Boston Harbor, Massachusetts

Deep Draft Navigation Improvement Feasibility Report and Supplemental Environmental Impact Statement

Technical Working Group
Project Update – 3 December 2012

USACE New England District
in Partnership with Massport

Mark L. Habel, USACE
Today’s Task – Re-Engage TWG

Under the Base Economic Case – 3 Carrier Services Use Larger Ships and PONYNJ Landings of New England Cargo Shifts to Boston Harbor

- Update on Corps Activities Since 2008 Draft Report
- Present Final Recommendation for Improvements
  - Design, Quantities, Costs, Timeline
- Review Plans and Opportunities for Disposal
- Review Design Phase Activities
BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT STUDY

FIGURE 5
MAINTENANCE AND IMPROVEMENT
DREDGING OF MAIN TRIBUTARIES
1998-2001

1990 AUTHORIZED IMPROVEMENT PROJECT
- 35-Foot Areas Deepened to 40 Feet
- 35-Foot Areas Deepened to 38 Feet
- Previously Undredged Area where Project was Widened at 40 Feet
Maintenance of 40-Foot Project Segments - North Entrance Channel, President Roads Anchorage, and Lower Main Ship Channel Reaches through President Roads

- Maintenance of 35-Foot Main Ship Channel Lower Reach
- Rock Removal from Broad Sound North Entrance Channel
- Removal of Sunken Steel Barge from North Entrance Channel

BOSTON HARBOR, MASSACHUSETTS DEEP DRAFT NAVIGATION PROJECT

FIGURE 6
2004-2005 OUTER HARBOR MAINTENANCE DREDGING
FIGURE 7B

2012 CHELSEA RIVER CHANNEL WIDENING FOR NEW BRIDGE
FIGURE 7C
LOWER INNER HARBOR
2012 ROCK REMOVAL

Rock Removal from 7 Areas in the Lower Main Ship Channel

- Logan Airport
- Ted Williams Tunnel I-90
- Deer Island
- Conley Terminal
- Rock Areas
- Spectacle Island
- Un-Scaled
- President Roads Anchorage
- Long Island
BOSTON HARBOR, MASSACHUSETTS
PROJECTS DREDGED
BETWEEN 1998 AND 2012

Legend:
- Boston Harbor Channel Extents
- 1998-2001 Improvement Project
- 2004-2005 Outer Harbor Maintenance
- 2008 Inner Harbor Maintenance
- 2012 Chelsea River Widening

NOAA CHART 13270 1:55,000
GCS NAD1983
Why Improve Boston Harbor?

• New Panama Canal to come Online in Late 2014 – 55 Foot Depth - Will Allow 50-Foot Drafts – Now Allows 39-Foot Vessels. Beam from 106 Now to 120
• Other Ports on Route Deepening – NYNJ to be at 50 Feet in 2015 and 55-Foot Study Authorized. Norfolk, Baltimore already at 50. Miami Authorized to 50. Savannah to 47. Charleston and Port Everglades at 45 and Studying Deeper. Most EU Ports at 56 Feet and Suez Canal now at 78 Feet (2011)
• Carriers Increasing Vessel Sizes in Trans-Oceanic Routes to Save Costs
• Road Traffic Congestion Worsens and with it Highway Maintenance and Air Quality Issues
• Global Trade Volumes Projected to Increase
What Has Happened Since 2008?

- Civil Works Review Board met in August and September 2008 to consider Boston Harbor.
- Board requested additional Economic Studies of Depth Optimization.
- Study Scope Approved 2009 and Studies Completed 2010.
- Additional Analysis wasRequested by Corps Headquarters.
- Final Economic Reports Submitted in May 2012.
- Final Design Depth of 47 Feet for Inner Main Channels Improvement to Conley Terminal Selected in September 2012.
- Final Entrance Channel Depth of 51 Feet Selected November 2012.
Economic Reanalysis Framework Issues

Three Parts to Framework Reanalysis

(1) Landside Analysis – Where are the containers going and why. How many more might come to Boston by water?
(2) Waterside Analysis – What means used to ship to Boston – larger ships, small ships, barges?
Landside Analysis (Task #1)

• Analysis of Current Shipping Conditions
  – Determine Current Origin & Destinations of boxes
  – Use PIERS data for Boston and PONYNJ
  – Conduct Sample of Shippers (200 shippers account for 80% of shipments)
  – Interview Carriers using Boston and PONYNJ
  – Develop Economic Model to explain current proportions of Boston cargo shipped through PONYNJ and project potential change in boxes that can go to Boston directly.
Determine Means Available to Transport Boxes Shifted from PONYNJ to POB

• What Carriers?
  – Existing Carriers Calling on POB?
  – Carriers Calling PONYNJ and Currently Not POB?
  – Why Carriers are Calling on PONYNJ and not POB.

• What Vessels & Routes?

• Trucking Firms Canvassed for Distance Costs and Volumes

• Carrier Interviews Conducted to Collect Needed Information
  – Both Carriers Currently Serving POB Interviewed
  – Seven Carriers that Call PONYNJ & Not POB Interviewed.
Vessel Loading & Sailing Drafts (Task #3)

• **Determine Existing Vessel Distribution and Current Operating Practices on Vessel Loading and Sailing Drafts.**
  – Boston First in/Last Out for North America
  – Boston Has Greater Tidal Advantage Than Most East Coast Ports (9.5 Feet versus 5.5 at NYNJ and 4-5 Feet Elsewhere along US East Coast)
  – High Export Percentage Relative to Other East Coast Ports Encourages Greater Loading.
  – Outbound Boston Cargo much Heavier than Inbound

• **Determine Future Vessel Loading and Sailing Drafts**
  – Drafts and Loading were Determined on Current Industry Practices and Weight of Cargo
  – Boston Harbor Pilots and Carriers Consulted on Underkeel Clearance Requirements and Movement Restrictions
Recommendation – 4 Improvements

- **Main Channels Improvement:** For Containership Access to Conley Terminal
- **Main Ship Channel Deepening Extension:** For Large Dry Bulk Carrier Access to Massport Marine Terminal
- **Mystic River Channel:** Deepen for Smaller Dry Bulk Carrier Access to Massport’s Medford Street Terminal
- **Chelsea River Channel:** Deepen Channel for Liquid Petroleum Carriers
- **Base Plan for Disposal - All Disposal at the Massachusetts Bay Disposal Site**
Main Channels Improvement
Deepening for Containership Access

- **Project Features**
  1. North Entrance Channel to 51 feet, widened at Finns Ledge Bend
  2. Main Ship Channel from Outer Confluence to Reserved Channel to 47 feet, widened to 900 feet below Castle Island and 800 feet above. Widened further in the bends.
  3. President Roads Anchorage Area to 47 feet
  4. Lower Reserved Channel along Conley Terminal to 47 feet
  5. Reserved Channel Turning Area widened to 1600 feet and deepened to 47 feet
  6. Conley Berths deepened to at Least 50 Feet
- Examined incremental depths of 42 to 50 feet MLLW – Optimized at 48 feet but no significant benefits increase above 47 feet
- Entrance Channel four feet deeper than inner channels for increased sea states and vessel motion
- Conley Terminal Berths will be deepened to 3 feet deeper than the channel by Massport for tidal navigation
- Benefits from shifting truck transport to containership transport
Existing 40-Foot Channels, Anchorage and Turning Basin – Deepen to between 45 to 50 Feet (2 to 5 Feet Deeper in Entrance Channel)

Existing 35-Foot Channel Areas – Deepen to between 45 to 50 Feet & Widen Deep Channel

Presently Un-dredged Areas – Deepen to 45 to 50 Feet (2 to 5 Feet Deeper in Entrance Channel) to Widen Bends & Turns

BOSTON HARBOR, MASSACHUSETTS DEEP DRAFT NAVIGATION IMPROVEMENT FEASIBILITY STUDY
FIGURE 32 – PLAN A-B-C
MAIN CHANNELS IMPROVEMENT FOR CONTAINERSHIP TRAFFIC TO CONLEY TERMINAL
MASSPORT MARINE TERMINAL

CONLEY TERMINAL

40-Foot Areas Deepened to 45 to or 50 Feet –
Lower Reserved Channel, Turning Basin, Main Ship Channel and Part of Drydock Channel

35-Foot Main Ship Channel Areas Deepened to 45 to 50 Feet

Upper Reserved Channel Remains at 35 Feet – Remains Unchanged

Areas Outside of Existing Project Deepened to 45 to 50 Feet
Areas to be Deepened to 45 to 50 Feet for Main Channels Deepening Project

Adjacent 35-Foot Reserved and Main Ship Channel Areas Not Deepened

NSTAR 115 KV Lines Route – 3 Lines

Un-Scaled

BOSTON HARBOR, MASSACHUSETTS DEEP DRAFT NAVIGATION IMPROVEMENT FEASIBILITY STUDY

FIGURE 18
NSTAR 115KV LINES ROUTE WITHIN RESERVED AND MAIN SHIP CHANNELS

MASSPORT MARINE TERMINAL

CONLEY TERMINAL

40-FOOT DRYDOCK
PLAN D PROJECT FEATURES

- **GNF**
  - 40-Foot Main Ship Channel Areas Deepened to 45 Feet for Marine Terminal Extension

- **LSF**
  - Massport Marine Terminal Berth – to be Deepened to 45 Feet

BOSTON HARBOR, MASSACHUSETTS
DEEP DRAFT NAVIGATION IMPROVEMENT
FEASIBILITY STUDY

**FIGURE 34**
PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENSION TO MASSPORT MARINE TERMINAL

40/35-Foot Areas Deepened to 47 Feet for Main Channels Deepening Project
BOSTON HARBOR, MASSACHUSETTS
FEASIBILITY STUDY

FIGURE 35 - 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
IMPROVEMENT FEATURES – CHELSEA RIVER CHANNEL

- **Deepen 38-Foot Chelsea River Channel and Turning Basin to -40 Feet MLLW**
- **Widen Chelsea River Channel at New Chelsea Street Bridge and in Approaches to Both Bridges at -40 Feet MLLW**
- **40-Foot Main Ship Channel and Inner Confluence – No Change**

BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT FEASIBILITY STUDY

FIGURE 36 - NAVIGATION PROJECT IMPROVEMENTS
PLAN F - CHELSEA RIVER PROJECT FEATURES
Widen and Deepen Lower Main Ship Channel and Lower Reserved Channel, Turning Basin and Anchorage to -47 Feet and to -51 Feet in the 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
<table>
<thead>
<tr>
<th>Description</th>
<th>CY Ordinary Material</th>
<th>CY Rock</th>
<th>Total CY</th>
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</thead>
<tbody>
<tr>
<td>Main Channels Improvement to 47 Feet for Conley Terminal (Entrance Channel to 51 Feet)</td>
<td>10,221</td>
<td>900</td>
<td>11,121</td>
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<td>Extend Deepening of MSC to Marine Terminal at 45 Feet</td>
<td>246</td>
<td>78</td>
<td>41</td>
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<td>Deepen Portion of 35-Foot Mystic Channel to 40 Feet</td>
<td>67</td>
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<td>9</td>
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<tr>
<td>Deepen 38-Foot Chelsea River Channel to 40 Feet</td>
<td>342</td>
<td>1</td>
<td>78</td>
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<td>TOTAL PROJECT (12/2012)</td>
<td>10,876</td>
<td>979</td>
<td>11,855</td>
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<tr>
<td>Detailed Plans</td>
<td>Ordinary Material</td>
<td>Ledge Blasting and Removal</td>
<td>Total Quantity - All Material</td>
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<td>---------------------------</td>
<td>-----------------------------</td>
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<tr>
<td></td>
<td>Cut to Design</td>
<td>Cut to Design</td>
<td>Cut to Design</td>
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<tr>
<td></td>
<td>Overdepth</td>
<td>All Allowance</td>
<td>All Additional</td>
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<tr>
<td></td>
<td>Depth</td>
<td>Material</td>
<td>Ordinary Material</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rock</td>
</tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<td>Total All Required</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Total All</td>
</tr>
<tr>
<td>47/51-Foot Depth</td>
<td>7,093,800</td>
<td>409,300</td>
<td>899,800</td>
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<td></td>
<td>3,127,100</td>
<td>271,600</td>
<td>7,774,700</td>
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<tr>
<td></td>
<td>10,220,900</td>
<td>218,800</td>
<td>3,345,900</td>
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<td></td>
<td>11,120,700</td>
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<tr>
<td>PLAN D - MAIN SHIP CHANNEL DEEPENING EXTENSION TO MASSPORT MARINE TERMINAL AT 600-FOOT WIDTH</td>
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<td>45-Foot Depth</td>
<td>151,800</td>
<td>12,600</td>
<td>78,400</td>
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<td></td>
<td>94,500</td>
<td>29,500</td>
<td>193,900</td>
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<td></td>
<td>246,300</td>
<td>36,300</td>
<td>324,700</td>
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<td>PLAN E - MYSTIC RIVER CHANNEL DEEPENING PLANS FOR MASSPORT MEDFORD STREET TERMINAL ACCESS</td>
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<td>40-Foot Depth</td>
<td>38,500</td>
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<td></td>
<td>28,600</td>
<td>0</td>
<td>28,600</td>
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<td></td>
<td>67,100</td>
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<td>PLAN F - CHELSEA RIVER CHANNEL DEEPENING PLANS</td>
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<tr>
<td>40-Foot Depth</td>
<td>80,200</td>
<td>0</td>
<td>0</td>
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<tr>
<td></td>
<td>262,400</td>
<td>50</td>
<td>262,900</td>
</tr>
<tr>
<td></td>
<td>342,600</td>
<td>490</td>
<td>343,100</td>
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<tr>
<td>TOTAL OF ALL RECOMMENDED IMPROVEMENT INCREASES - PLANS ABC, D, E &amp; F</td>
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<td></td>
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<tr>
<td>ABC-D-E-F</td>
<td>7,364,300</td>
<td>421,900</td>
<td>978,740</td>
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<td>3,512,600</td>
<td>301,150</td>
<td>8,087,300</td>
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<td>10,876,900</td>
<td>255,590</td>
<td>3,768,200</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>11,855,600</td>
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</tbody>
</table>

Plan ABC includes Deepening of the Broad Sound North Entrance Channel to 51 Feet, and Deepening the President Roads Anchorage, Widened Lower Main Ship Channel, Lower Reserved Channel & Expanded Reserved Channel Turning Area to 47 Feet.
## Table 51
### Recommended Plans of Improvement
**Main Channels Deepening to Conley Terminal**
*With Main Ship Channel Extension to MMT, Mystic River Channel Deepening to MST, and Chelsea River Channel Deepening*

<table>
<thead>
<tr>
<th>Recommended Plans of Improvement by Project Segment</th>
<th>Plan ABC Main Channels 47/51 Feet</th>
<th>Plan D MSC to MMT 45 Feet</th>
<th>Plan E Mystic River 40 Feet</th>
<th>Plan F Chelsea River 40 Feet</th>
<th>Total Combined 4 Plans ABC-47/51 + D, E &amp; F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components of Recommended Plan</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</table>

### First Cost - July 2011 Estimate

<table>
<thead>
<tr>
<th>Component</th>
<th>Plan ABC</th>
<th>Plan D</th>
<th>Plan E</th>
<th>Plan F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Navigation Features - Construction</td>
<td>$252,130,000</td>
<td>$15,431,000</td>
<td>$1,902,000</td>
<td>$9,943,000</td>
<td>$279,406,000</td>
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<tr>
<td>GNF - PED Costs</td>
<td>$5,373,000</td>
<td>$367,000</td>
<td>$170,000</td>
<td>$394,000</td>
<td>$8,304,000</td>
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<tr>
<td>GNF - Construction Management Costs</td>
<td>$8,593,000</td>
<td>$843,000</td>
<td>$259,000</td>
<td>$880,000</td>
<td>$10,665,000</td>
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<tr>
<td>Total GNF - July 2011 Estimate</td>
<td>$266,066,000</td>
<td>$16,641,000</td>
<td>$2,341,000</td>
<td>$11,297,000</td>
<td>$266,375,000</td>
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<td>Real Estate (LERRDs)</td>
<td>$125,000</td>
<td>$15,000</td>
<td>$4,000</td>
<td>$18,000</td>
<td>$182,000</td>
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<td>Aids to Navigation</td>
<td>$120,000</td>
<td>$24,000</td>
<td>$0</td>
<td>$48,000</td>
<td>$264,000</td>
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<tr>
<td>Utility Relocations</td>
<td>$0</td>
<td>$0</td>
<td>$0</td>
<td>$15,000</td>
<td>$15,000</td>
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<tr>
<td>Local Service Facilities (Berths)</td>
<td>$446,000</td>
<td>$1,344,000</td>
<td>$0</td>
<td>$1,493,000</td>
<td>$3,283,000</td>
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<tr>
<td>Total First Cost - July 2011 Estimate</td>
<td>$286,859,000</td>
<td>$18,024,000</td>
<td>$2,345,000</td>
<td>$27,856,000</td>
<td>$315,084,000</td>
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### Project First Cost - Constant Dollar Basis - 2013 Budget Year

<table>
<thead>
<tr>
<th>Component</th>
<th>Plan ABC</th>
<th>Plan D</th>
<th>Plan E</th>
<th>Plan F</th>
<th>Total</th>
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<tr>
<td>Total GNF First Cost - PY2013 Basis</td>
<td>$275,837,000</td>
<td>$17,231,000</td>
<td>$2,419,000</td>
<td>$11,687,000</td>
<td>$306,974,000</td>
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<tr>
<td>Local Service Facilities (Berths)</td>
<td>$462,000</td>
<td>$1,394,000</td>
<td>$0</td>
<td>$1,548,000</td>
<td>$3,404,000</td>
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<tr>
<td>Total Project First Cost - PY2013 Basis</td>
<td>$276,428,000</td>
<td>$18,666,000</td>
<td>$2,423,000</td>
<td>$28,304,000</td>
<td>$325,821,000</td>
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### Fully Funded Project Cost

<table>
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<tr>
<th>Component</th>
<th>Plan ABC</th>
<th>Plan D</th>
<th>Plan E</th>
<th>Plan F</th>
<th>Total</th>
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<tr>
<td>Total GNF Fully Funded Cost - Escalated</td>
<td>$285,795,000</td>
<td>$18,303,000</td>
<td>$2,471,000</td>
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<td>Local Service Facilities (Berths)</td>
<td>$476,000</td>
<td>$1,475,000</td>
<td>$0</td>
<td>$1,573,000</td>
<td>$3,524,000</td>
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<td>Escalated/Fully Funded Project Cost</td>
<td>$286,612,000</td>
<td>$19,821,000</td>
<td>$2,475,000</td>
<td>$28,562,000</td>
<td>$337,470,000</td>
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# TABLE ES-1

**BOSTON HARBOR NAVIGATION IMPROVEMENT STUDY**

**SUMMARY OF RECOMMENDED PLAN COSTS AND BENEFIT/COST ANALYSIS**

<table>
<thead>
<tr>
<th>July 2011 Price Levels with April 2012 Contingency Risk Analysis</th>
<th>Main Channels Improvements</th>
<th>Main Ship Channel Extension to Marine Terminal</th>
<th>Mystic River Channel Deepening</th>
<th>Chelsea River Channel Deepening</th>
<th>Total All Recommended Improvements</th>
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<tbody>
<tr>
<td>FY 2012 Interest Rates</td>
<td>PLAN ABC</td>
<td>PLAN D</td>
<td>PLAN E</td>
<td>PLAN F</td>
<td>COMBINED</td>
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<tr>
<td></td>
<td>47/51 Feet</td>
<td>45 Feet</td>
<td>40 Feet</td>
<td>40 Feet</td>
<td>$296,801,000</td>
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<tr>
<td>GNF Construction</td>
<td>$266,413,000</td>
<td>$16,680,000</td>
<td>$2,345,000</td>
<td>$11,363,000</td>
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<td>Total First Cost - July 2011 Price</td>
<td>$280,619,000</td>
<td>$16,758,000</td>
<td>$2,345,000</td>
<td>$11,434,000</td>
<td>$311,156,000</td>
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<td>Investment Cost (+IDC)</td>
<td>$446,000</td>
<td>$1,344,000</td>
<td>$0</td>
<td>$1,493,000</td>
<td>$3,283,000</td>
</tr>
<tr>
<td>Local Service Facilities Cost</td>
<td>$12,770,000</td>
<td>$829,000</td>
<td>$116,000</td>
<td>$718,000</td>
<td>$14,433,000</td>
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<tr>
<td>Total Annual Costs (Fed &amp; Non-Fed)</td>
<td>$102,555,000</td>
<td>$1,161,000</td>
<td>$221,000</td>
<td>$1,936,000</td>
<td>$105,873,000</td>
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<tr>
<td>Total Annual Benefits</td>
<td>8.03</td>
<td>1.40</td>
<td>1.91</td>
<td>2.70</td>
<td>7.34</td>
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<td>Benefit/Cost Ratio</td>
<td>$89,785,000</td>
<td>$332,000</td>
<td>$105,000</td>
<td>$1,218,000</td>
<td>$91,440,000</td>
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</table>
Maintenance of 35-Foot Lane of Broad Sound North Entrance Channel

Maintenance of 35-Foot President Roads Anchorage

Maintenance of 30-Foot Broad Sound South Entrance Channel

Maintenance of 15-Foot Nubble Channel

Not Shown: Remaining Upper Harbor Main Ship Channel Maintenance and CAD Cell Excavation Covered by 2007 SEIS
## DREDGING QUANTITY ESTIMATES (1000s of CY)

For Associated Maintenance Dredging

<table>
<thead>
<tr>
<th>Location</th>
<th>CY Cut to Design Depth</th>
<th>Over Depth</th>
<th>Total CY</th>
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<tr>
<td>Broad Sound South Channel</td>
<td>53</td>
<td>86</td>
<td>139</td>
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<tr>
<td>Broad Sound North Channel 35-Foot Lane</td>
<td>246</td>
<td>78</td>
<td>56</td>
</tr>
<tr>
<td>Nubble Channel</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>35-Foot Barge Anchorage</td>
<td>2</td>
<td>65</td>
<td>67</td>
</tr>
<tr>
<td>Chelsea River Remaining O&amp;M</td>
<td>126</td>
<td>88</td>
<td>214</td>
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<tr>
<td><strong>Total Associated Maintenance</strong></td>
<td><strong>215</strong></td>
<td><strong>263</strong></td>
<td><strong>478</strong></td>
</tr>
<tr>
<td>Upper Main Ship Channel and Mystic River O&amp;M Remaining from Work Covered in 2007 SEIS</td>
<td>589</td>
<td>415</td>
<td>994</td>
</tr>
<tr>
<td>Upper Main Ship Channel CAD Cell from Work Covered in 2007 SEIS</td>
<td>1,176</td>
<td>0</td>
<td>1,176</td>
</tr>
</tbody>
</table>
All Dredged Materials from Boston Harbor Would be Beneficially Used

All Materials Suitable for Unconfined Ocean Disposal at Mass Bay Disposal Site by US EPA and Corps
- 300-Foot Deep Basin Site has Indefinite Capacity

Beneficial Use Potential for Clay and Unconsolidated Material
- One-Time Opportunity for Using Dredged Material as Clean Cap Material for Old Industrial Waste Site
- US EPA Monitored Former Ocean Waste Site Contains Barrel Fields of Chemical and Radiological Waste from 1930s to 1970s. EPA has asked Corps to cap the site.

Beneficial Use Potential for Rock and Till
- Rock Reef and Hard Bottom Habitat in Mass Bay
- State may Process Ashore for Use in Shore Protection Work
Territorial Sea (3-Mile Limit)

Former Foul Area
Disposal Site

Former Industrial
Waste Site

Disposal Tow Haul Route

Current Mass Bay
Disposal Site
(2 NM Diameter)

BOSTON HARBOR, MASSACHUSETTS
NAVIGATION IMPROVEMENT STUDY

FIGURE 8
MASS BAY DISPOSAL SITE LOCATION
UPPER HARBOR CONFINED AQUATIC DISPOSAL CELL LOCATIONS

- **Cells Used for 1998-2001 Improvement Project**
- **Cell IC2 – Conley Berth (Phase I)**
- **Cells Proposed for Inner Harbor Maintenance**
- **Approved but Unused Cell Sites**
- **Areas Available for Possible Additional Cell Development above the Tunnels**

**Note:** Chelsea CAD Cell Sites #6 & #7 Eliminated Due to Shallow Bedrock Elevations

**BOSTON HARBOR, MASSACHUSETTS NAVIGATION IMPROVEMENT STUDY**

**FIGURE 9**

CONFINED AQUATIC DISPOSAL CELL LOCATIONS IN UPPER BOSTON HARBOR
### TABLE D2-30B - 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

<table>
<thead>
<tr>
<th>Current Feasibility Estimate</th>
<th>Total Duration Months</th>
<th>Excavation Time (Months)</th>
<th>Year #1 - 2014</th>
<th>Year #2 - 2015</th>
<th>Year #3 - 2016</th>
<th>Year #4 - 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad Sound North Entrance Channel - 51 Feet</td>
<td>17</td>
<td>6.10 M0</td>
<td>1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>1 2 2</td>
</tr>
<tr>
<td>Drill and Blast Ledge</td>
<td></td>
<td>2.41 M0</td>
<td>1 2 2 2 2 2 2</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2 2</td>
</tr>
<tr>
<td>Rock Removal and Disposal</td>
<td></td>
<td>2.56 M0</td>
<td>1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2 2</td>
</tr>
<tr>
<td>President Roads Anchorage - 47 Feet</td>
<td>10</td>
<td>6.10 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 1</td>
</tr>
<tr>
<td>Drill and Blast Ledge</td>
<td></td>
<td>1.50 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 1</td>
</tr>
<tr>
<td>Rock Removal and Disposal</td>
<td></td>
<td>0.37 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>1 1</td>
</tr>
<tr>
<td>Main Ship Channel - Roads to Reserved Channel - 47 Feet</td>
<td>12</td>
<td>5.92 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>1 1</td>
</tr>
<tr>
<td>Drill and Blast Ledge</td>
<td></td>
<td>1.38 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Rock Removal and Disposal</td>
<td></td>
<td>1.80 M0</td>
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<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Lower Reserved Channel and Turning Area - 47 Feet</td>
<td>6</td>
<td>5.38 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>1 1</td>
</tr>
<tr>
<td>Drill and Blast Ledge</td>
<td></td>
<td>2.41 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Rock Removal and Disposal</td>
<td></td>
<td>2.56 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td><strong>PLAN D - MAIN SHIP CHANNEL EXTENSION TO MMT - 45 FEET</strong></td>
<td>4</td>
<td>1.38 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Drill and Blast Ledge</td>
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<td>1.97 M0</td>
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<td>Rock Removal and Disposal</td>
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<td>0.40 M0</td>
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<tr>
<td><strong>PLAN E - MYSTIC RIVER CHANNEL AT M51 - 40 FEET</strong></td>
<td>1</td>
<td>0.41 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
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<td>2 2</td>
</tr>
<tr>
<td>Dredging and Disposal - Ordinary Material</td>
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<td>0.47 M0</td>
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</tr>
<tr>
<td><strong>PLAN F - CHELSEA RIVER CHANNEL - 40 FEET</strong></td>
<td>5</td>
<td>4.38 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Drill and Blast Ledge (1 Plant Only)</td>
<td></td>
<td>0.02 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Rock Removal and Disposal (1 Plant Only)</td>
<td></td>
<td>0.02 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td><strong>TOTAL - COMBINED PLANS A2-6</strong></td>
<td>34</td>
<td>4.38 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Drill and Blast Ledge (1 Plant Only)</td>
<td></td>
<td>0.02 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
<tr>
<td>Rock Removal and Disposal (1 Plant Only)</td>
<td></td>
<td>0.02 M0</td>
<td>1 1 1 1 1 1 1 1</td>
<td>2 2 2 2 2 2 2</td>
<td>2 2 2</td>
<td>2 2</td>
</tr>
</tbody>
</table>
Under the Base Economic Case – 3 Carrier Services Use Larger Ships and PONYNJ Landings of New England Cargo Shifts to Boston Harbor

• 218,800 TEUs annually shift to ships
• 125,000 Trucks reduce their haul distance
• 148.5 miles saved per trip
• 18.5 million truck miles annually
• About 3 million gallons diesel fuel saved annually
• Road air emissions reduced
• Traffic safety and congestion improved.
Next Steps in Process

• Re-coordination with State and Federal Agencies - Ongoing
• Revised Report Submitted to Corps HQ – February 2013
• Civil Works Review Board Reconsideration – March 2013
• Draft Chief of Engineers Report with Final Report & FSEIS Released for State (Governor) and Agency (Federal Cabinet Level) Review and Notice in Federal Register – April 2013
• Chief’s Report Submitted to Assistant Secretary of the Army and OMB – Summer 2013
• Record of Decision Published – Late Summer 2013
• Reports Submitted to Congress for Action – Fall 2013
• Design Phase Efforts Commence – Summer 2013
• Construction Requires Authorization of Project by Congress thru Water Resources Development Act
Critical Design Phase Activities

Continue Technical Working Group Involvement During Design Phase
Execute Design Phase Cost-Sharing Agreement with Massport
Dredged Material Characterization
• Subsurface Explorations to Define Nature and Amount of Rock and Other Hard Material and Identify Potential Removal Methods
• Refine Dredging Quantities and Durations
• Confirm Suitability of Associated Maintenance Area Sediments
Develop Dredge and Rock Removal Sequencing Plans
• Time of Year Sensitivities of Fisheries Resources and Listed Species
• Timeline of Other Harbor Activities and Traffic Management Strategy
Identify Potential Beneficial Uses of the Rock and Gauge Financial Interest
• Identify Costs of Rehandling Rock for Various Uses Proposed by Others
Identify Alternative Air Quality Mitigation Measures if Necessary
• EPA Revised Attainment for Boston Area?
NStar-MWRA Power Cable Elevation Resolved for Reserved/MS Channels
Critical Design Phase Activities

Remaining Cultural Resource Investigations
• Cultural Resource Surveys in Chelsea River Widening Areas
• Cultural Resource Investigations at Proposed Rock Reef Creation Sites
• Cultural Resource Investigations for Shipwrecks at IWS if to be Capped

Update Project Cost and Cost-Sharing
Congress Includes Project in Water Resources Development Act
Identify Non-Federal Funding Sources
Execute Project Cooperation Agreement with Massport