertainty (specifically the presence of "unknown unknowns") makes 100% confidence a theoretical impossibility.

6.2.1 Sensitivity Analysis

Sensitivity analysis generally ranks the relative impact of each risk/opportunity as a percentage of total cost uncertainty. The Crystal Ball software uses a statistical measure (contribution to variance) that approximates the impact of each risk/opportunity contributing to variability of cost outcomes during *Monte Carlo* simulation.

Key cost drivers identified in the sensitivity analysis can be used to support development of a risk management plan that will facilitate control of risk factors and their potential impacts throughout the project lifecycle. Together with the risk register, sensitivity analysis results can also be used to support development of strategies to eliminate, mitigate, accept or transfer key risks.

6.2.2 Sensitivity Analysis Results

The risks/opportunities considered as key or primary cost drivers are ranked in order of importance in contribution to variance bar charts. Opportunities that have a potential to reduce project cost and are shown with a negative sign; risks are shown with a positive

sign to reflect the potential to increase project cost. A longer bar in the sensitivity analysis chart represents a greater potential impact to project cost.

Figure 1 presents a cost confidence sensitivity analysis for cost growth risk from the high level cost risks identified in the risk register. Figure 2 presents the sensitivity analysis depicting factors and relative impact to the confidence levels. Appendix B is the complete list of all Cost Contingency developed for each reach and plan.

Figure 2. Sample Cost Sensitivity Confidence Levels Analysis

Cost Basis (ie Feasibility)

Contingency Analysis

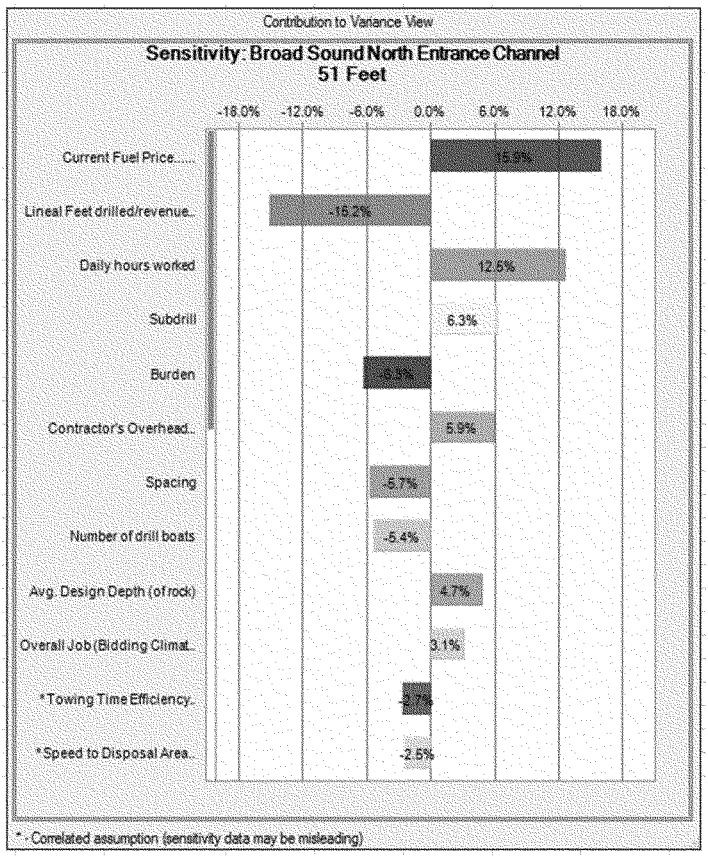
Broad Sound North Entrance Channel

51 Feet

Most Likely		$ 105,298,000
Confidence Level	**Project Cost**	**Contingency**
0%	$70,099,000	-33.4%
5%	$90,871,000	-13.7%
10%	$94,769,000	-10.0%
15%	$97,386,000	-7.5%
20%	$99,458,000	-5.5%
25%	$101,290,000	-3.8%
30%	$103,184,000	-2.0%
35%	$104,773,000	-0.5%
40%	$106,306,000	1.0%
45%	$107,857,000	2.4%
50%	$109,464,000	4.0%
55%	$111,031,000	5.4%
60%	$112,611,000	6.9%
65%	$114,233,000	8.5%
70%	$116,103,000	10.3%
75%	$118,049,000	12.1%
80%	$120,321,000	14.3%
85%	$122,917,000	16.7%
90%	$126,321,000	20.0%
95%	$131,382,000	24.8%
100%	$164,533,000	56.3%

Confidence Level of 80% means, for a base project cost of $105,298,000 with a 14% contingency would have a 80% probability that project cost would not be exceeded.

Figure 2. Sample Cost Sensitivity Analysis



6.3 Schedule and Contingency Risk Analysis

The result of risk or uncertainty analysis is quantification of the cumulative impact of all analyzed risks or uncertainties as compared to probability of occurrence. Though the probability of reducing or eliminating these risks is high, the results are applied directly to the baseline schedule herein through inclusion of extension of time in the baseline project schedule and cost. Since the base schedule and cost are extended and

conservatively estimated, the PDT decided to maintain this conservative estimate in lieu of estimating the anticipated and applying contingency. In summary, the schedule includes the risk and mitigation and will be revisited during the Design phase.

The primary risks identified in the schedule of the project were rock quantities and air quality shutdown.

Air quality shutdowns are included in the baseline schedule every other year from October through March, hence have been mitigated through current project duration in the project schedule. Cost mitigation is applied through the direct addition of the full cost for Remob and Demob for air quality shutdown. This cost is applied directly to the project cost in the TPCS, thereby applying the full value of the contingency to Plan ABC, hence mitigating the total cost of this risk. Though it was decided by the PDT to apply the full contingency of this item, it is anticipated that the sponsor will purchase or use credits to continue work and avoid shutdown for air quality and may result only in the reduction of the project cost.

Rock quantities and means of removal were conservatively developed. All sonar data with rebound which historically have proven to be clay in addition to rock was assessed as 100% rock. Additionally, historical dredging and boring data confirm the composition of the rock is ardulite. The dredging experience by the District has shown that much of the ardulite is fractured and does not require extensive measures for removal and mechanical means have been sufficient, however rock quantities have been quantified and estimated as rock, hence has mitigated the risk.

6.4 External and Other Risk Factors

Weather and Other Jobsite Conditions and Commodities/Raw Materials are identified as External Risk factors by the PDT. A review of these factors and impacts to cost and schedule was developed through a historical review of projects. Review of these risks did not provide the anticipated impact to the overall project schedule, however were included in the risk analysis. Figure 2 presents a sensitivity analysis for both of these items used in the development of contingency to mitigate the impact of these risks.

7.0 MAJOR FINDINGS/OBSERVATIONS/RECOMMENDATIONS

This section provides a summary of significant risk analysis results that are identified in the preceding sections of the report. Risk analysis results are intended to provide project leadership with contingency information for scheduling, budgeting, and project control purposes, as well as to provide tools to support decision making and risk management as projects progress through planning and implementation. Because of the potential for use of risk analysis results for such diverse purposes, this section also reiterates and highlights important steps, logic, key assumptions, limitations, and decisions to help ensure that the risk analysis results are appropriately interpreted.

7.1 Major Findings/Observations

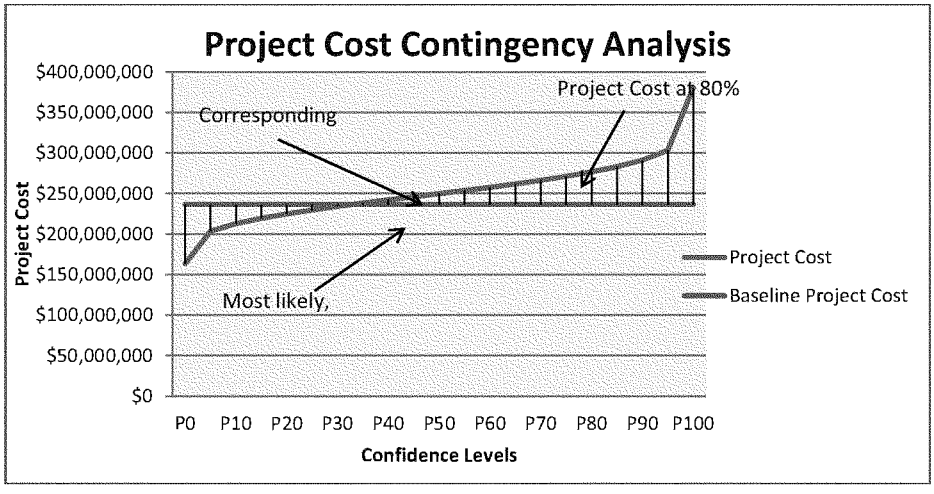
Project cost comparison summaries are provided in Table 3 and Figure 3. Additional major findings and observations of the risk analysis are listed below.

The key schedule risk drivers identified through sensitivity analysis were Risk PPM-8 (Construction Schedule – 4 years) EST – 2 (Fuel), and EST – 4 (Two Dredge Productivity), which together have already been computed in the percent of the statistical schedule variance as a part of the CEDEP risk analysis computations.

Table 2. Project Cost Comparison Summary (Uncertainty Analysis)

Confidence Level	Contingency(%)	Contingency ($)	Project Cost ($)
P0	-33.8%	-$72,967,358	$163,466,642
P5	-14.2%	-$32,900,545	$203,533,455
P10	-10.2%	-$23,506,686	$212,927,314
P15	-7.5%	-$16,938,274	$219,495,726
P20	-5.2%	-$11,569,366	$224,864,634
P25	-3.2%	-$6,851,205	$229,582,795
P30	-1.3%	-$2,337,764	$234,096,236
P35	0.5%	$1,816,151	$238,250,151
P40	2.1%	$5,744,247	$242,178,247
P45	3.7%	$9,557,692	$245,991,692
P50	5.4%	$13,456,784	$249,890,784
P55	7.0%	$17,334,613	$253,768,613
P60	8.6%	$21,246,945	$257,680,945
P65	10.4%	$25,402,069	$261,836,069
P70	12.3%	$30,031,823	$266,465,823
P75	14.3%	$34,763,409	$271,197,409
P80	16.7%	$40,245,820	$276,679,820
P85	19.4%	$46,655,219	$283,089,219
P90	22.8%	$54,743,377	$291,177,377
P95	27.9%	$66,979,681	$303,413,681
P100	60.0%	$143,983,784	$380,417,784

Figure 3. Project Cost Summary



7.2 Recommendations

Risk Management is an all-encompassing, iterative, and life-cycle process of project management. The Project Management Institute's (PMI) *A Guide to the Project Management Body of Knowledge (PMBOK® Guide), 4th edition*, states that "project risk management includes the processes concerned with conducting risk management planning, identification, analysis, responses, and monitoring and control on a project." Risk identification and analysis are processes within the knowledge area of risk management. Its outputs pertinent to this effort include the risk register, risk quantification (risk analysis model), contingency report, and the sensitivity analysis.

The intended use of these outputs is implementation by the project leadership with respect to risk responses (such as mitigation) and risk monitoring and control. In short, the effectiveness of the project risk management effort requires that the proactive management of risks not conclude with the study completed in this report.

The Cost and Schedule Risk Analysis (CSRA) produced by the PDT identifies issues that require the development of subsequent risk response and mitigation plans. This section provides a list of recommendations for continued management of the risks identified and analyzed in this study. Note that this list is not all inclusive and should not substitute a formal risk management and response plan.

1. Key Cost Risk Drivers: The key schedule risk drivers identified through sensitivity analysis were Risk PPM-8 (Construction Schedule – 4 years) EST – 2 (Fuel), and EST – 4 (Two Dredge Productivity), which together have already been computed in the percent of the statistical schedule variance as a part of the CEDEP risk analysis computations.

a) Current Fuel Price. This risk identified is significant and present on all reaches. The eventual impact of fuel price is largely dependent on the time of the construction contract and national economic factors. This item presents potential risk for cost and impacted by schedule, as well as opportunity for savings for the same. This risk is mitigated through contingency risk % on the project costs and added cost escalation to the midpoint of construction.

b) Contractor Overhead. This moderate risk impacts the reaches of Broad Sound North, President Roads Anchorage, Main Ship Channel, Reserve Channel and Turning Area, Main Ship Channel Extension, and Chelsea. The only reach not impacted is the Mystic. The risk identified in contractor overhead includes the differences in both contractor and subcontractor overhead markups for the work effort. This is largely dependent on the contractor performing the work and company operations which may vary from one contractor to another. This risk is mitigated through the application of contingency to the project cost.

c) Daily Hours Worked. The risk due to daily hours worked is not present in all reaches and found only in the Broad Sound North, Reserved Channel and Turning Area, and the Main Ship Channel Extension. The risk is related not correlated with other risks, however may be related to environmental factors and potentially contractor dependant. There is a strong likelihood that the level of effort will be less than presumed for the Drill & Blast work in these reaches, hence greater man-hours may be required. There exists and opportunity for savings by completing additional analysis to determine the exact quantities of material to be blasted. The current estimate was derived from the assumption that all material with minimal rebound was determined as rock whereas the quantities likely represent some loose rock in addition to the hard consolidated rock material. This risk is weighted to the right indicating that this is addressed as a more significant factor and increasing the risk percentage for these areas. This risk has been mitigated through increased contingency percentage.

The key schedule risk drivers identified through PDT Review were Risk PPM-8 (Construction Schedule – 4 years) EST – 2 (Fuel), and EST – 4 (Two Dredge Productivity), which together have already been computed in the percent of the statistical schedule variance as a part of the CEDEP risk analysis computations.

Risk PPM-8 (Construction Schedule 3 – 4 years), represents moderate risk on the project and is identified in the CEDEP Risk Analysis. Historically, 2 dredges have been utilized based on market availability as well as quantities. The construction estimate assumes two medium sized dredges. The mechanical dredge size and number of dredges is commonly established by the quantity in the contract. A market study and contract development could result in opportunity for reduction of costs and schedule. Secondly, this risk has also been associated with CON-2(Schedule Constraints). The risk presented highlights potential requirement for shut down for air quality. The PDT has confirmed with the sponsor that it is strongly anticipated that purchased or earned credits will be used to avoid shutdown due to air quality requirements. Though this is strongly anticipated, the PDT has decided to include the full costs of shutdowns directly in the project cost and is detailed in the TPCS. This is a full 100% contingency applied, thereby mitigated and any changes would be represented by a credit or reduction in cost of the the project.

Risk EST-2 (Fuel), represents the largest risk contingency on the project. Immediate market history with in the last 6 months indicates increasing costs of fuel, however they have leveled in the past month and historically recede and rebound. There exists an opportunity for savings on fuel should prices continue on the current historical path given the additional contingency reflected in the cost estimate and contingency.

Risk EST-4 (Two Dredge Productivity), the estimate assumes certain productivity based on two medium sized dredges with a 20-28 mile haul (depending on the project reach being worked) where productivity may vary. These estimate assumptions establish the schedule. There exists great opportunity for risk reduction through determining the number of dredges and dredge size.

Recommendations, as detailed within the main report, include the implementation of cost and schedule contingencies, further iterative study of risks throughout the project

life-cycle, potential mitigation throughout the PED phase, and proactive monitoring and control of risk identified in this study.

3. Risk Management: Project leadership should use of the outputs created during the risk analysis effort as tools in future risk management processes. The risk register should be updated at each major project milestone. The results of the sensitivity analysis may also be used for response planning strategy and development. These tools should be used in conjunction with regular risk review meetings.

4. Risk Analysis Updates: Project leadership should review risk items identified in the original risk register and add others, as required, throughout the project life-cycle. Risks should be reviewed for status and reevaluation (using qualitative measure, at a minimum) and placed on risk management watch lists if any risk's likelihood or impact significantly increases. Project leadership should also be mindful of the potential for secondary (new risks created specifically by the response to an original risk) and residual risks (risks that remain and have unintended impact following response).

Printed:12/21/2012
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****** TOTAL PROJECT COST SUMMARY ******

PROJECT: **Boston Harbor Deep Draft Navigation Improvement** DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION Boston, Massachusetts Total of 4 Project Segments - with 47/51 Main Channels Plan POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report: Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
						Program Year (Budget EC): 2013 Effective Price Level Date: 1 OCT 12								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG ($K)	TOTAL ($K)	ESC ($K)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru 1-Jul-11 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
12	NAVIGATION PORTS & HARBORS													
	Plan ABC - Main Channels	$213,754	$35,651	17%	$249,405	3.7%	$221,846	$36,967	$258,813			$229,378	$38,257	$267,634
	Plan D - Main Ship Channel Extension	$12,648	$2,850	23%	$15,481	3.7%	$13,115	$2,956	$16,073			$13,677	$3,108	$16,985
	Plan E - Mystic River Channel	$1,534	$330	24%	$1,864	3.7%	$1,591	$274	$1,864			$1,616	$283	$1,898
	Plan F - Chelsea River Channel	$8,488	$1,482	17%	$9,980	3.7%	$8,812	$1,518	$10,323			$8,951	$1,540	$10,491
	CONSTRUCTION ESTIMATE TOTALS	$236,424	$40,308		$276,740	3.7%	$245,163	$41,794	$286,958			$253,621	$43,285	$297,106
01	LANDS AND DAMAGES	$164	$15	10%	$159	3.3%	$149	$13	$164			$154	$15	$170
30	PLANNING, ENGINEERING & DESIGN	$3,392	$301	17%	$6,293	3.8%	$5,596	$335	$6,531			$5,643	$343	$6,586
31	CONSTRUCTION MANAGEMENT	$9,314	$1,334	14%	$10,638	3.8%	$9,966	$1,374	$11,040			$10,413	$1,480	$11,894
	PROJECT COST TOTALS	$251,264	$42,547	17%	$293,831		$260,575	$44,116	$304,693			$270,032	$45,723	$315,755

BOLTON.PATRICIA.HAAS.1008970544 — CHIEF, COST ENGINEERING, PATRICIA BOLTON

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MACKOS.ANTHONY.T.12284 7489 — CHIEF, ENGINEERING, ANTHONY MACKOS

FEDELE.FRANCIS.J.1228 588993 — CHIEF, OPERATIONS, FRANK FEDELE

CHIEF, CONSTRUCTION, SEAN GOLAN

CHIEF, CONTRACTING, SHEILA VINNTON

CHIEF, PMPB, **

CHIEF, OPM, WILLIAM SCULLY

ESTIMATED FEDERAL COST: 67% **$211,558**

ESTIMATED NON-FEDERAL COST: 33% $104,197

ESTIMATED TOTAL PROJECT COST: $315,755

Project includes 4 separable navigation project segments, one of which (Plan ABC) involves deepening both above and below -45 feet MLLW. A 25% upstream cost share applies to dredging for project feature depths up to 45 feet, and 50% for project feature depths beyond 45 feet. 15 RRDs are a 100% non-Federal project cost upfront. Estimated overspending shown above is based on upstream cost distribution and appurtenance.

FEDERAL O&M COST OUTSIDE OF TOTAL PROJECT COST ($k): $10,633

Matches May 2012 Feasibility Cost Appendix D-2

Filename: Boston-Harbor-47-51-TPCS-15DEC2012NAE.xlsx#ml (2).xlsx
TPCS

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

****** CONTRACT COST SUMMARY ******

PROJECT: Boston Harbor Deep Draft Navigation Improvement DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN ADC - Main Channels Improvement Plan** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report: Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
PLAN ADC - Main Channels Improvement 47'/51'Pool Deepening/Widening		Estimate Prepared: 1-Aug-11 Effective Price Level: 1-Jul-11				Program Year (Budget EC): 2013 Effective Prices Level Date: 1 OCT 12								
		RISK BASED												
WBS	Civil Works	COST	CNTG	CNTG	TOTAL	ESC	COST	CNTG	TOTAL	Mid-Point	INFLATED	COST	CNTG	FULL
NUMBER	Feature & Sub-Feature Description	($K)	($K)	(%)	($K)	(%)	($K)	($K)	($K)	Date	(%)	($K)	($K)	($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	Contract I Base													
12	NAVIGATION PORTS & HARBORS													
12	Broad Sound North Entrance Channel	$105,299	$15,053	14%	$120,357	3.7%	$109,187	$15,614	$124,800	2015Q4	3.5%	$112,999	$16,138	$129,137
	Main Ship Channel	$30,032	$7,811	21%	$43,843	3.7%	$31,436	$8,203	$47,639	2015Q4	3.5%	$40,812	$9,489	$69,301
	Reserved Channel & Turning Area	$27,575	$5,681	21%	$33,257	3.7%	$28,594	$5,890	$34,485	2015Q4	3.5%	$29,592	$6,095	$35,688
	President Roads Anchorage	$38,162	$8,220	19%	$44,382	3.7%	$39,571	$8,450	$48,021	2015Q4	3.5%	$40,951	$8,575	$47,527
	Air Quality Shutdown Remob Demob	$4,835	$781	17%	$5,466	3.7%	$4,858	$810	$5,668	2015Q4	3.5%	$5,027	$639	$5,666
	CONSTRUCTION ESTIMATE TOTALS	$213,754	$35,551	17%	$249,305		$221,646	$36,967	$258,613			$229,379	$38,257	$267,636
01	LANDS AND DAMAGES	$114	$11	10%	$125	3.7%	$118	$12	$130	2015Q4	3.5%	$122	$12	$133
30	PLANNING, ENGINEERING & DESIGN													
0.3%	Project Management	$704	$120	17%	$824	3.8%	$731	$124	$855	2014Q1	0.8%	$737	$125	$862
0.5%	Planning & Environmental Compliance	$1,006	$171	17%	$1,177	3.8%	$1,044	$177	$1,222	2014Q1	0.8%	$1,053	$179	$1,232
1.3%	Engineering & Design	$2,517	$428	17%	$2,945	3.8%	$2,612	$444	$3,056	2014Q1	0.8%	$2,634	$448	$3,082
0.1%	Engineering Tech Review ITR & VE	$170	$29	17%	$199	3.8%	$176	$30	$206	2014Q1	0.8%	$178	$30	$208
0.1%	Contracting & Reprographics	$185	$32	17%	$217	3.8%	$192	$33	$225	2014Q1	0.8%	$194	$33	$227
	Project Operations				$5,361				$5,564					$5,615
31	CONSTRUCTION MANAGEMENT													
2.3%	Construction Management	$4,534	$740	16%	$5,274	3.8%	$5,130	$783	$5,939	2015Q4	7.8%	$5,519	$839	$6,357
0.6%	Engineering During Construction	$1,267	$137	10%	$1,394	3.8%	$1,315	$131	$1,446	2015Q4	7.8%	$1,418	$142	$1,560
0.2%	Planning During Construction	$493	$74	15%	$567	3.8%	$512	$77	$589	2015Q4	7.8%	$551	$83	$633
	Project Operation													
0.4%	Project Management	$858	$121	14%	$980	3.8%	$890	$128	$998	2015Q4	7.8%	$956	$136	$1,091
					$8,215				$8,972					$9,582
	CONTRACT COST TOTALS:	$225,083	$37,504		$263,457		$234,305	$38,859	$273,166			$242,660	$40,273	$282,963

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

****** CONTRACT COST SUMMARY ******

PROJECT: Boston Herbor Deep Draft Navigation Improvement

DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN D - Main Ship Channel Extension Plan** POC: CHIEF, COST ENGINEERING, PATRICIA A GLYDON

This Estimate reflects the scope and schedule in report: Updated Cost Engineering Appendix D3 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)					
	PLAN D - Main Ship Channel Extension 45 Foot Deepening/Widening 248,300 CY Ordinary Dredging 78,426 CY Rock	Estimate Prepared: Effective Price Level:			14-Aug-11 1-Jul-11	Program Year (Budget EC): Effective Price Level Date:			2013 1 OCT 12						
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG %	TOTAL ($K)	ESC %	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	INFLATED %	COST ($K)	CNTG ($K)	FULL ($K)	
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O	
	Contract 1 Option 1														
12	NAVIGATION PORTS & HARBORS	$12,648	$2,833	22%	$15,481	3.7%	$13,115	$2,938	$16,053	2017Q1	5.8%	$13,877	$3,108	$16,985	
	CONSTRUCTION ESTIMATE TOTALS:	$12,648	$2,833	22%	$15,481		$13,115	$2,938	$16,053			$13,877	$3,108	$16,985	
01	LANDS AND DAMAGES	$12	$1	10%	$13	3.7%	$12	$1	$14	2017Q1	5.8%	$13	$1	$14	
30	PLANNING, ENGINEERING & DESIGN														
0.4%	Project Management	$45	$7	15%	$52	3.8%	$47	$7	$54	2014Q1	0.8%	$47	$7	$54	
0.8%	Planning & Environmental Compliance	$80	$12	15%	$92	3.8%	$83	$12	$95	2014Q1	0.8%	$84	$13	$98	
1.2%	Engineering & Design	$152	$23	15%	$175	3.8%	$158	$24	$182	2014Q1	0.8%	$159	$24	$183	
0.1%	Engineering Tech Review TR & VE	$14	$2	13%	$16	3.8%	$15	$2	$17	2014Q1	0.8%	$15	$2	$17	
0.2%	Contracting & Reprographics	$28	$4	15%	$32	3.8%	$29	$4	$33	2014Q1	0.8%	$29	$4	$33	
	Project Operations				$307				$331					$334	
31	CONSTRUCTION MANAGEMENT														
4.2%	Construction Management	$525	$79	15%	$605	3.8%	$546	$82	$628	2017Q1	12.9%	$616	$93	$709	
0.8%	Engineering During Construction	$97	$10	10%	$107	3.8%	$101	$10	$111	2017Q1	12.9%	$114	$11	$125	
0.2%	Planning During Construction	$43	$6	15%	$49	3.8%	$45	$7	$51	2017Q1	12.9%	$50	$8	$58	
	Project Operation:														
0.6%	Project Management	$71	$11	15%	$82	3.8%	$74	$11	$85	2017Q1	12.9%	$83	$12	$95	
					$843				$976					$1,099	
	CONTRACT COST TOTALS:	$13,778	$2,989		$16,705		$14,293	$3,099	$17,323			$15,059	$3,285	$18,372	
									1.0370						

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

****** CONTRACT COST SUMMARY ******

PROJECT: Boston Harbor Deep Draft Navigation Improvement DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN E- Mystic River Channel- Medford St. Terminal Area De** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report; Updated Cost Engineering Appendix D2 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
	PLAN E - Mystic River Channel 45-Foot Deepening 57,100 CY Ordinary Dredging	Estimate Prepared: 1-Aug-11 Effective Price Level: 1-Jul-11				Program Year (Budget EC): 2013 Effective Price Level Date: 1 OCT 12								
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid Point Date	INFLATED (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	Contract 1 Option 2													
12	NAVIGATION PORTS & HARBORS	$1,534	$360	24%	$1,894	3.7%	$1,591	$374	$1,964	2014Q4	1.6%	$1,616	$380	$1,996
	CONSTRUCTION ESTIMATE TOTALS:	$1,534	$360	24%	$1,894		$1,591	$374	$1,964			$1,616	$380	$1,996
01	LANDS AND DAMAGES	$3	$0	10%	$3	3.7%	$3	$0	$3	2014Q4	1.6%	$3	$0	$3
30	PLANNING, ENGINEERING & DESIGN													
1.8%	Project Management	$28	$4	16%	$32	3.8%	$29	$4	$33	2014Q1	0.8%	$29	$4	$34
2.0%	Planning & Environmental Compliance	$31	$5	16%	$36	3.8%	$32	$5	$37	2014Q1	0.8%	$32	$5	$37
3.0%	Engineering & Design	$60	$9	16%	$69	3.8%	$62	$9	$72	2014Q1	0.8%	$63	$9	$72
0.5%	Engineering Tech Review (TR & VE	$8	$1	16%	$9	3.8%	$8	$1	$10	2014Q1	0.8%	$8	$1	$10
1.4%	Contracting & Reprographics	$21	$3	16%	$24	3.8%	$22	$3	$25	2014Q1	0.8%	$22	$3	$25
	Project Operations				$170				$177					$175
31	CONSTRUCTION MANAGEMENT													
10.5%	Construction Management	$165	$24	16%	$189	3.8%	$171	$25	$196	2014Q4	3.7%	$176	$25	$204
1.9%	Engineering During Construction	$29	$3	16%	$32	3.8%	$30	$3	$33	2014Q4	3.7%	$31	$3	$34
0.8%	Planning During Construction	$13	$2	16%	$15	3.8%	$13	$2	$15	2014Q4	3.7%	$14	$2	$15
	Project Operation:													
1.9%	Project Management	$29	$4	16%	$33	3.8%	$30	$5	$35	2014Q4	3.7%	$31	$5	$36
					$269				$280					$293
	CONTRACT COST TOTALS:	$1,821	$416		$2,337		$1,889	$432	$2,424			$2,028	$439	$2,467
									1.0371					1.0177

Filename: Boston Harbor-47-51-TPCS-15DEC2012 NAE submit.xlsx
TPCS

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

****** CONTRACT COST SUMMARY ******

PROJECT: Boston Harbor Deep Draft Navigation Improvement

DISTRICT: NAE New England PREPARED: 12/19/2012

LOCATION: Boston, Massachusetts **PLAN F - Chelsea River Channel Deepening Plan** POC: CHIEF, COST ENGINEERING, PATRICIA BOLTON

This Estimate reflects the scope and schedule in report: Updated Cost Engineering Appendix D3 for Feasibility Report, Dec 2012

WBS Structure		ESTIMATED COST				PROJECT FIRST COST (Constant Dollar Basis)				TOTAL PROJECT COST (FULLY FUNDED)				
	PLAN F - Chelsea River Channel 49-Foot Deepening/Widening 342,500 CY Ordinary Dredging 549 CY Rock	Estimate Prepared: Effective Price Level:			1-Aug-11 1-Jul-11	Program Year (Budget EC): Effective Price Level Date:			2013 1 OCT 12	FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	B	C	D	E	F	G	H	I	J	P	L	M	N	O
	Contract 1 Option 3													
12	NAVIGATION PORTS & HARBORS	$5,493	$1,482	17%	$9,960	3.7%	$8,812	$1,516	$10,327	2014Q4	1.6%	$8,951	$1,540	$10,491
	CONSTRUCTION ESTIMATE TOTALS:	$5,493	$1,482	17%	$9,960		$8,812	$1,516	$10,327			$8,951	$1,540	$10,491
01	LANDS AND DAMAGES	$16	$2	10%	$17	3.7%	$16	$2	$17	2014Q4	1.6%	$16	$2	$18
30	PLANNING, ENGINEERING & DESIGN													
0.5%	Project Management	$40	$6	15%	$46	3.8%	$42	$6	$48	2014Q1	0.8%	$42	$6	$48
1.4%	Planning & Environmental Compliance	$122	$18	15%	$140	3.8%	$127	$19	$146	2014Q1	0.8%	$128	$19	$147
1.7%	Engineering & Design	$148	$22	15%	$170	3.8%	$154	$23	$177	2014Q1	0.8%	$155	$23	$178
0.1%	Engineering Tech Review, PR & VE	$8	$1	19%	$9	3.8%	$8	$1	$10	2014Q1	0.8%	$8	$1	$10
0.3%	Contracting & Reporting/Not Project Operation	$26	$4	15%	$29	3.8%	$26	$4	$30	2014Q1	0.8%	$26	$4	$30
					$394				$409					$413
31	CONSTRUCTION MANAGEMENT													
8.1%	Construction Management	$695	$102	15%	$798	3.3%	$712	$106	$818	2014Q4	3.7%	$730	$110	$840
0.7%	Engineering During Construction	$57	$8	10%	$63	3.8%	$59	$8	$66	2014Q4	3.7%	$61	$8	$68
0.2%	Planning During Construction	$26	$4	15%	$29	3.8%	$26	$4	$30	2014Q4	3.7%	$27	$4	$31
	Project Operation:													
0.8%	Project Management	$70	$11	16%	$81	3.8%	$73	$11	$84	2014Q4	3.7%	$75	$11	$87
					$969				$996					$1,033
	CONTRACT COST TOTALS:	$6,894	$1,637		$11,391		$10,053	$1,697	$11,750			$10,229	$1,726	$11,954

1,033

BOSTON HARBOR
MASSACHUSETTS

NAVIGATION IMPROVEMENT STUDY

FINAL FEASIBILITY REPORT
AND FINAL SUPPLEMENTAL
ENVIRONMENTAL IMPACT STATEMENT
AND MASSACHUSETTS
FINAL ENVIRONMENTAL IMPACT REPORT

APPENDIX E

REAL ESTATE PLAN

THIS APPENDIX SUPPLEMENTED AUGUST 2008
TO INCLUDE NAD INTERNAL TECHNICAL REVIEW
CERTIFICATION

CENAE-RE-E 17 September 2007

MEMORANDUM FOR Chief, Planning Branch, ATTN: Mark Habel

SUBJECT: Boston Harbor Deep Draft Navigation Improvement Project, Boston, Massachusetts

1. Attached is the Real Estate Plan for the subject project in Boston, Massachusetts. All the work will be done in the water, including the disposal of the dredged material. The local sponsor, the Massachusetts Port Authority (Massport), owns extensive waterfront land, facilities and berthing space in the Port of Boston and they intend to make land and berthing space available for the construction staging area. The Board of Directors of Massport authorized leases and tenant-at-will agreements for 22,500 square feet of space at a set rate of $3,337.50 per month.

2. Should you have any questions regarding this report, feel free to contact Mary Dunn at extension 465.

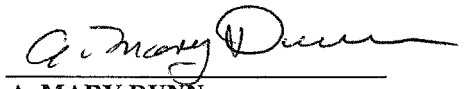
JOSEPH M. REDLINGER
Chief, Real Estate Division

Enclosure

NEW ENGLAND DISTRICT
U.S. ARMY CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REAL ESTATE PLAN
BOSTON HARBOR DEEP DRAFT NAVIGATION IMPROVEMENT PROJECT
BOSTON, MASSACHUSETTS

PREPARED BY:



A. MARY DUNN
STAFF APPRAISER

SEPTEMBER 2007

Boston Harbor Deep Draft Navigation Improvement Project, Boston, Massachusetts.

1.PURPOSE: This report is a result of a cost-shared feasibility study conducted by the New England District, Corps of Engineers, and the Massachusetts Port Authority (Massport). The purpose of this project is to deepen the major channels in Boston Harbor between 48 and 50 feet. Economic optimization indicates a depth of 48 feet yields the greatest net benefits.

2.a. PROJECT AREA DESCRIPTION: The construction effort for deepening the major channels in Boston Harbor is anticipated to take six years. All the construction work will be done in the water, below Mean Lower Low Water (MLLW). All the

CENAE-RE-E 17 September 2007

MEMORANDUM FOR Chief, Planning Branch, ATTN: Mark Habel

SUBJECT: Boston Harbor Deep Draft Navigation Improvement Project, Boston, Massachusetts

1. Attached is the Real Estate Plan for the subject project in Boston, Massachusetts. All the work will be done in the water, including the disposal of the dredged material. The local sponsor, the Massachusetts Port Authority (Massport), owns extensive waterfront land, facilities and berthing space in the Port of Boston and they intend to make land and berthing space available for the construction staging area. The Board of Directors of Massport authorized leases and tenant-at-will agreements for 22,500 square feet of space at a set rate of $3,337.50 per month.

2. Should you have any questions regarding this report, feel free to contact Mary Dunn at extension 465.

JOSEPH M. REDLINGER
Chief, Real Estate Division

Enclosure

with minor widening in the bridge approaches and the channel bend between bridges.

All the project areas to be deepened under the main channel's plan are presently part of the existing 40-foot and 35-foot deep Federal navigation project features except of small ledge areas that would be removed to widen the outer approach turn in the entrance channel opposite Finns Ledge and enlargement of the Reserved Channel Turning Area.

The main ship channel deepening extension to the Marine Terminal, the deepening of the Mystic River at Medford Street, and the deepening of the Chelsea River all involve dredging to deepen the existing project limits, except for three small areas along the Chelsea River Channel. The area immediately upstream of the A.P. McArdle Bridge and the area of the bend between the bridges just downstream of the Conoco-Philips Terminal, both along the East Boston side of the channel, would be widened by no more than 50 feet. At the Chelsea Street Bridge, the Federal channel would be widened to conform to the new fender opening as part of the next maintenance dredging operation (the Chelsea Street Bridge is scheduled for replacement in 2008-2009 by the City and the U.S. Coast Guard). The widened channel cut through the bridge opening would also be deepened.

The Corps and Environmental Protection Agency (EPA) have determined that all of the material to be removed by the deep draft improvement project consists of parent glacial material and rock determined suitable for disposal at the Massachusetts Bay Disposal Site. The main channel improvement plan at 48 feet and the three additional plans (main ship channel extension, Mystic River and Chelsea River) would generate about 12 million cubic yards of ordinary unconsolidated material and 1.1 million cubic yards of blasted rock. The rock would either be used for beneficial purposes, made available for use upland as structural fill by other parties, or placed at the Mass Bay Disposal Site.

As with the 1998-2001 improvement dredging, Massport will provide some space at one of its terminals for the construction office trailers, construction team parking, and temporary berthing as needed for the construction plant (in 1998, they used a site in East Boston).

It appears that a channel depth of 48 feet (MLLW) with 50 feet in the entrance channel for the main channel improvement to the Conley Terminal results in the highest net benefit.

2.c. OWNERSHIPS: All of the work will be done in the water and the open sea will be used as a disposal site for the dredged material. The Massachusetts Port Authority owns extensive waterfront land, facilities and berthing space in the Port of Boston, and they intend to make land and berthing space available to the contractor or the Corps for construction staging and access to the water. A specific site will be identified by Massport prior to the issuance of the project solicitation.

3. DESCRIPTION OF NON-FEDERAL SPONSOR'S EXISTING OWNERSHIP:

Massport owns extensive waterfront land, facilities and berthing space in the Port of Boston including the Fish Pier, Boston Autoport, and the Conley Terminal.

4. RECOMMENDED ESTATES: The work will all be done in the water and the open sea will be used as a disposal site for the dredged material. The only land needed for this project is approximately 22,500 square feet of land that will be utilized by the contractor for a staging area. The Massachusetts Port Authority owns extensive waterfront land, facilities and berthing space in the Port of Boston, and they intend to make land and berthing space available to the contractor or the Corps for construction staging area. They (Massport) will be given credit for the temporary use of the land area needed during construction.

5. EXISTING FEDERAL PROJECTS: There are no current projects in the project area.

6. EXISTING FEDERAL OWNERSHIPS: There are no federally owned lands in the project area.

7. NAVIGATION SERVITUDE: Navigation servitude applies since the purpose of this project is to deepen and widen the anchorage areas and channels at Boston Harbor. All construction, operation, and maintenance are within the navigation servitude and the navigation servitude will be exercised.

8. REAL ESTATE MAPPING: No real estate maps are available and none are anticipated to be needed for this project. The Massachusetts Port authority owns extensive waterfront land, facilities and berthing space in the Port of Boston and they intend to make land and berthing space available to the contractor for the construction staging area. A specific site will be identified by Massport prior to the issuance of the project solicitation. Some of the options are the Fish Pier, Boston Autoport, and the former Coastal Oil property.

9. INDUCED FLOODING: No induced flooding is anticipated due to the proposed project.

10. BASELINE COST ESTIMATE FOR REAL ESTATE:

Fee Value: No fee acquisition is required.

Permanent Easement Value: No permanent easement areas will be required.

Temporary Easement Value: In 1995, the Board of Directors of the Massachusetts Port Authority voted to authorize leases and tenants-at-will agreements for space at their various facilities at a rate of $1.25 per square foot per year, for storage areas greater than 1000 square feet. This rate was effective March 1, 1995 through February 28, 1999. The board also voted that the rate would escalate at a rate of between 2% and 10% annually, effective on the first day of March each year. The annual escalation set was 2.7% which brings the current annual rate to $1.78 per square foot.

Thus, using the rate authorized by the Board of Directors of the Massachusetts Port Authority, the annual rent for the temporary use of the 22,500 square feet of land is $40,050 or $3,337.50 per month.

Administrative Costs: There are no administrative costs associated with this project.

11. PUBLIC LAW 91-646 RELOCATIONS: No potential Public Law 91-646 relocations are required in connection with this project.

12. MINERAL/TIMBER ACTIVITY: There is no present or anticipated mineral or timber harvesting activity in the vicinity of the project that may affect the operation thereof.

13. ASSESSMENT OF NON-FEDERAL SPONSOR'S REAL ESTATE ACQUISITION CAPABILITIES: The non-federal sponsor is the Massachusetts Port Authority (Massport). There will not be any real estate acquired for this project, therefore, the *Assessment of Non-Federal Sponsor's Real Estate Acquisition Capability* is not required.

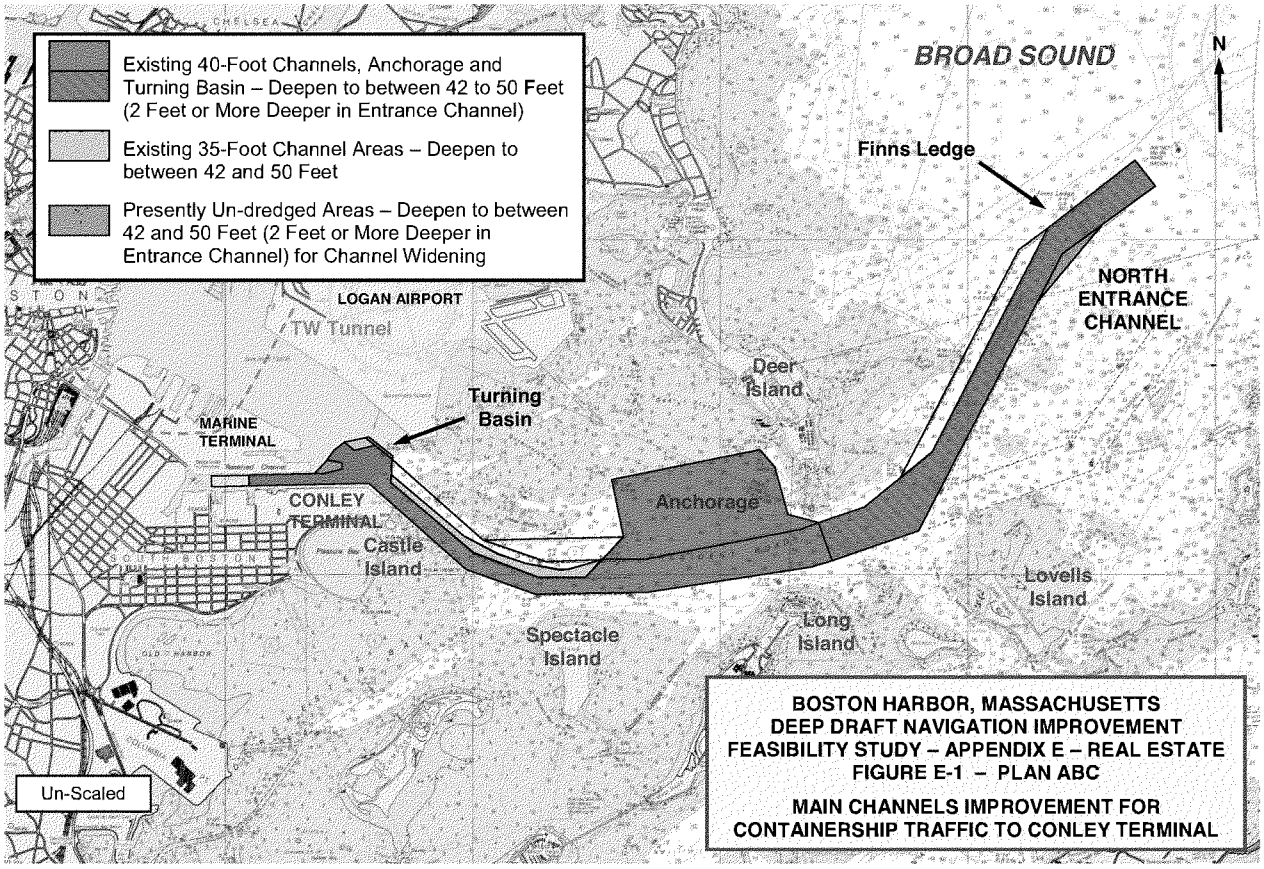
14. ZONING CHANGES: No zoning changes are proposed in lieu of, or to facilitate, real estate acquisitions.

15. ACQUISITION SCHEDULE: There is no real estate being acquired for this project, since all the work will be in the water and the disposal site is also in the water. Massport owns extensive waterfront land, facilities and berthing space in the Port of Boston and will make land and berthing space available to the Corps and the contractor for a staging area.

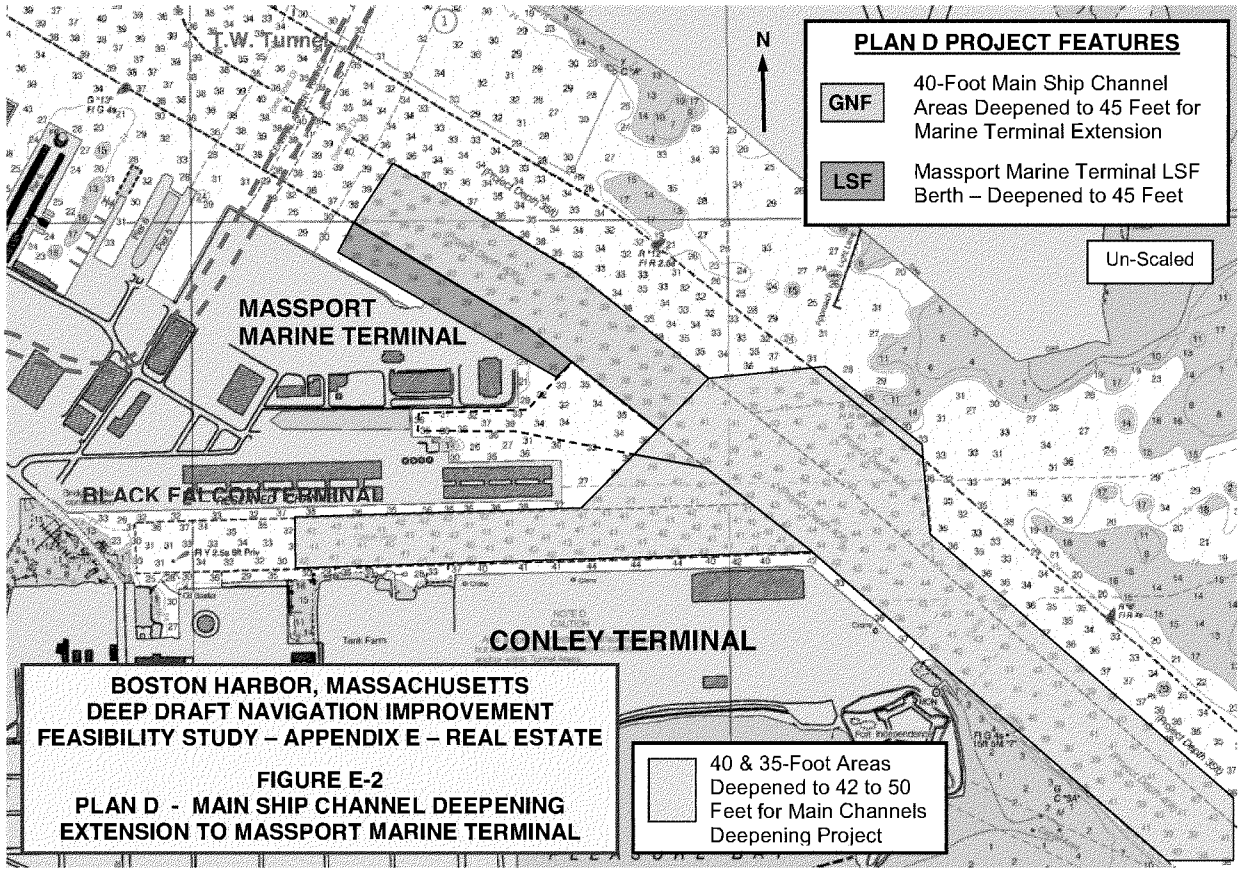
16. FACILITIES AND UTILITIES RELOATIONS: The proposed project will not require any utility and/or facility relocations.

17. HAZARDOUS, TOXIC, AND READIOACTIVE WASTE: There is no known on-site contamination.

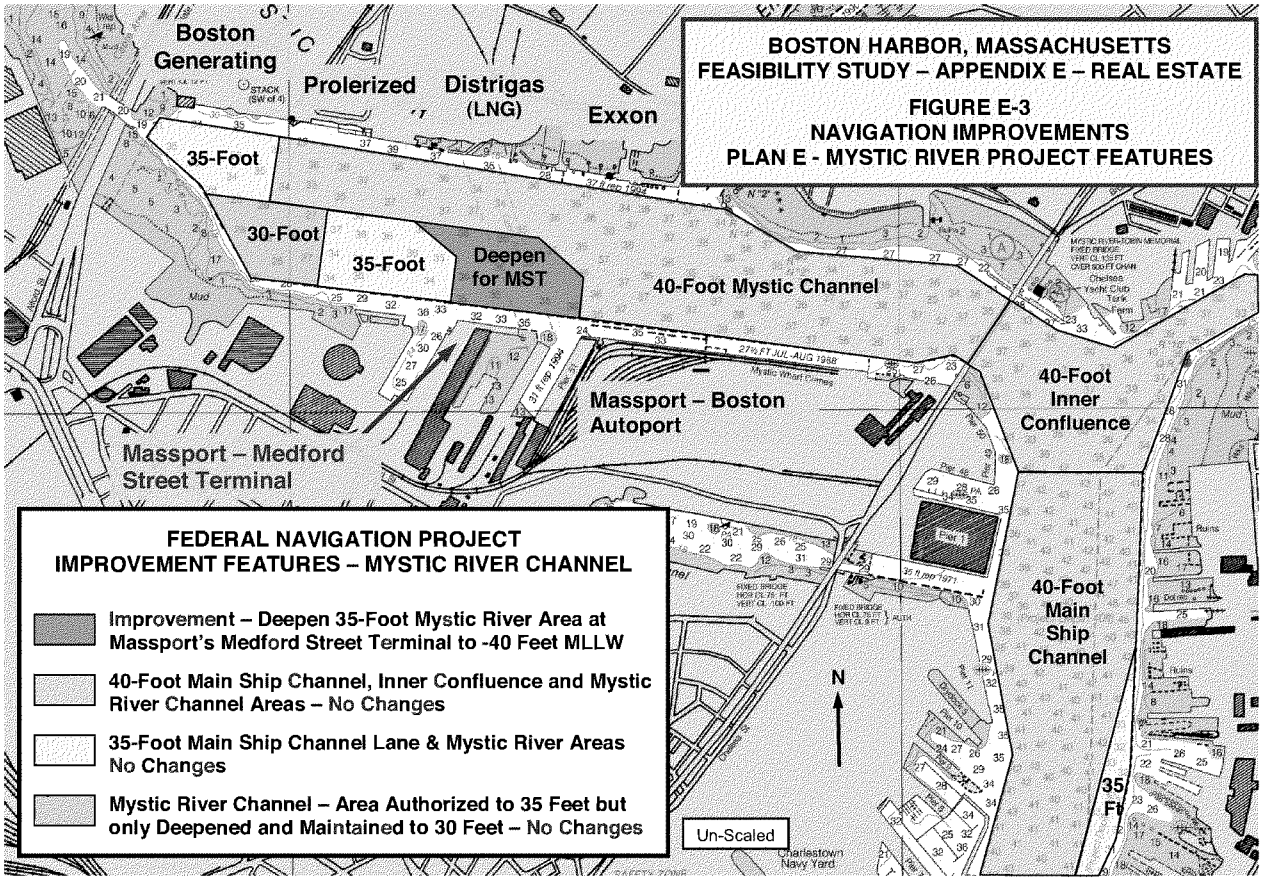
18. LANDOWNER SENTIMENT: The Massachusetts Port Authority is very much in favor of this project, and any deep draft navigation dependent terminal that receives large vessels would benefit from the project.

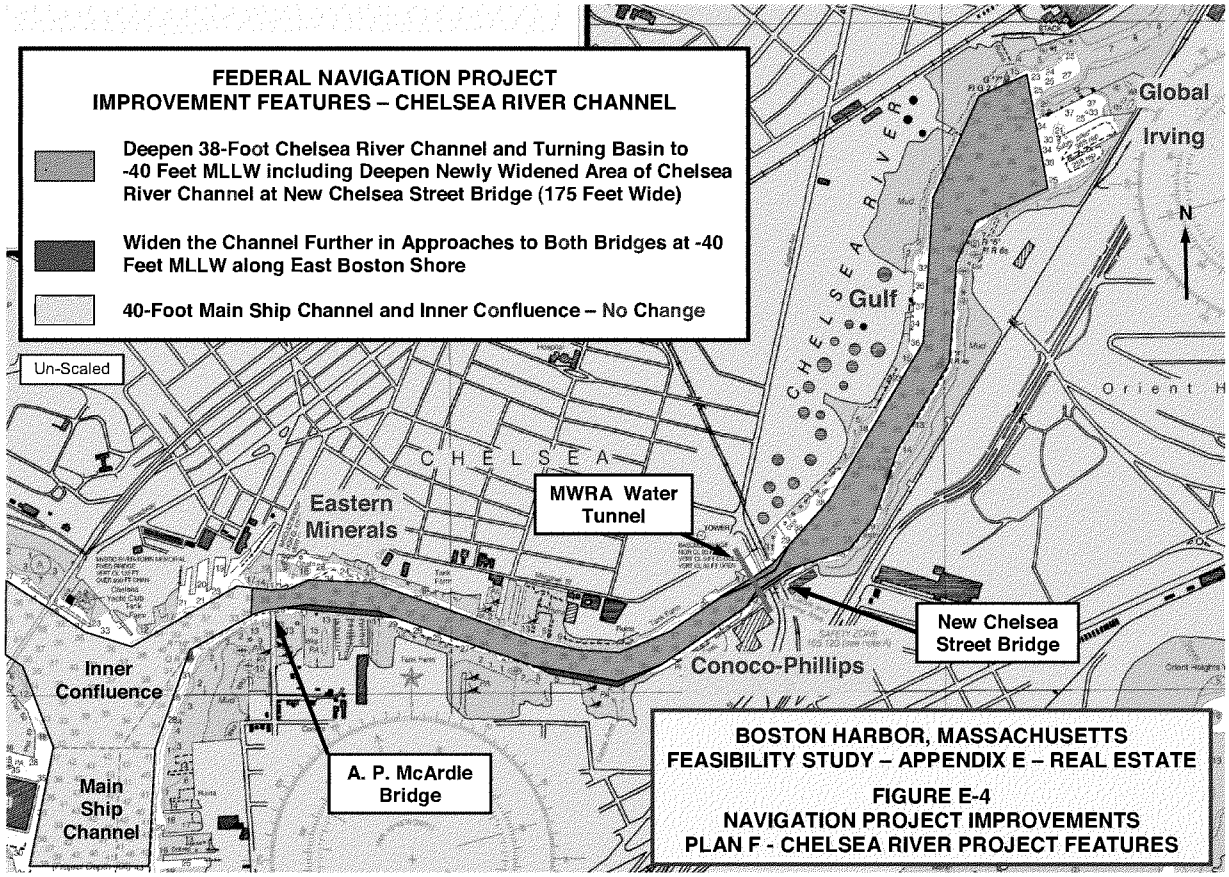

Existing 40-Foot Channels, Anchorage and Turning Basin – Deepen to between 42 to 50 Feet (2 Feet or More Deeper in Entrance Channel)
Existing 35-Foot Channel Areas – Deepen to between 42 and 50 Feet
Presently Un-dredged Areas – Deepen to between 42 and 50 Feet (2 Feet or More Deeper in Entrance Channel) for Channel Widening
BROAD SOUND
N
Finns Ledge
NORTH ENTRANCE CHANNEL
LOGAN AIRPORT
TW Tunnel
Deer Island
Turning Basin
MARINE TERMINAL
CONLEY TERMINAL
Anchorage
Castle Island
Lovells Island
Long Island
Spectacle Island
Un-Scaled
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY – APPENDIX E – REAL ESTATE
FIGURE E-1 – PLAN ABC
MAIN CHANNELS IMPROVEMENT FOR
CONTAINERSHIP TRAFFIC TO CONLEY TERMINAL

1041


PLAN D PROJECT FEATURES
GNF
40-Foot Main Ship Channel Areas Deepened to 45 Feet for Marine Terminal Extension
LSF
Massport Marine Terminal LSF Berth – Deepened to 45 Feet
Un-Scaled
N
MASSPORT MARINE TERMINAL
BLACK FALCON TERMINAL
CONLEY TERMINAL
T.W. Turner
BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY – APPENDIX E – REAL ESTATE
FIGURE E-2
PLAN D - MAIN SHIP CHANNEL DEEPENING
EXTENSION TO MASSPORT MARINE TERMINAL
40 & 35-Foot Areas Deepened to 42 to 50 Feet for Main Channels Deepening Project

1042


BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY STUDY – APPENDIX E – REAL ESTATE
FIGURE E-3
NAVIGATION IMPROVEMENTS
PLAN E - MYSTIC RIVER PROJECT FEATURES
Boston Generating
Prolerized
Distrigas (LNG)
Exxon
35-Foot
30-Foot
35-Foot
Deepen for MST
40-Foot Mystic Channel
Massport – Boston Autoport
Massport – Medford Street Terminal
40-Foot Inner Confluence
40-Foot Main Ship Channel
35 Ft
N
Un-Scaled
Charlestown Navy Yard
FEDERAL NAVIGATION PROJECT
IMPROVEMENT FEATURES – MYSTIC RIVER CHANNEL
Improvement – Deepen 35-Foot Mystic River Area at Massport's Medford Street Terminal to -40 Feet MLLW
40-Foot Main Ship Channel, Inner Confluence and Mystic River Channel Areas – No Changes
35-Foot Main Ship Channel Lane & Mystic River Areas No Changes
Mystic River Channel – Area Authorized to 35 Feet but only Deepened and Maintained to 30 Feet – No Changes


FEDERAL NAVIGATION PROJECT
IMPROVEMENT FEATURES – CHELSEA RIVER CHANNEL
Deepen 38-Foot Chelsea River Channel and Turning Basin to -40 Feet MLLW including Deepen Newly Widened Area of Chelsea River Channel at New Chelsea Street Bridge (175 Feet Wide)
Widen the Channel Further in Approaches to Both Bridges at -40 Feet MLLW along East Boston Shore
40-Foot Main Ship Channel and Inner Confluence – No Change
Un-Scaled
N
Global
Irving
Gulf
CHELSEA RIVER
CHELSEA
Eastern Minerals
MWRA Water Tunnel
New Chelsea Street Bridge
Conoco-Phillips
Inner Confluence
Main Ship Channel
A. P. McArdle Bridge
BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY STUDY – APPENDIX E – REAL ESTATE
FIGURE E-4
NAVIGATION PROJECT IMPROVEMENTS
PLAN F - CHELSEA RIVER PROJECT FEATURES

1044

Integrated General Reevaluation Report
&
Environmental Impact Statement
Review Report

Boston Harbor Deep Draft Navigation Improvement Project

Boston
Massachusetts

Internal Technical Review of
Real Estate Plan

Location: Federal Navigation Channels, Boston Harbor, Boston, Massachusetts

User: USACE

Appraiser: A, Mary Dunn
Staff Appraiser, New England District
North Atlantic Division
USACE
Boston, Massachusetts

Effective Date of Valuation: September 2007

Appraisal Report Date: September 2007

Date of Review: 19 June 2008

Navigational Servitude: Navigational servitude applies since the purpose of this project is to deepen and widen the anchorage areas and channels at Boston Harbor. All construction, operation, and maintenance are within the navigational servitude and the navigational servitude will be exercised.

Estate Appraised: There is no real estate or rights to real estate being acquired for this project since all the work will be in the water and the disposal site is also in the water. Massachusetts Port Authority (Massport) owns extensive waterfront land, facilities and berthing space in the Port of Boston and will make land and berthing space available to the USACE and the contractor for a staging area.

Recommended Estates:	All work will be done in the water and the open sea will be used as a disposal site for the dredged material. Massport owns extensive waterfront land, facilities and berthing space in the Port of Boston, and they intend to make land and berthing space available to the contractor of the Corps for construction staging area. Massport will be given credit for the temporary use of the land area needed during construction. The land area required by the contractor is approximately 22,500 square feet.
Purpose:	The report is a result of a cost-shared feasibility study conducted by New England District Corps of Engineers, and the Massachusetts Port Authority. The purpose of this project is to deepen and widen the major channels in Boston Harbor between 48 and 50 feet. Economic optimization indicates a depth of 48 feet yields the greatest net benefits.
Project Area Description:	The construction effort for deepening the major channels in Boston Harbor is anticipated to take six years. All the construction work will be done in the water, below Mean Lower Low Water (MLLW). All dredged material has been determined suitable for ocean disposal by the US EPA.
Baseline cost Estimated for Real estate:	No fee acquisition is required and no permanent easement areas will be required. In 1995 , the Board of Directors of Massport voted to authorize leases and tenants-at-will agreements for space in their various facilities at a rate of $1.25 per square foot per year, for storage areas greater than 1,000 square feet. When the annual escalations are applied a current rental of $1.78 per foot is derived or $40,050 annually or $3,357.50 per month.
Intended Use:	The Intended Use of this review report is to recommend approval/disapproval of the report under review.
Scope of Review:	This survey is reviewed by the undersigned. The review is a desk review only. The report was reviewed for adequacy of community data, property/channel description, comparative data, and support for the reasonableness of the final value conclusion. In addition, I have reviewed the report for compliance with USPAP and UASFLA. The rental rate determined by the Board of Director of Massport is for internal use of the USACE and considered to be subject to the Jurisdictional Exception provision of USPAP.

General Comments: The work for all of the project alternatives will be in the water with access from Massport facilities for the work boats, tugs, and other floating plant. The disposal for the dredging material is also in the water. The proposed projects are well defined, explained and readily understandable. The USACE and EPA have determined that all of the material to be removed by the deep draft improvement project consists of parent glacial material and rock determined suitable for disposal at the Massachusetts Bay Disposal Site. The description is based on information made by the owner, appraiser or his representative.

The rental rate for the land appears to be justified and is supported by Massport. The appeal for the subject project is due to the fact that it will increase commerce by allowing larger and wider ships to pass, and hence potentially bring in more business.

I am in agreement with the USACE appraiser's report. I agree with the methodology employed used to obtain said value and conclusions. The methods used to estimate said conclusions are very descriptive and encompass adequate analysis.

Conclusions

I am in agreement with the report prepared by the government appraiser and is in accordance with USPAP, UASFLA or USACE guidelines.

It does provide a comprehensive market analysis of the subject.

It explains the valuation portion of the report.

It explains the revaluation report and the environmental impact statement.

It reaches supported conclusions.

I recommend acceptance of the Navigation Improvement Study, Draft Feasibility Report and Supplemental Impact Statement (and Massachusetts EIR) Appendix E Real Estate Plan performed on the subject property by A. Mary Dunn, government appraiser, New England District, USACE with an effective date of September 2007

Certification:
CERTIFICATION:

I certify that to the best of my knowledge and belief:

• The facts and data reported by the review appraiser and used in the review process are true and correct.

• The analyses, opinions, and conclusions in this review report are limited only by the assumptions and limiting conditions stated in this review report, and are my personal, impartial and unbiased professional analyses, opinions and conclusions.

• I have no present or prospective interest in the property that is the subject of this report and I have no personal interest with respect to the parties involved.

• I have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment.

• My engagement in this assignment was not contingent upon developing or reporting predetermined results.

• My compensation is not contingent on an action or event resulting from the analyses, opinions, or conclusions in this review or from its use.

• My analyses, opinions, and conclusions were developed, and this review report was prepared in conformity with the Uniform Appraisal Standards for Federal Land Acquisitions and in conformity to the Uniform Standards of Professional Appraisal Practice.

• I did not personally inspect the subject property(s) of the report under review. I did not make a personal inspection of the market comparables cited in the appraisal report under review. I did not verify the factual data presented in the appraisal report.

• No one provided significant real or personal property appraisal or appraisal review assistance to the person signing this certification.

• The Appraisal Foundation through each state's division of registration of Real Estate Appraisers requires a mandatory program of continuing education for recertification. I am in compliance with the requirements of the program."

Charles P. Cavanna

Charles P. Cavanna, MAI, SRA
Chief Appraiser
New York District.

FOR CONTINUATION OF HOUSE DOCUMENT 113-105

BOSTON HARBOR MASSACHUSETTS DEEP DRAFT
NAVIGATION IMPROVEMENT PROJECT

SEE PART 3